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ONLY CALL FOR PAPERS FOR THE 64th MEETING

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ABSTRACT SUBMISSION – SEE PAGE – 304



Howard Neufeld addresses the banquet audience as
Past President of the Association

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PURPOSE

The purpose of this association shall be to promote the advancement of biology as a science by encouraging research, the imparting of knowledge, the application of knowledge to the solution of biological problems, and the preservation of biological resources. The ASB has representation in Section G Committee of the AAAS. Varying types of membership are available to individuals and institutions. See inside back cover.

TIME AND PLACE OF FUTURE MEETINGS

- 2003 April 9-12 Co-hosted by Howard University, Washington, DC, and Bowie State University, Bowie, Maryland; see <http://www.biology.howard.edu/asb2003.htm>
- 2004 April 14-17 Co-hosted by Univ. of Memphis, Rhodes College, and Christian Brothers Univ., Memphis, Tenn.

**A MESSAGE FROM THE PRESIDENT
J. KENNETH SHULL**

Several years ago I wrote an article for what was then *The ASB Bulletin* entitled "So, You Want to Host an ASB Meeting...?" In that article I outlined the advantages to your institution to host an ASB meeting, what was required and the benefits of hosting such a meeting. We are reprinting an updated version of that article in this issue of *Southeastern Biology*. At present, we have commitments from Howard University to host the 2003 meeting in Washington, DC, and from Memphis State University, Christian Brothers University, and Rhodes College to host the 2004 meeting in Memphis, Tennessee. We need invitations to host meetings past 2004. I urge you to consider hosting a future meeting of ASB. It is a lot of work, but you do repay the work that others have done when they hosted the meeting, and you may well find that some student participants will come to your institution as graduate students.

I would especially encourage members at "flagship" or R1 universities to consider hosting an ASB meeting. These institutions are often in larger communities, generally have the logistical support to make hosting the annual meeting easier and it exposes graduate students and faculty members, who often do not come to our meetings, to our association. It is from these institutions that our future members are being educated, and it is important to our Association that we maintain a close working relationship with these universities.

In this issue is the call for papers for the 2003 meeting in Washington, DC. I urge each of you to advertise this call and the awards that are available to members of your faculty and other faculty of which you are familiar. Try to get the participation of biologists who do not usually attend the ASB meeting. At the 2002 meeting we had a nearly full paper session in animal behavior, a completely new session for us. There were eight papers and eight posters in microbiology, thirteen papers and ten posters in genetics, cell and molecular biology at the meeting. These represent a significant increase from the past ten years, and says that we can attract people of many different disciplines. Talk to your colleagues and tell them that we really do want them at our meeting. Encourage them to not only come themselves but to send their graduate students. Our meeting is a great place to present a first paper, and I am sure that many of you did just that.

I look forward to seeing you in Washington in 2003.



Kenneth Shull (right) receives the gavel from Robert Haynes.

**ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
63rd ANNUAL BUSINESS MEETING
FRIDAY, 12 APRIL 2002
BROYHILL INN AND CONFERENCE CENTER
BOONE, NORTH CAROLINA**

Call-to-Order—President Robert Haynes called the 63rd Annual Meeting of ASB to order at 11:34 AM EST with 103 members in attendance.

Local Arrangements Committee—Howard Neufeld presented the report. He announced that about 750 were in attendance at the meeting with 330 abstracts submitted and about 130 posters. Howard mentioned there were 450 in attendance at the Thursday night social and that over 200 were expected at the banquet.

President's Report—Robert Haynes presented the president's report. Robert mentioned that the new *Southeastern Naturalist* journal ASB had decided to sponsor was doing well and the first issue came out in March. There were over 450 current subscribers with over 100 additional subscriptions sold at this meeting. There is going to be a symposium on conservation issues at next year's annual meeting that will be published in a special issue of the *Southeastern Naturalist*. Robert pointed out that the 2003 meeting would be hosted by Howard University in Washington, D.C.

Motion 1: Robert presented a motion from the ASB Executive Committee that University of Memphis, Christian Brothers University, and Rhodes College, all of Memphis, Tennessee, have offered to host the 2004 meeting. Passed.

The motion passed and ASB will meet in Memphis in 2004.

Robert mentioned that online registration was a success and encouraged its continued use.

Secretary's Report—Terry Richardson asked if there were any additions or changes for the minutes of the 62nd Annual Business Meeting in New Orleans. Hearing none, Robert asked for a motion for approval of last year's business meeting minutes.

Motion 2: Gerhard Kalmus moved the minutes be approved. Kim-Marie Tolson seconded. The motion passed.

Robert mentioned that John Herr, ASB Archivist, has developed a typeset of the *ASB Bulletin*, now *Southeastern Biology*. The typeset is to be stored at the University of Georgia and we would like to move the ASB Archives from Emory University to be stored at the same location as the typeset. This would require a change to the ASB constitution.

Motion 3: Robert presented a motion from the ASB Executive Committee to amend the ASB constitution to accommodate moving the archives from Emory University to the University of Georgia.

The motion to amend the ASB constitution was approved.

Motion 4: Robert presented a motion from the ASB Executive Committee to amend the ASB bylaws to clarify eligibility for the ASB Meritorious Teaching Award. The clarification would limit eligibility to those “teaching at the college level.”

The motion to amend the ASB bylaws was approved.

Terry next presented the roll of those requesting emeritus status: Vince Bellis, William R. Bowen, Robert Creek, Armando A. de la Cruz, Gary Dillard, Larry Elliott, David A. Etnier, Frank Golley, Donald C. Tarter.

Motion 5: Robert presented a motion from the ASB Executive Committee to grant emeritus member status to these individuals.

The motion passed.

Terry presented the names of 2001-2002 deceased ASB members and called for a moment of silence to honor them. The deceased members were Eugene T. Bergquist and C. Leland Rodgers.

Treasurer’s Report—Tim Atkinson presented the report. Tim indicated the 2001 budget numbers are finalized and ASB finished over \$23,000.00 to the good for 2001 with an overall ending balance of \$96,713.00. Tim presented a proposed 2003 budget that had slight increases in areas that were previously under budgeted.

Motion 6: Robert presented a motion from the ASB Executive Committee to approve the proposed 2003 budget.

The motion passed.

Tim indicated a dues increase was needed and proposed the following dues structure: regular member \$25, 3-year member \$65, family membership \$30, student membership \$15, patron membership \$750. All other membership categories would remain unchanged.

Motion 7: Robert presented a motion from the ASB Executive Committee to approve the proposed dues increases.

Amendment to the motion—student membership remain unchanged at \$10 and regular member dues be raised to \$30.

Motion 8: A motion was made to consider student membership and regular membership dues increases in the amendment separately. It was seconded. Discussion ensued. The question was called and the motion approved.

Student Membership dues—remain at \$10. Passed.
Regular Membership dues—increase to \$30. Failed.

Motion 7 (as amended): Regular membership \$25, three-year membership \$65, family membership \$30, student membership \$10, patron membership \$750. All other membership categories would remain unchanged.

The motion as amended passed.

Print Editor's Report—Jim Caponetti gave this report. *Southeastern Biology* is getting out on time and it is now an all-electronic submission to Allen Press. Jim mentioned that the archived typeset of the *ASB Bulletin* and *Southeastern Biology* is now complete.

Resolutions Committee—Howard Neufeld read a resolution of appreciation to Appalachian State University and the Local Arrangements Committee.

Resolution 1: Howard Neufeld asked that the resolution of appreciation to Appalachian State University and the Local Arrangements Committee be approved.

The resolution was approved.

Nominations Committee—Pat Parr presented the slate of nominees and asked for any additional nominations from the floor. There were no nominations from the floor.

Motion 9: It was moved that nominations be closed. Seconded.

The motion passed.

Motion 10: It was moved that the slate of nominees be approved. Seconded.

The motion passed.

Adjournment—The meeting adjourned at 12:18 PM EST.

Respectfully Submitted,

Terry D. Richardson
Secretary

**EVENTS OF THE 2002 ANNUAL MEETING IN BOONE, NC
HOSTED BY APPALACHIAN STATE UNIVERSITY**

**ASB MERITORIOUS TEACHING AWARD
UNIVERSITY PROFESSOR HONORED**

DONALD C. TARTER

The 2002 winner of the ASB Meritorious Teaching Award was Dr. Donald C. Tarter, Professor of Biological Sciences at Marshall University. Dr. Tarter was born in Somerset, Kentucky. He earned a B.S. in Biology and Chemistry from Georgetown College. He obtained a M.A.T. in Zoology from Miami University but returned to Kentucky to complete his education. Working with Dr. Louis Krumholz, Dr. Tarter earned his Ph.D. in Zoology from the University of Louisville. By this time his interest in aquatic ecology, particularly in fishes and benthic macroinvertebrates, was well established.

Dr. Tarter's teaching career began with the completion of his undergraduate degree. After graduating from Georgetown College, he began teaching high school science. He continued teaching at the high school level as he worked on his Master's. While working on his Ph.D., he obtained a position at Kentucky Southern College. In 1968 he took a faculty position at Marshall University in Huntington, West Virginia. He stayed at Marshall until his recent retirement. It was soon after he joined the Marshall faculty that he became a member of ASB. Since then, he has been an active member of ASB, serving on several committees. However, Dr. Tarter is best known in ASB for bringing large numbers of both graduate and undergraduate students to the annual meetings.

During his tenure at Marshall, Dr. Tarter has taught many different biology, animal ecology, limnology, and ichthyology courses. He has served as a research advisor to 88 Master's students and has authored or co-authored over 160 articles. Throughout his career at Marshall, he continually updated and developed his courses teaching them with enthusiasm and humor. This made his classes extremely popular and won him praise from colleagues and former students. They describe his teaching as vital, exciting, interesting, enjoyable, enthusiastic, enlightening, and stimulating.

According to colleagues, Dr. Tarter's effectiveness was because he "allowed his research to flow readily into his teaching" and he used "numerous opportunities and approaches in passing on his vast knowledge of his field". The popularity of his classes is reflected in some of the comments made by former students. One remembered sitting in line very early in the morning on the first day of registration to make sure he got into Dr. Tarter's class before it closed while another commented that "you would make sure all of your other classes did not conflict with his. He was that good". A former graduate student suggested he was able to be such a popular and effective educator "by relating often difficult ecological concepts to everyday life and by cracking jokes".

While Dr. Tarter was an excellent teacher in the classroom, a colleague pointed out that he was "in his true element teaching both undergraduate and graduate students in natural field settings. The students were infinitely the better for his labors". Former graduate students recall field trips as "an incredible eye-opening learning experience" where they spent time "exploring rivers and streams, learning

skills that many of us would later apply as employees of state and federal agencies, consulting firms, and private industry”.

Some of the traits that contributed to Dr. Tarter's success as an educator are related to his personal qualities. A long-time colleague described him as “fun to be around, considerate of others; has a warm sense of humor and a fine sense of social responsibility”. His concern for the individual student was pointed out by a former graduate student who recalled that Dr. Tarter “helped students stay in school by finding them jobs or just lending moral support at the right times”. Another remembered that “he never walked away until he was certain that your problem was solved or your question was answered”. A third commented “I've never heard anyone say anything negative about him and that, in itself, is unique.”

Finally one former graduate student summarized why Dr. Donald Tarter is such an outstanding teacher. He said, “Dr. Tarter taught me how to study, how to perform research, how to write but most importantly he instilled within me a lifelong love for learning.”



Rebecca Cook presents the Meritorious Teaching Award to Donald C. Tartar, Professor of Biological Sciences at Marshall University

ASB ENRICHMENT FUND AWARD HIGH SCHOOL TEACHER HONORED

Marilyn Pendley

The 2002 awardee of the ASB Enrichment Fund Award was Marilyn Pendley, Science Educator, West Iredell High School, Statesville, NC. Ms. Pendley received a plaque, an honorarium of \$500, and her expenses to attend the meeting at Boone, NC, were defrayed by the fund. She was also the 2001 National Association of Biology Teachers Outstanding Biology Teacher from North Carolina, and the 2002 NC Student Academy Science Teacher of the Year.

2002 RESEARCH AWARD RECIPIENTS

ASB SENIOR RESEARCH AWARD

The ASB Senior Research Award was presented by John Herr (award committee chair) to **Steven W. Seagle** of the University of Maryland Center for Environmental Science for his paper "Bottom-up determination of forest-floor invertebrate biomass and ovenbird (*Seiurus aurocapillus*) reproductive success in central Appalachian forest landscapes" co-authored with **Brian R. Sturtevant** of the USDA Forest Service, *SE Biology Abstr.* 284, 49(2).



Steven W. Seagle (left) receives the ASB Senior Research Award from award committee chairperson John Herr.

ASB STUDENT RESEARCH AWARD

The ASB Student Research Award sponsored by the Martin Microscope Company, Easley, SC, was presented by Richard N. Henson (award committee chair) to **Rebecca L. Brown** of the University of North Carolina at Chapel Hill for her paper "Diversity and invasibility in southern Appalachian plant communities" co-authored with **Robert K. Peet**, *SE Biology Abstr.* 301, 49(2).

ASB STUDENT RESEARCH AWARD IN AQUATIC BIOLOGY

The ASB Student Research Award in Aquatic Biology was presented by Richard N. Henson (award committee chair) to **John D. Willson** of Davidson College for his paper "The effects of habitat disturbance on stream salamanders: implications for buffer zones and watershed management" co-authored with **Michael E. Dorcas**, *SE Biology Abstr.* 174, 49(2).



Rebecca L. Brown receives the ASB Student Research Award from award committee chairperson Richard N. Henson.



John D. Willson (right) receives the ASB Student Research Award in Aquatic Biology from award committee chairperson, Richard N. Henson.

EUGENE P. ODUM AWARD

The Eugene P. Odum Award sponsored by the SE Chapter of the ESA was presented by Debbie Moore (award committee chair) to **Jason D. Riddle** of Appalachian State University for his paper "Short-term effects of wildfire on breeding bird communities in Southern Appalachian old-growth/pre-settlement forests" co-authored with **Matthew P. Rowe**, *SE Biology Abstr.* 291, 49(2).



Jason D. Riddle receives the Eugene P. Odum Award from award committee chairperson Debbie Moore.

THE NORTH CAROLINA BOTANICAL GARDEN AWARD

The North Carolina Botanical Garden Award sponsored by the NCBG was presented by John Randall (award committee chair) to **Misty A. Franklin** of North Carolina State University for her paper "Factors affecting seed production in natural populations of *Lysimachia asperulifolia* Poir. (Primulaceae), a rare, self-incompatible plant species" co-authored with **Jon M. Stucky** and **Thomas R. Wentworth**, *SE Biology Abstr.* 153, 49(2).



Misty A. Franklin receives the North Carolina Botanical Garden Award from award committee chairperson John Randall.

ASB STUDENT POSTER AWARD

The ASB Student Poster Award was presented by Steve Baker (award committee chair) to **Laura Garrett** of Furman University for her poster "Effect of controlled agricultural burning and plant community type on the diversity and abundance of moth communities" co-authored with **John Snyder**, *SE Biology* Poster 47, 49(2).



Laura Garrett receives the ASB Student Poster Award from award committee chairperson Steve Baker.

The committee also singled out the following two posters for honorable mention:

Scott L. Graham and **William K. Smith** of Wake Forest University for their poster "Photosynthetic acclimation to changing sunlight regimes in understory evergreen species of a mixed deciduous forest," *SE Biology* Poster 84, 49(2).

Janna Owens, Ken Marion, Robert Angus, Melinda Lalor, Eric Meyer, and Steve McKinney of the University of Alabama and Storm Water Management Authority, Inc., for their poster "Association between sedimentation potential as estimated by GIS technology, habitat assessment scores, and macroinvertebrate community structure metrics in small southeastern streams," *SE Biology* Poster 28, 49(2).

SE DIVISION OF AMERICAN SOCIETY OF ICHTHYOLOGISTS AND HERPETOLOGISTS AWARD

The Southeastern Division of ASIH Award was presented by the Society's Division President Jeffrey Camper for Ichthyology to **Nicholas J. Lang** of Saint Louis University for his paper "Defining proper conservation units within the federally threatened yellowfin madtom, *Noturus flavipinnis*" co-authored with **Richard L. Mayden**, *SE Biology* Abstr. 297, 49(2); and for Herpetology to **John B. Sealy** of Appalachian State University for his paper "Species preferences in scent-trailing by neonatal timber rattlesnakes (*Crotalus horridus*)" co-authored with **Matthew P. Rowe**, *SE Biology* Abstr. 115, 49(2).

President Camper was also pleased to report that the following student presenting a paper at the annual meeting was awarded a travel grant:

Diana Huestis—Herpetology. Department of Natural Sciences, Echerd College, St. Petersburg, FL 33730.

SOUTHERN APPALACHIAN BOTANICAL SOCIETY AWARDS

Joe Winstead, president of SABS, made three awards at the Friday morning breakfast meeting, and announced the names of the awardees at the Friday night banquet.

Earl Core Student Research Award

Presented to assist students with their botany research. We have four winners this year:

1. **Susan B. Farmer** of University of Tennessee: \$300 – *Additional Insights into Trilliaceae Phylogeny: The Delostylis Group*.
2. **Thomas E. Hancock** of Wake Forest University: \$200 – *Species Living on the Edge: Ecophysiological Adaptation in Barrier Beach Plants and Possible Effects of Climate Change on Biodiversity*
3. **Aswini Pai** of Ohio University: \$200 – *Population Growth of Acorus calamus, a Perennial Wetland Macrophyte in Southeastern Ohio*
4. **Kristin Taverna** of University of North Carolina at Chapel Hill: \$300 – *Forests of Continuity of the North Carolina Piedmont: Species composition and Distribution Across the Landscape*

Elizabeth Ann Bartholomew Award

Presented to individuals for outstanding service to botany or to the society. The 2002 award goes to **William H. Martin**, of the Division of Natural Areas and Eastern Kentucky University, Richmond, Kentucky.

Richard & Minnie Windler Award

Presented for the best systematic botany paper published in volume 66 of *Castanea* (2001): The award goes to **James R. Allison** (Georgia Department of Natural Resources) and **Timothy E. Stevens** (Alabama Department of Public Health Laboratories) for their paper "Vascular Flora of the Ketona Dolomite Outcrops in Bibb County, Alabama," *Castanea* 66: 154-205.

BETA BETA BETA BIOLOGICAL SOCIETY SOUTHEASTERN REGION OUTSTANDING PAPER AND POSTER AWARDS

District I Paper – Brooks Award Winner

PATRICIA N. POCHELON. Sigma Psi, Florida Institute of Technology. "Selective tidal-stream transport behavior of ovigerous blue crabs *Callinectes sapidus*: role of circatidal activity rhythms."

District II Paper – Brooks Award Winner

ARIANNA K. BRUNO. Pi Delta, East Tennessee State University. "Developing a tissue culture system for the study of xylogenesis in Arabidopsis."

Districts I and II Paper – Brooks Award Winner

JEFFREY M. GRIM. Sigma Nu, University of Tampa. "The distribution and abundance of the pea crab, *Tumidotheres* (= *Pinnotheres*) *moseri* (Crustacea: Decapoda: Brachyura: Pinnotheridae) and its relationship with the sea squirt host, *Styela plicata*."

District I Poster – Johnson Award Winner

JESSICA VONCANNON. Beta Alpha, Salem College. "Site-directed mutagenesis of the *Pseudomonas aeruginosa* algZ gene."

District II Poster – Johnson Award Winner

AMANDA TROUT. Mu Iota, Northern Kentucky University. "Toxicity of blue green algae dietary supplements."

Beta Beta Beta Research Foundation Award Winner for 2001-2002

JILL HOPKINS. Rho Kappa, Widener University. "Correlation between ploidy and guard cell area in *Sisyrinchium atlanticum* Bickn. in eastern U.S. coastal populations."



Officers and Staff of ASB for 2002-2003

From left: Kenneth Shull, Andrew Ash, Claudia Jolls, Terry Richardson, Rebecca Cook, Tim Atkinson, James Caponetti, Thomas Wentworth, Zack Murrell, Michael Dennis, Robert Haynes, and Kim Marie Tolson.



Bruce Roe (facing camera) delivered the Plenary Address.

The Pembroke Group at Boone

Faculty and undergraduate students from the University of North Carolina, Pembroke, at the 63rd Annual Meeting of ASB in Boone, NC, April 10-13, 2002



Pictured from left to right (above) are: Dr. Bruce Ezell, Rebecca Rice, Bryan Scott, Chrishia Dolan, Kathleen Long, Kathy Frye, Candy Jacobs, Dr. Lisa Kelly, and Dr. Andrew Ash.



Pictured from left to right (above) are Kathy Frye, Chrishia Dolan, Bryan Scott, Rebecca Rice, Kathleen Long, Dr. Bonnie Kelley, Dr. Andrew Ash, Candy Jacobs, and Dr. Bruce Ezell.

RESOLUTION OF APPRECIATION TO APPALACHIAN STATE UNIVERSITY

Whereas the Appalachian State University did agree to make all local arrangements for the Association of Southeastern Biologists to hold its annual meeting on April 10-13 in Boone, NC, and

Whereas Local Arrangements Chair Howard Neufeld and Program Chair Ken Shull did an admirable job of orchestrating the events and organizing the paper and poster session, and

Whereas

Skip Sedivec and Mary Connell assisted as Program Co-Chairs,
Michael Windelspecht organized posters and audiovisuals,
Bill Dewel coordinated commercial exhibits and corporate sponsorships,
Robert Creed and Zack Murrell planned field trips,
Jan Johnson handled registration and meeting statistics,
Coleman McCleneghan and Gary Walker made social arrangements,
Dru Henson coordinated with Beta Beta Beta,
Ray Williams and Jeff Butts arranged transportation and volunteers,
Melany Fisk arranged lodging for all attendees, and

Whereas the citizens of Boone and the administrators of Appalachian State University cooperated to welcome ASB to the city of Boone, and

Whereas the students of Appalachian State University volunteered to assist with local arrangements,

Therefore, let it hereby be resolved that the members and officers of the Association of Southeastern Biologists give their sincere thanks and appreciation to all involved in making this the excellent and memorable ASB meeting that resulted from the cumulative efforts of these individuals and organizations.

April 12, 2002

OMITTED ABSTRACTS

These abstracts were either received too late for or were accidentally omitted from the April, 2002, abstract issue listing.

GREENE, MICHELLE, YVES SUCAET, AND CHRISTI MAGRATH. Troy State University—Identification of 3'-end Formation Sequences in Intergenic Regions and Autonomous Replication Sequences in *Saccharomyces cerevisiae*.

To determine the frequency of 3'-end formation sequences within intergenic regions of Chromosome III of *S. cerevisiae*, the *Saccharomyces* Genome Database Pat Match program was utilized and a custom-tailored database was created. This bioinformational approach was used to create a dataset of all sequences from the intergenic regions of Chromosome III with significant homology to one of six different 3'-end formation consensus sequences. Multiple searches were completed to identify sequences with zero, one, and two mismatches to each consensus sequence. Our studies have demonstrated that the 3'-end consensus sequences appear more frequently in the intergenic regions containing autonomous replication sequences (ARSs) than in intergenic regions that do not harbor ARSs. This data complements our molecular biological data that demonstrates a seemingly obligate overlap between replication and transcription termination/3'-end formation and suggests that ARS regions must be highly efficient at termination of transcription by RNA polymerase II. Additionally, this investigation has created a set of bioinformational queries that can be applied to other chromosomes and consensus sequences in subsequent analysis. This project is funded by NSF CAREER Grant 9985156.

BRADLEY, KIANA AND CHRISTI MAGRATH. Troy State University—Analysis of replication from a transcription termination deficient autonomous replication sequence in *Saccharomyces cerevisiae*.

Previously, the ARS305 element from chromosome III of *S. cerevisiae* was subjected to random mutagenesis and an ARS mutant that had decreased levels of transcription termination by RNA polymerase II was identified. Using a plasmid loss assay, the mutant sequence was shown to confer decreased replication efficiency at levels that correlated directly with transcription levels. To determine if this observation can be extended to replication from a chromosomal origin (versus a plasmid), the chromosomal copy of ARS305 will be replaced with the termination deficient ARS305 mutant. Two-dimensional gel electrophoresis of chromosomal DNA will allow direct examination of replication from ARS305 on Chromosome III from both the mutant and wild type origins of replication. The results will illustrate the relationship between transcription termination function and replication function from both plasmid and chromosomal DNA in *S. cerevisiae*. This work was funded by NSF CAREER Grant 9985156 (CM) and the Troy State University Chancellor's Fellowship (KB).

SWANSON, INGRID, MICHELLE GREENE, AND CHRISTI MAGRATH. Troy State University—Identification of lead responsive genes in *Saccharomyces cerevisiae*.

Our investigation of heavy metal uptake and detoxification genes in *Saccharomyces cerevisiae* focuses on establishing the mechanism lead toxicity. The fate of lead in cells treated with toxic doses of lead acetate and the general pathway of lead uptake in yeast is not well established. The goal of this analysis is to identify genes with altered lead response from the yeast in the *Saccharomyces* Deletion Strains (a set of approximately 4700 gene knockout strains that each contain a deletion of a single non-essential yeast gene). A small set of these deletion strains have been analyzed (about 10% of the total collection), and several lead

responsive gene deletion strains that manifest phenotypic alterations in response to growth at hypotoxic and hypertoxic lead dose rates have been isolated and characterized. Initial results indicate that the lead acetate responsive genes are mitochondrial function related genes, are previously identified heavy metal related genes, are calcium related genes, or are unknown gene products. Ultimately, the entire deletion set will be analyzed and a complete set of genes with altered lead responsiveness will be identified. The Troy State University Foundation, the TSU Department of Biological and Environmental Sciences, the Alabama Department of Public Health ALERT Grant, and the National Science Foundation provided support for this project.

CIRTAİN, MARGARET C. University of Memphis—Molecular Genetic Analysis in Sympatric Species of *Gammarus*.

How animals have adapted to their environments has long been a question that has intrigued scientists. Molecular biology has given us the tools to explore these evolutionary processes. By understanding the changes in genetic patterns, in relation to the physical variation of its geographic setting, we have a method for examining species-environment adaptations. A unique study site in western Tennessee offers an opportunity to study two sympatric amphipod species inhabiting a varying environment. Based on past studies, the site physiognomy and environmental gradient variables may have a determining role in the niche partitioning of these two species. By employing molecular markers to estimate the population genetic parameters, it is possible to demonstrate a relationship between these genotypes and the environmental gradient of the site. It has been suggested that mitochondrial DNA (mtDNA), due to small size, relatively rapid rate of evolutionary change, and maternal-haploid inheritance, make it suitable for examining population history and structure among closely related taxa. In addition, the availability of primer sequence for use with the 12S ribosomal RNA gene, further facilitates examination of the molecular structure of the two species. By comparing the DNA sequences of the two species, *Gammarus minus* Say and *Gammarus troglophilus* Hubricht and Mackin, it is possible to show a relationship between intraspecific and interspecific diversity in mtDNA. My hypothesis is to demonstrate that interspecific divergence based on the 12S rRNA sequences will be concordant microgeographically.

RAIMONDO, SANDY AND LINDA BUTLER. West Virginia University—Spatial synchrony of caterpillar populations in the Monongahela National Forest, WV and the George Washington National Forest, VA.

The mechanisms driving population fluctuations have been investigated and debated for decades. In a more recent approach to population dynamics, identifying the spatial extent of population synchrony may elucidate the factors regulating populations by defining a characteristic scale. We determined the scale of spatial synchrony of three caterpillar species [*Acronicta ovata* Grote, *Polia latex* (Guenée), and *Itame pustularia* (Guenée)] in the Monongahela National Forest (MNF), WV and the George Washington National Forest (GW), VA as a preliminary step in identifying the exogenous factors that may influence their population dynamics. On each forest, three blocks were established, each of which contained three plots. On each plot, caterpillars were collected from foliage clippings and from under canvas bands attached to the trunks of oaks (*Quercus* spp.), maples (*Acer* spp.), and hickories (*Carya* spp). Collections were made from 1995 through 2001. Annual abundance was calculated for each plot, block, and forest. Spearman's correlation coefficients were calculated for the yearly fluctuations between all combinations of sections (all plots within a block, all blocks, and both forests). These coefficients were then plotted against the distance (km) between each section. The best-fitting linear regression of correlation on distance was calculated to determine the range of spatial synchrony. These results will later be used to determine possible mechanisms acting within the scale of the synchronized populations.

REID, JANET W. Virginia Museum of Natural History—The copepod crustacean fauna of Great Smoky Mountains National Park: preliminary studies.

Analysis of the free-living copepod crustacean fauna in Great Smoky Mountains National Park began in 1998. Three intensive short-term surveys and additional more limited collections have revealed the existence of a species-rich fauna, living mainly in wetland and semi-terrestrial habitats such as springs, seeps, bogs, moist mosses, ephemeral sloughs, and in streambeds. Collections in caves have so far yielded only a few, typically epigeal species. The 3 identified species of the order Calanoida, *Epischura fluviatilis*, *Osphranticum labronectum*, and *Skistodiaptomus carolinensis*, all live in the large reservoirs bordering the Park in North Carolina; a fourth, still-undetermined calanoid species lives in an ephemeral swamp within the Park. As expected, most faunal diversity lies in the orders Cyclopoida (40 species) and Harpacticoida, families Canthocamptidae (36 species), Parastenocarididae (3 species), and Phyllognathopodidae (1 species). The Park harbors more species of copepods than other well-studied and much larger areas in North America, such as the Laurentian Great Lakes. About one-fourth of the species are new to science. The U. S. National Park Service and the Discover Life in America Foundation provided partial support.

HILL, CHRISTOPHER E. Coastal Carolina University—Differentiation between several Southeastern populations of seaside sparrows, *Ammodramus maritimus*.

Seaside sparrows (*Ammodramus maritimus*) breed only in salt marshes along the Atlantic and Gulf Coasts of the United States. Northern populations are migratory, but southern populations are resident. Strong phenotypic differentiation in different populations suggests historical isolation. Previous work has shown a genetic split between Gulf and Atlantic Coast populations. Currently, coastal development continues to fragment breeding populations on both coasts, but it is not known to what extent human-caused gaps in the breeding range result in genetic isolation between groups of breeding sparrows. I sampled sparrows from three populations in South Carolina and Florida, and I will present data from microsatellite DNA markers to investigate the degree to which populations at different geographic scales have diverged genetically.

JANES, DANIEL, KRISTIN BARUS, MATTHEW MILNES and WAYNE KING. The University of Florida—Can Sex-Determining Responses to Incubation Temperature be Determined Among Florida Populations of *Alligator mississippiensis*, a Temperature-Dependent Sex-Determining Species?

During the summer of 2000, the Florida Fish and Wildlife Conservation Commission Wildlife Research Lab collected American alligator eggs from nine Florida lakes. The eggs were incubated collectively at ~31°C. During the third week after hatching, the hatchlings were sexed by manual eversion of the clitero-penis from the cloaca. By reporting the appearance and coloration of the clitero-penis, we identified hatchling alligators as male or female. Using this technique, we found significant differences among the hatchling sex ratios from different clutches within lakes. The observed variation in sex determining response to incubation temperature suggests that natural selection may shape the critical temperatures that initiate embryonic sex differentiation. The observed variation suggests that maladaptive sex ratios resulting in extinction are not necessarily the fate of temperature-dependent sex determining species when faced with rapid climate change as has been suggested in recent literature.

NORMAN, KIM AND CHRISTI MAGRATH. Troy State University—Transcription termination capacity of active ARSs from Chromosome III in *Saccharomyces cerevisiae*.

In an ongoing research investigation to establish the interaction of transcription termination and replication in *Saccharomyces cerevisiae*, a battery of constructs will be evaluated to assess the transcription termination capacity of the autonomous replication sequences of Chromosome III from *S. cerevisiae*. Previously, it has been demonstrated that ARS (autonomous replication sequence) elements have the capacity to terminate transcription by RNA polymerase II in *S. cerevisiae*. However, only a small set of ARSs were examined in these investigations. To extend these previous studies, the six most highly efficient ARS elements from Chromosome III (of eighteen total ARSs) will be examined. Each of these ARS elements will be evaluated to determine if the sequence is capable of efficiently terminating transcription termination by RNA polymerase II in *S. cerevisiae*. A reporter construct that contains a galactose inducible promoter upstream of an intron fused to a *LacZ* gene (beta-galactosidase) allows assessment of the level of transcription termination for any DNA sequence (when inserted into the construct) by quantitation of the amount of beta-galactosidase produced in a yeast cell harboring the reporter construct. The results obtained from these new mutant strains will expand on previous research and be essential for establishing the relationship between transcription termination and DNA replication. This project is funded by NSF CAREER Grant 9985156 (CM) and a Troy State Trojan Pride Scholarship (KN).

PELTIER, DEZRA M., SHAFFER, LAWRENCE R. AND MARJORIE M. HOLLAND. The University of Mississippi—Age Structure of Freshwater Mussel Populations in the Sunflower River in Mississippi.

There are about 297 species of freshwater mussels in North America with the greatest diversity in the South East United States. Of these 297 species, 69 (23%) are included on the Federal Endangered Species List. Mussels are of great economic, cultural and ecological value. Their shells have been utilized in the manufacturing of ornaments, tools and pearl buttons. Today the shells are also exported to Asia for the manufacturing of pearls. One species in high demand in the pearl industry is *Amblema plicata plicata* (three ridge). It has a thick shell and is abundant in the Southeastern United States. In this study we compare *Amblema plicata plicata* from three sites along the Sunflower River that differ in flow, depth and substrate. The Sunflower River flows through agricultural land between the counties of Sharkey and Yazoo in the state of Mississippi. Samples were collected in 0.25m² quadrats along the bottom of the river. Only live mussels were selected. Comparisons between populations included growth rates, length, width, dry weight, volume and inflation. A total of 275 mussels were collected. Site 1 had the greatest average length of 98.34mm, and also the greatest average width of 68.77mm. The average dry weight and depth were also higher in site 1 measured 14.62g and 49.43mm respectively. A technique for aging mussels and determining growth rates is described.

TATE, WILLIAM B. and MIKE S. ALLEN. UNIVERSITY OF FLORIDA—Using age-structured models to revise the recovery criteria for the Gulf of Mexico sturgeon.

We used an age-structured computer model to produce population viability categories for Gulf of Mexico sturgeon *Acipenser oxyrinchus desotoi*. Simulations were performed under varied regimes of adult mortality, sex ratio, and percent of females spawning annually. Intrinsic rates of population increase were calculated from regression lines of population size plotted through time. Intrinsic rates were pooled, ranked and grouped according to percentile. Two population viability categories, stable or increasing (S-I) and decreasing (D), were determined

based on trends in population increase or decrease. Generally, high adult mortality could be countered by a greater proportion of females in the population or higher percent of adult females spawning annually. Three levels of exploitation were applied to a representative S-I simulation. All exploitation rates greatly reduced Gulf sturgeon population size in our models. We suggest improvements to the current recovery criteria for Gulf sturgeon using viability categories based on our simulations. These viability categories may expedite recovery of this subspecies by improving efficiency in recovery efforts and providing more reliable indicators of population viability.

MCCULLOUGH, SHAUN D., WILL K. REEVES, AND GAYLE PITTMAN NOBLET.
Clemson University—Developmental interaction of experimentally infected *Aedes aegypti* with *Ascogregarina taiwanensis*.

Ascogregarina taiwanensis is a gregarine parasite that naturally infects wild populations of the mosquito *Aedes albopictus*. This gregarine protozoan is also known to infect certain life cycle stages of aberrant mosquito hosts such as *Aedes aegypti*. In this study, we examined the developmental interaction of experimentally infected *Ae. aegypti* with *A. taiwanensis*. Mosquito larvae appeared to show no effects of the infection, while gregarine numbers were proportional to infective dose. Additionally, the effect of *A. taiwanensis* infection on *Ae. aegypti* pupation rate and mortality was examined. Gametocysts were not observed in the Malpighian tubules of experimentally infected mosquito pupae or adults, and oocysts were not isolated from infected adults. Results of this study indicated that infection and initial development of gregarine trophozoites did occur in *Ae. aegypti* larvae; however, further development in mosquito pupa and adults did not occur, suggesting that *A. taiwanensis* would not be able to perpetuate infection in wild aberrant mosquito populations.



**A letter to Robert Haynes from
THE SCIENCE EDITOR OF *BIO*SCIENCE**

Dear Dr. Haynes:

BioScience, ranked 5/51 journals in the Biology category of ISI's Journal Citation Report, is the preeminent journal for overviews of research in the biological sciences, with strong suits in organismal and environmental biology and ecology. In addition to research overviews, we also publish essays in a variety of areas pertinent to Biology and its practice. With a paid circulation of about 8,500 copies per month, we reach an extremely broad readership, ranging from advanced high school students and teachers to professional biologists and policymakers.

The member organizations of the American Institute of Biological Sciences represent a largely untapped source of authors, who may not always be aware of *BioScience's* broad reach and unique audience. I am therefore writing you directly, to ask for your help in making your membership aware of this publishing opportunity. I would be most grateful if you could disseminate this invitation to members of the Association of Southeastern Biologists, via your newsletter, or e-mail.

Instructions for manuscript preparation may be found at our website, <http://www.aibs.org/bioscienceguide/resources/contributors.html>. Authors may also contact me directly by phone or e-mail (contact information below).

Thank you very much for your assistance. Sincerely, Matt Greenstone

Matthew H. Greenstone, Ph.D., Science Editor, *BioScience*, 2404 Northwood Lane, Edmond, OK 73013, USA; Tel: 405 607-0309; Fax: 405 607-0310; mgreenstone@aibs.org; <http://www.aibs.org>.

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- ◆ A sister journal of the *Northeastern Naturalist* (ISSN #1092-6194), published since 1997. Both journals are identical in focus, format, quality, and features. The journals together serve as a matched-pair of regional journals that provide an integrated publishing and research resource for the eastern part of North America.
- ◆ Printed by Allen Press, printer of many journals in the biological and environmental sciences, especially those whose parent organization is a member of the American Institute of Biological Sciences (AIBS).
- ◆ Available online in full-text version in the BioOne database (www.bioone.org, a collaborative effort of Allen Press, AIBS, and other organizations) and the Proquest Information and Learning databases (www.il.proquest.com).

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ASB Banquet Address

Howard S. Neufeld
Past-President of ASB

*The Great Triumph of Science -
The Slaying of Ugly Hypotheses by Beautiful Facts
(with apologies to T.H. Huxley)*

Introduction

Good evening, and thanks for sticking around at this late time. I'd like to first acknowledge the tremendous help of the local committee in organizing and carrying out this meeting. In particular, I'd like to thank the Office of Conferences and Institutes for its assistance with registration, transportation, and other aspects of the meeting. Jan Johnson especially deserves a round of applause for her efforts. In addition, I'd like to thank all the volunteers and members of the local arrangements committee for their hard work in making this yet another successful ASB meeting.

However, for some, the work finally got to them.



Here is Ken just the other day. Now, remember, this is your president-elect. And yes, I'm scared too!

So, anyway, I said to Ken, "What gives?"

And he said, "I'm not sure, but I'm just not feeling right. Do you have any idea what might be wrong?"

And I replied, "Well sure, it's quite apparent."

"What is it then?", he asked.

"It's obvious", I replied, "you don't eat right!"

Then Ken says, "I think I want a second opinion!"

And I replied, "Well, you're ugly too!"

Okay, so I'm not Henny Youngman, but if I'm going to give a semi-serious after-dinner talk, we all need a little humor up front.

Now, the topic of the ASB dinner speech gives pause to those of us given the honor of serving as President--deciding what to talk about can be a daunting task. It might also be the reason some people *don't* run for President. I began tossing ideas around as soon as I was elected, and now I realize that I have been doing that for almost three years. Topic after topic after topic came and went. Finally, I took the advice of many a writer, and said to myself, "talk about what you know!" Well, that really shortened the list of potential topics!

And it did start to focus my thoughts. For the past several years, I've been interested in the subjects of junk science, irrationality, and skepticism. When I found out that my interests coincided with those of a colleague of mine here in the Physics and Astronomy Department at ASU, we thought it might be important enough to warrant developing a course on the topic. My colleague is Dan Caton, Director of our Astronomy Observatory, and also a keen skeptic.

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Towers of sculpted gas in the Eagle nebula (M16)

He and I developed a non-majors, undergraduate course called Science and Reason, and though it's not currently on the books due to other commitments by the both of us, it was a popular course at the time.

To give you an idea of what pseudo-scientific debunking Dan does, consider his attempts to figure out if there is anything to the Brown Mountain lights, a popular folklore here that out in the Linville Gorge, one can see colored, dancing lights on cold, clear nights. I remember one absolutely freezing January night when he and I sat at the Wiseman's Overlook for several hours waiting to see the lights. This is what we saw - Dark!!

Dan even got an internal grant to put out super sensitive CCD cameras to record whatever lights might be out there without freezing his you know what off anymore. As recently as last week, he was in the Gorge, looking for the lights. So far, no unexplainable lights.

Or consider this watercolor painting that Dan has posted on his website, done by one of our most well-known local artists, Bob Timberlake. Dan says this painting is an astronomical impossibility. Why?

Well, he analyzed the shadows by the buildings, and assuming they are coming from the sun, and that it is winter, the angle and position are such that you could never have a full moon in that position on the horizon at that time of day, which is near noon. Anyway, that's how Dan thinks, and it was a pleasure teaching with him for those years. I hope we can do it again some time in the future.

So, now I had a topic, but deciding how to present it, and what to present, has been my toughest task. The subject is vast, and could consume hours and hours of talking. And while I would have no problem doing that, I feel your pain--I too have had to sit through these things, and I know how rare it is that they are entertaining. To help guide me, I have the philosophy of one of our Executive Committee members to go by, Kim Tolson. Her philosophy is simply, if you talk for too long, I'm going to kill you. That helped greatly to trim the number of topics down! I may ramble tonight, but they'll be short rambles!

Of course, once you have the topic, then you have to have a title. That might be even worse than trying to determine what to talk about. But then I remembered a famous saying by T.H. Huxley, and took inspiration from that. So I've titled my talk tonight:

**The Great Triumph of Science -
The Slaying of Ugly Hypotheses by Beautiful Facts
(with apologies to T.H. Huxley)**

To set the stage for later, let me briefly review how I distinguish between what might be called "good" and "bad" science.

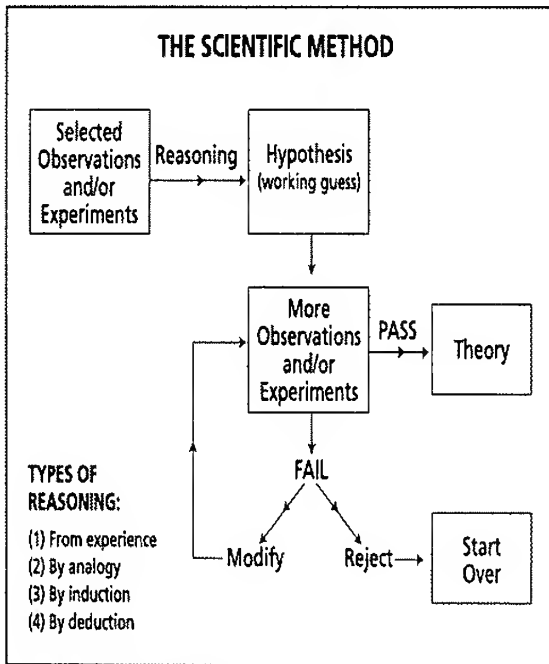
In his book *Consilience*, E.O. Wilson wrote: "Science is the systematic enterprise of gathering knowledge about the world and organizing and condensing that knowledge into testable laws and theories."

Robert Park, author of the remarkable book *Voodoo Science: The Road to Foolishness and Fraud*, further refines this definition by providing two criteria that must be met in order for an enterprise to be called “science”. They are:

- (1) “Is it possible to devise an experimental test?” and
- (2) “Does it make the world more predictable?”

If either of these is not met in the affirmative, then the enterprise does not qualify as science. Park further states that credible scientists must then follow two rules:

- (1) “Expose new ideas and results to independent testing and replication by other scientists” and,
- (2) “Abandon or modify accepted facts or theories in the light of more complete or reliable experimental evidence.”



From *Skeptical Enquirer*,
July, August 1999

Of course, this is the standard scientific process that we are all drilled in as we prepare for a life of scientific inquiry, but sometimes it’s nice to be exposed to it again, as a refresher so to speak.

Park then defines four kinds of “bad” science, all of which he lumps under the category of *Voodoo Science*: the first is *pathological science*, which is when scientists manage to fool themselves because they have a preconception of what the result ought to be, or rather, what they *want* it to be.

“What a man would like to be true, he preferentially believes... Numberless and sometimes imperceptible are the ways in which the affections colour and infect the understanding.”

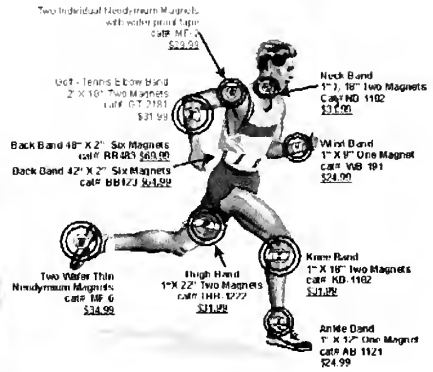
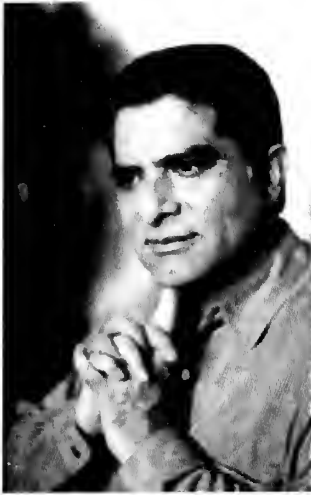


Francis Bacon 1620
Novum Organum

Not a particularly new concept, but one worth reiterating anyway. Francis Bacon said *this* over 400 years ago: “What a man would like to be true, he preferentially believes... Numberless and sometimes imperceptible are the ways in which the affections colour and infect the understanding.”

We can distinguish pathological science from *junk science*, which is science deliberately done so as to obfuscate or muddle the situation, done by people with little or no background in the field and as Park so eloquently states: “consists of tortured theories of what *could be* so, with little supporting evidence to prove that it *is* so.”

Sometimes there is absolutely no evidence for a theory, and when this happens, we enter the realm of *pseudoscience*. Here, beliefs in supernatural powers, or actions that violate known laws of physics are dressed up in the symbolism of science, using equations and other imagery borrowed from the legitimate scientific world, and used to promulgate nonsense.



As examples, we have Deepak Chopra telling us that healing is somehow based on quantum mechanics, yet his usages of this theory betray his actual misunderstandings of it, or Harvard University professor John Mack contending that aliens have visited us and had sex with a majority of those encountered. Population ecologists of the world must cringe at that--what about the concept of reproductive isolation? Or what about the simpler question of why would they want to do this after traveling light years through space? Or Chi Chi Rodriguez touting magnet therapy as the key to better health (how many of you coming from the southern portion of the district passed that large magnet factory in Traveler's Rest, SC?).

Lastly, perpetrators of pseudoscience, perhaps unknowingly at first, and through small, incremental steps that may be barely noticeable, become blinded by their own ideology, and either knowingly, or unknowingly, slide from self-delusion into outright and deliberate deception, at which point we have *fraudulent science*.

As one example, we have the marketing of Vitamin O--which the seller called "stabilized oxygen molecules in a solution of distilled water and sodium chloride," or in plain English, oxygenated salt water! Some time ago the government shut the company down, but it has re-appeared in a different guise, still selling hokum. Kind of reminds me of the mechanical ducks at the fair--you keep shooting them down, yet they keep re-appearing at the other end!

Now, lest you think I concentrate on some fringe group of people, or that my examples are perhaps trivial, do the following for me. Take a look at the person on your left. Now, turn and look at the person on your right. On average in the United States, of the three of you, two of you believe in the paranormal, in the reality of psychic powers. That's nearly 70% of the population. Yet at the same time, 90% of those who profess to believe in psychic powers readily admit to never having experienced it firsthand, but rather, that they simply think it is true. And as detailed in Nicholas Humphrey's excellent book, *Leaps of Faith*, such belief systems can be

found worldwide, not just in the United States. His thesis is that such beliefs may be a cross-cultural phenomenon.

I continue my case:

- (1) Consider that nearly 80% of Ohio legislators think that dinosaurs and humans co-existed.
- (2) Reflect on the fact that most people do know that the earth revolves around the sun (thank you Galileo!!), which is good, but sober up on the fact that only ½ of these people know that it takes one year to do so!
- (3) That 7 out of 10 college students think they can communicate with the dead.

Irrationality, as you see, is not restricted to an isolated fringe of society, but rather, pervades throughout, from blue-collar worker, right up to the most educated of us all. Chopra, for example, was a respected physician in Boston and head of Endocrinology at one of the area hospitals before embarking on his dubious new career as a health guru.

Although the need for public understanding and appreciation of science goes without saying, most polls show that the large majority of people are scientifically illiterate. This is not a new finding, and many of you probably already know this. My question to you is, why should we care? What difference does it make if people have their fantasies, as long as they don't injure or hurt anyone? Well, my contention is that despite what appear to be harmless fantasies, they are indeed doing great harm, not only to themselves, but to society as a whole.

Let me give you just one example, out of the many that are possible. Consider that nearly one-half of all the laws passed by Congress involve either technology or science. I would argue that as a result, a scientifically illiterate public is a threat to democracy if it cannot rationally decide on the scientific merits of its own laws. Instead, decisions begin to be made, not on the basis of science, but rather, on ideology and partisan politics. We are beginning to see such trends with the abolition of the Office of Technological Assessment, and with the arguments before Congress concerning global warming and how to counter the impacts.

Over half a century ago, Nehru said the following about the role of science in society:

"It is science that can solve the problems of hunger and poverty, of insanitation and illiteracy, of superstition and deadening custom and tradition, of vast resources running to waste, or a rich country inhabited by starving people.... Who indeed could afford to ignore science today? At every turn we have to seek its aid.... The future belongs to science and those who make friends with science."

Okay, so we admit that the public doesn't know much science, and worse yet, often does not appreciate it. So, what should we do about this? Should we cram scientific "facts" into everyone's head? I don't think so. While everyone needs some minimal factual knowledge, scientific literacy will not be achieved by rote memorization of a collection of arbitrary, and often useless, facts. Instead, we need to concentrate our efforts (and this is where groups like ASB come into play) more on developing an

awareness and appreciation for how science is done, about what constitutes the scientific process, and how this process contributes to the increase in knowledge of society as a whole. It is simply not possible for scientists to know everything about all facets of science, and we should not expect of society what we do not expect of ourselves.

In his book *The Myth of Scientific Literacy*, Morris Shamos dispels the idea that attaining any significant measure of scientific literacy is going to be easy. In fact, after reading this book, one could be left with the impression that it might well be impossible. But he does offer some advice:

- (1) "Teach science mainly to develop an appreciation and awareness of the enterprise, that is, as a *cultural* imperative, and not primarily for content."
- (2) "...focus on technology as a practical imperative...."
- (3) "For developing social (*civic*) literacy, emphasize the proper use of scientific experts...."

In the epilogue to his book, Shamos then defines his criteria for scientific literacy:

- (1) "having an awareness of how the science/technology enterprise works"
- (2) "having the public feel comfortable with knowing what science is *about*, even though it may not know much *about* science"
- (3) "having the public expect what can be expected from science," and
- (4) "knowing how public opinion can best be heard in respect to the enterprise...."

How we conduct our science will in large part determine how the public receives it. If we do it well, and the science is of high quality, society will respect it. It may take some time to appreciate it (consider all those theories, once thought bogus, that have since been confirmed--i.e., plate tectonics or the bacterial origin of ulcers). But because science is self-correcting, errors that creep in from time to time will not survive the test of time, and will be eliminated. The good science will survive and stimulate future research.

How science should be done has been analyzed in the book *The Sociology of Science*, by Robert K. Merton, who defines four norms for the appropriate behavior of scientists:

- (1) universalism--that the value attached to a scientific statement must in no way be connected with the personal characteristics of that scientist. Strahler, another philosopher of science, terms this *apersonalism*.
- (2) communality--findings by one person must be shared with others in the scientific community
- (3) skepticism--there must be organized skepticism to proposed ideas, and finally,
- (4) disinterestedness--a scientist's research must not be guided by a desire for personal reward.

While I would not expect, nor assume, that all scientists adhere strictly to the above precepts (what scientist fails to reap reward from research, if not monetarily, then by acclaim and recognition from his or her peers?), practitioners of pseudoscience and junk science have all but abandoned them.

How often do we see claims of pseudoscience brought forth in the press, rather than through peer review? And while the practitioners of pseudoscience claim that they do this because traditional peer review is biased against them, the truth is, if you make the outrageous scientific claim, then the burden of proof is on *you* to provide the convincing evidence necessary to support your claim, not the other way around. And there is no evidence to support claims of bias in most cases--good science eventually gets published, and bad science is relegated to the dust heaps of history.

Today, the internet allows us access to more information than ever before. We are inundated with absolutely tons of information, much of it junk, because the internet makes little or no attempt to distinguish the good from the bad. In fact, sometimes it is downright confusing to distinguish the two on the internet. Take for example the website JunkScience.com. One might suppose this is the place to find out where bad science has been done, and in some cases you'll find it here. But deeper digging reveals that the site is run by Steven J. Milloy, an adjunct scholar at the Cato Institute, and a columnist for FoxNews.com.

The Cato Institute, as you may or may not know, is a conservative (think Republican) think tank, one of whose goals is to convince people that global warming science is bad or junk science. Sites such as these are often sponsored by energy companies. Another such fuzzy and warm sounding site is the GreenEarth site. The theme of this site is that warming and high CO₂ are good for you--because they enhance plant growth, thus making the world greener. And of course, it is sponsored by an energy consortium. You have to be more careful today than ever when searching for information, or you'll be sucked into endless vortices of irrationality.

So here we are in the infancy of the 21st century, with the greatest scientific achievements in history occurring as we speak, and yet we have to ask ourselves, why, in these highly technological and scientific times, is pseudoscience so prevalent in today's society? In some countries, like Russia, it is more popular today than 50 years ago.

I think one reason is that it satisfies the desires of a large number of people for a simpler world in which nature is viewed in either black or white, with shades of gray eliminated. It makes no great demands on the intellect, it rarely puts forth testable hypotheses, and is often logically flawed. It is a world of convenience, of mystery and meaning. It fulfills the innate desires and preconceived notions of fundamentalists, literalists, and ignorant people who make no attempts to improve their knowledge base. The purveyors of pseudoscience may use scientific terms to hide their lack of scientific training, or couch their beliefs in ways that appear on the surface to be scientific, but under scrutiny they have little or no substance.

Most often, pseudoscientists come from fields outside their normal discipline, what Isaac Asimov called "exoheterics." They work in isolation from the very scientific world they purport to be a part of. Velikofsky used to isolate himself in a library without discourse with other scientists, and Daniken hid out in Swiss hotels to write his book *Chariot of the Gods*. Now some reputable scientists are hermit-like, and prefer to work alone. But even they eventually submit their work for peer review.

Pseudoscientists do not--less than 1% of their work is ever submitted to reputable scientific journals--showing that not only are they afraid of criticism, they don't even make an attempt to have their work reviewed.

Okay, so I've set the stage that voodoo science is important. Now, with what little time is left, let me just highlight two examples--these will be my two ugly hypotheses, both of which will be rejected by beautiful facts.

First, let me state that much of the history that follows was paraphrased from Linus Pauling's book, *Vitamin C and the Common Cold*, or obtained from various websites on the internet. I start by going back over 500 years ago. In 1497, Vasco de Gama, the great Portugese navigator made a voyage from Lisbon to Calicut in India. The trip began on July 9th and ended nearly 11 months later, on May 20th. At the beginning of his trip there were 160 healthy sailors. By the time he arrived in Calicut, 100 of these had died--from scurvy.

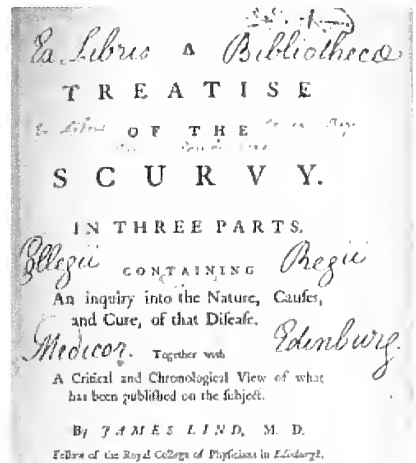
In another instance, Admiral George Anson, of the Royal British Navy, set sail in late 1740 for the Juan Fernandez islands, with six ships manned by 961 sailors. When he arrived in June of 1741, only 335 sailors were still alive, and nearly half of those that died did so from scurvy. The French explorer Jacques Cartier, who discovered the St. Lawrence River and sailed to the present site of Quebec, suffered the loss of 25 of his men to scurvy.

Scurvy as we know today is a Vitamin C deficiency disease, and results in an inability to synthesize collagen, causing gum and skin lesions, and eventual death. Despite its deadly consequences, the cure for scurvy was known as far back as the 1400s, where documents suggested that a varied diet, most notably one that included citrus juices, staved off the symptoms. Yet its adoption for use by sailors and explorers took another nearly *three* centuries before it was made routine.

Native Americans had advised Cartier and his men to drink a tea made from the arbor vitae tree, *Thuja occidentalis*. This stemmed further progression of scurvy, and today we know that the needles of this conifer contain about 50 mg of Vitamin C per 100 g of needles.

The most widely respected study of scurvy was carried out by the Scottish physician James Lind in 1747, just a few years after Admiral Anson's fateful expedition. Lind conducted one of the first systematic studies of potential cures for scurvy. Here I show the frontispiece and several pages of his opus, *A Treatise on Scurvy*, which was published in 1753.

Frontispiece of James Lind's Treatise of the Scurvy



The following are the experiments.

On the 20th of May 1747, I took twelve patients in the scurvy, on board the *Salisbury* at sea. Their cases were as similar as I could

U R G H
 1747, 2nd October
 J. A. DONALDSON.
 17111.

192 *Of the prevention of the scurvy. Part II.*
 have them. They all in general had putrid gums, the spots and lassitude, with weakness of their knees. They lay together in one place, being a proper apartment for the sick in the fore-hold; and had one diet common to all, *viz.* water-gruel sweetened with sugar in the morning; fresh mutton-broth often times for dinner; at other times puddings, boiled biscuit with sugar, &c.; and for supper, barley and tailins, rice and currants, sago and wine, or the like. Two of these were ordered each a quart of cyder a-day. Two others took twenty-five guts of *elixir vitriol* three times a-day, upon an empty stomach; using a gargle strongly acidulated with it for their mouths. Two others took two spoonfuls of vinegar three times a-day, upon an empty stomach; having their gruels and their other food well acidulated with it, as also the gargle for their mouth. Two of the worst patients, with the tendons in the ham rigid, (a symptom none of the rest had), were put under a course of sea-water. Of this they drank half a pint every day, and sometimes more or less as it operated, by way of gentle physic. Two others had each two oranges and one lemon given them every day. These they eat with greenness,

In some of the earlier studies the juices had been boiled first, which reduced the effective concentration of Vitamin C, since it is somewhat heat labile. This resulted in some studies not being able to demonstrate any benefits with regards to scurvy from drinking citrus juices, which confused the situation. But Lind's results eventually prevailed, and in 1795 the Royal Navy finally ruled that all British sailors should be given a daily dose of *unboiled* lime juice, which effectively eliminated scurvy from the Navy. It also resulted in British sailors being called "limeys"! The British Merchant Marine, not wanting to jump on any bandwagons, waited another 70 years before recognizing the benefits of lime juice, despite these early positive results from the Royal Navy.

Back in the United States, scurvy was also prevalent in our Merchant Marines. Richard Henry Dana, in his great book, *Two Years Before the Mast*, wrote the following about dealing with scurvy:

"...and the steward, taking a few bunches of onions for the cabin, gave the rest to us.... We carried them forward...and ate them raw.... And a glorious treat they were.... We were ravenous for them.... We ate them at every meal."

Onions are high in Vitamin C, and this was a very practical solution to the scurvy problem, since without refrigeration, citrus fruits quickly spoiled on board, whereas onions kept fresh for months. They may not have had the greatest breath in the world, but at least they didn't have scurvy either!

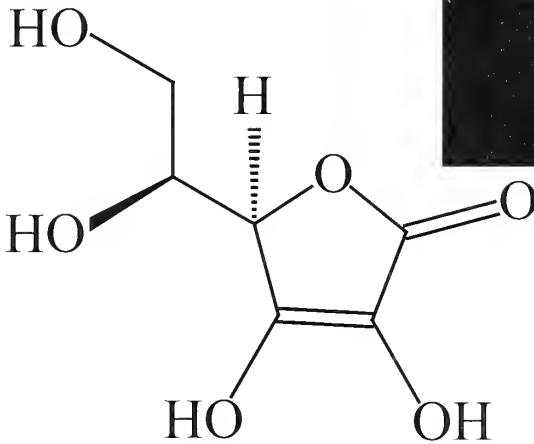
Curiously, not all explorers in the late 18th and 19th centuries suffered from scurvy. During his three voyages around the Pacific, many of which lasted for years, Captain Cook lost not a single man to scurvy. Why? What did this British captain do differently from the other explorers and sailors of his day?

Cook was a believer in eating fresh vegetables and fruits. At every landfall, he stocked his ships with fruits, all sorts of vegetables, and most importantly, sauerkraut. On one voyage, he brought on board nearly 8000 pounds of the stuff! I personally am very fond of this boiled cabbage product. Yet I resisted putting it on the banquet menu tonight, much to everyone's relief I expect. In elementary school, I was one of the few kids who would eat the stuff, and all the other kids would dump their sauerkraut on my plate, thereby guaranteeing, much to my delight, a heaping plateful whenever the cafeteria staff served it (Thanksgiving dinner was the usual time it was served where I grew up in Maryland).

Turns out sauerkraut is also a great source of Vitamin C. Even after being cooked, it still has about 30 mg per 100 g, and it can stay fresh longer than many other vegetables.

So by the mid-19th century scurvy was a thing of the past, but it wasn't until the early 20th century before the active substance was isolated and characterized. Albert Szent-Gyorgyi, a plant biochemist, was the first person to isolate Vitamin C, or ascorbic acid.

Albert Szent-Gyorgyi
c. 1920's

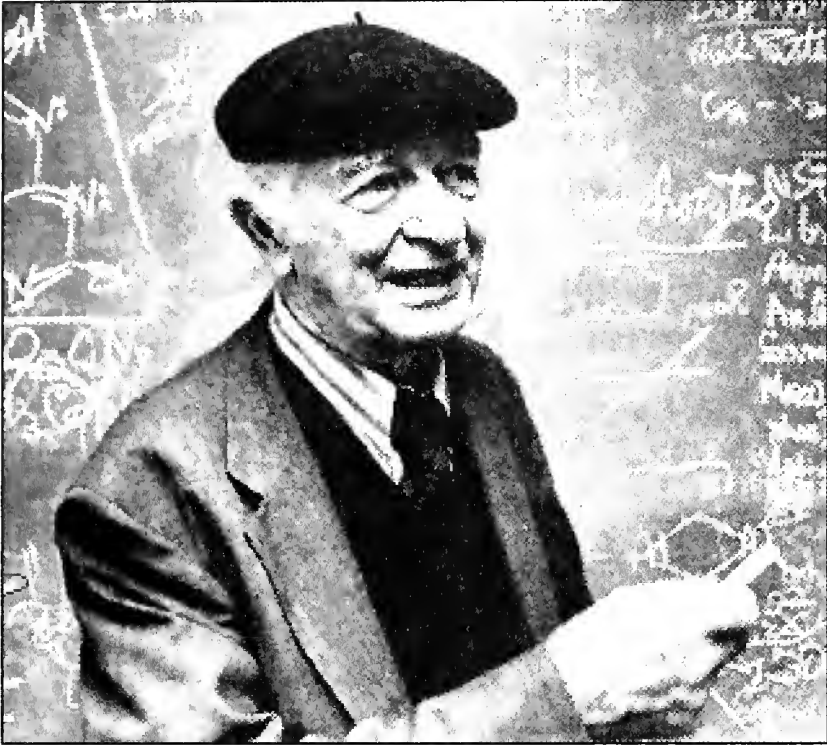


Structure of Ascorbic Acid

And only within the last 10 years has the biosynthetic pathway been fully worked out, allowing some in the molecular community to speculate that the genes for ascorbate production can be manipulated to increase production in crop plants.

So by now I'm sure you're wondering, why he is telling us all about scurvy and Vitamin C? Well, a hint might be gained by my first ugly hypothesis: *If a little Vitamin C is good for you, then more should be even better.*

This hypothesis is made all the more remarkable because it was promulgated, in large part, by one of the most respected scientists of this or any other century, Linus Pauling, the only person to ever have won two independent Nobel prizes (one for Chemistry in 1954 and one for Peace in 1962).



Linus Pauling

Beginning in 1968 Pauling began suggesting that the RDA's (recommended daily allowances) for vitamins were too small for most people. He even suggested that megadoses of vitamins, a therapy he termed "orthomolecular, or, right molecule," could cure mental illness, and cancer.

Wrote Pauling: "It is better to treat disease by means of substances occurring normally in the body than to resort to powerful synthetic substances that generally produce toxic side effects. By orthomolecular medicine I mean therapy entailing varying concentrations of such low-toxicity substances as vitamin c and other vitamins which are normally found in the body and which are necessary to good health."

In his book, *Vitamin C and the Common Cold*, he suggested that if you took 1,000 mg of Vitamin C (when the RDA was 60 mg) you could fight off colds, and even went so far as to say that 45% of those who took these doses would not get colds. By this time, Pauling himself was taking an average of 12,000 mg of Vitamin C a day, and would increase this to nearly 40,000 mg when he felt ill. Pauling died in 1994 of prostate cancer. While undergoing treatment, he said that had he not taken his high doses of Vitamin C, he would have contracted the disease 20 years earlier - a nonscientific and untestable assessment of the efficacy of his treatments.

Stephen Barrett, M.D., has summarized the impacts of Pauling's Vitamin C therapies, as well as the scientific and medical trials designed to test the efficacy of Vitamin C in treating the common cold. Barrett is a co-author on the bestselling college text titled: *Consumer Health: A Guide to Intelligent Decisions*, published by McGraw-Hill, and also maintains the excellent website, *QuackWatch.com*.

Despite Pauling's claims, over 16 different clinical trials now undisputably show that taking Vitamin C will not prevent you from getting a cold and it is absolutely useless in preventing cancer. Those are clear, unambiguous, and beautiful facts, and the hypothesis is now no longer accepted by respectable scientists. An ugly hypothesis rejected.

Nutritionists now recommend that small amounts of Vit C, in the range of 60-200 mg/day, are sufficient to keep people healthy. And even the Linus Pauling Institute now sings a different tune when it comes to Vit C. I quote from their webpage: "...It is important to note that two recent studies by a group of scientists at the National Institutes of Health (NIH) have indicated that vitamin C concentrations in cells and tissues are saturated at a daily intake of 100 to 200 mg."

The Institute has backed away from Pauling's early megadose recommendations and suggests adults take no more than 200 mg/day. As one biochemist stated, if you take megadoses of Vit C, all you are producing is expensive urine (your body cannot store Vit C which is water soluble).

So why harp on the Vit C issue? Because it is clear that the public has not accepted this rejection! And that is having severe consequences. Pauling's advocacy of megadoses of Vit C to prevent the common cold has made its way into medicine as modern folklore. To this day, people continue to take large doses of Vit C when they feel a cold coming on, without realizing how little effect it has, except on their pocketbook. I daresay some of you in this room might do it. I won't ask for a show of hands--as if after this diatribe any of you would raise them anyway!

At the same time, drug companies have not been reticent about promoting the benefits of Vit C, however fictitious, while laughing all the way to the bank as they pad their corporate profits at the public's expense. It is estimated that the Vit C market in the United States alone involves hundreds of millions of dollars per year, and perhaps billions worldwide.

In a recent report, The National Academy of Sciences stated that there is no credible scientific evidence that Vit C, E or selenium prevent colds, yet the drug industry continues to promote these items for doing exactly that. And in a similar vein, they now promote the use of herbal remedies for everything from curing memory loss by taking ginkgo biloba, to boosting the immune system with Echinacea tablets, to stimulants made from Ephedra, or kava. Ginkgo will cause blood vessels to dilate, but there is absolutely no evidence that increased blood flow to the brain will increase memory abilities. No studies have shown that Echinacea has any impact on your immune system, and both Ephedra and kava have recently been shown to be dangerous for certain groups of people, and kava is under consideration for withdrawal by the FDA.

Yet, society continues to purchase and take herbals as if they are some magic remedy come to cure all their ills. It is the modern equivalent of the snake oil salesman, except it is happening in the 21st century, not the 19th. And the costs, besides the health ones? To the tune of nearly \$5 billion dollars a year for the purchase of herbals, almost none of which are either regulated for safety or quality. Clear and simple, this is pseudoscience, junk science and pathological science all wrapped up in one.

So many people take herbals now in what must be construed as a backlash against western science that the notion of complementary medicine has risen to the fore. The NIH has even formed a unit devoted to the study of Alternative and Complementary Medicines. While the impetus for setting this up came from Congress for dubious reasons, as long as they stick to doing good science on the impacts of herbals then they can make a substantial contribution to our collective scientific literacy. Let's hope they stick to that goal.

So, getting back to the Vit C issue. How were so many fooled into believing that Vit C could help you if you had a cold? Certainly appeal to authority had a lot to do with it. It is perfectly reasonable to assume that if a two-time Nobel Laureate tells you that Vit C will cure the common cold, you're going to listen to him. But blind appeal to authority must have limits and reason. It is reasonable to defer to people who appear to have more credibility than we do for advice and guidance, but we should always reserve a healthy amount of skepticism for anyone who touts a miracle cure-all. Such claims have been around for thousands of years, and of course violate the two dictums mentioned earlier about what constitutes science and what does not. But when it comes to health fraud, we appear not to learn from our past mistakes. Take this little ditty for example:

A Short History of Medicine

I have an earache:

2000 B.C. – Here, eat this root.

1000 A.D. – That root is heathen. Here, say this prayer.

1850 A.D. – That prayer is superstition. Here, drink this potion.

1940 A.D. – That potion is snake oil. Here, swallow this pill.

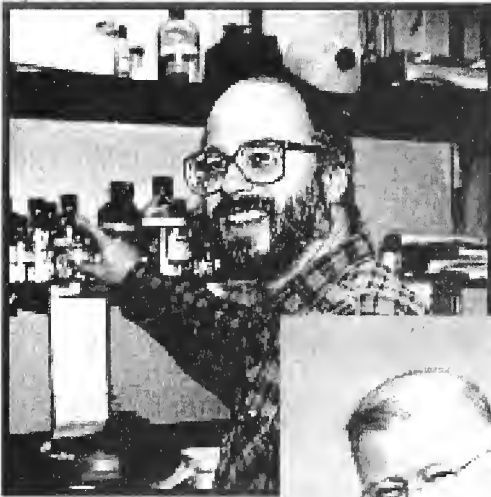
1985 A.D. – That pill is ineffective. Here, take this antibiotic.

2000 A.D. – That antibiotic is artificial. Here, eat this root.

American's spend over \$3 billion dollars per year on vitamins, most of which have little or no effect on their health according to David Nieman *et al.* in their 1992 text on nutrition, and which agrees with the latest NAS findings. A great source of information on nutritional pseudoscience can be gained from The National Council Against Health Fraud, which publishes a bimonthly newsletter, full of the latest pseudoscientific claims, and other medically or nutritionally related junk science. Note in proof: the National Academy of Sciences just issued a new report which suggests that there might be some benefit to taking a multi-vitamin pill once a day, even in healthy people. Watch for more developments on this front.

Okay, enough health fraud. Let's move over to the one topic that all biologists agree is central and pivotal to the field--evolution. Ever since Darwin, the battle between creationists and evolutionists has been fiercely waged. Today, a whole new

generation of creationists are making headlines, replacing the Duane Gish's and Henry Morris' of previous years. Avoiding the term creationism, because it connotes Biblical fundamentalism, and negativism, they instead promote what is known as Intelligent Design (ID), but which is really just a thinly veiled attempt to push creationism and the Bible into the classroom--again.



Michael Behe



William Dembski



Philip Johnson

Led by Michael Behe, a biochemist from Lehigh University who wrote *Darwin's Black Box*, they argue that organisms exhibit *Irreproducible Complexity*, or in other words, natural selection simply could not have produced the complex biochemical reactions seen in living organisms, nor resulted in the selection of other complex systems, such as the eye or immune system. The movement's other poster child is Phillip Johnson, a retired lawyer from the University of California-Berkeley, who wrote *Darwin on Trial* and more recently *Defeating Darwinism by Opening Minds*. The third author in the ID triumvirate is William Dembski, who has published *Intelligent Design: The Bridge Between Science & Theology*, and *No Free Lunch : Why Specified Complexity Cannot Be Purchased Without Intelligence*.

I'm sure many of you are following the ID movement, and much of what I might say is old hat to you. The latest issue of *Natural History* magazine has a nice collection of articles on ID, half written by ID proponents, and half by evolutionary scientists. It's worth a good read.

Currently, Behe, Dembski and Johnson are much involved in attempts around the country to have ID brought into the science classroom as a viable alternative theory to evolution. Witness their attempts to have ID introduced into the Ohio state education standards.

Their argument, in a nutshell, is that certain systems are too complex to have simply evolved on their own. Behe uses the immune system as his example, stating that such a complex chain of reactions could not have evolved for its present purpose one step at a time, because it takes all the steps for it to work at all.

And thus we arrive at our second ugly hypothesis: ID is a valid scientific theory, worthy of being taught alongside evolutionary theory.

Brown University biologist Kenneth R. Miller, who admits to being very religious, has convincingly shown scientists and the public how our present day immune system evolved from more primitive versions, one step at a time. It is this very system upon which Behe based much of his book. But the concept of irreducible complexity fails, not only because it cannot be scientifically defined, but because its very premise has been shown to be false. It fails to satisfy either of the two precepts set forth by Robert Park. And it also fails because the facts of evolution are there, in contradiction to what is proposed by the ID movement. Once again, beautiful facts destroying another ugly hypothesis.

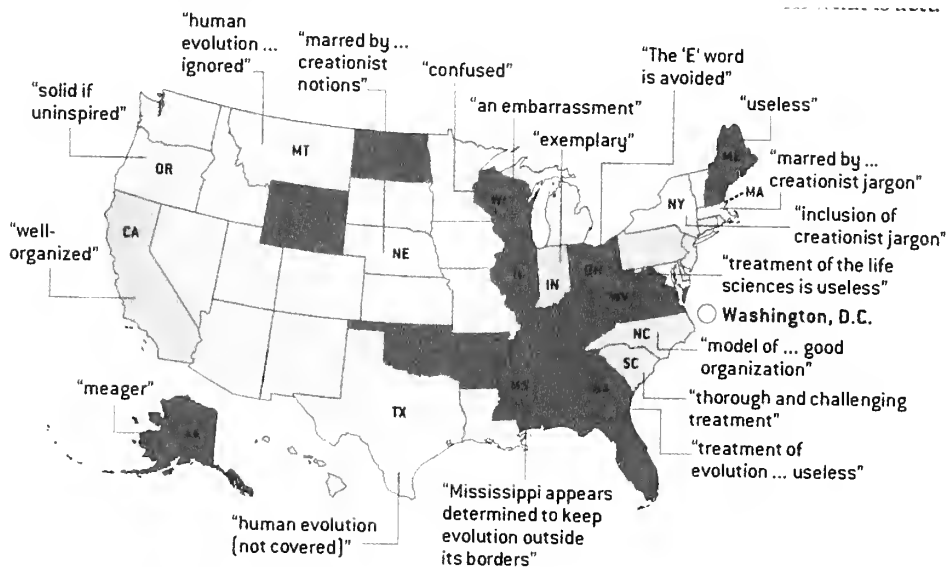
It is clear that ID is yet another attempt to reinsert creationist ideas into the science classroom. The late Stephen Jay Gould, in his book *Rocks of Ages*, laid out the separation of religion and science as two magisteria whose domains do not, and should not, overlap. It is improper to teach religion as a viable alternative to science, and vice-versa, as science is no *sine qua non* for religion.

As members of a biological advocacy association, which in essence is what ASB is, it is our responsibility to speak up when creationists or ID proponents attempt to weasel their way into the science curriculum. In some states, they have already made inroads. Alabama requires a disclaimer in the front of its biology texts. This discriminatory treatment of one discipline over others is disheartening not only to teachers, but to students as well. Luke Collins, a high school student in Alabama has written this letter, and I quote most of it to you:

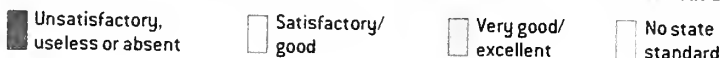
“By continuing an infamous ‘Evolution Warning Label’ in textbooks, the Alabama State Board of Education has made life more difficult for me, a high school junior looking forward to a career in the life sciences....”

“The intent of this disclaimer, ...is to discourage teachers from teaching evolution—the basis for all biology. This is roughly equivalent to teaching chemistry by saying ‘No one has seen atoms, so their existence remains controversial.’ Just how does the board expect students to master a subject without learning its foundations? My dream is to attend a renowned college such as Duke or Washington University. I can see myself sitting down with the admissions committee and worrying whether they are thinking, ‘Oh, this is that kid from Alabama, where the school board mandates 17th century biology.’”

"One thing is sure. The board has guaranteed that 'brain drain'--the loss of the best and brightest--will continue. Just as soon as I am able, I am emigrating to a state where the board is as serious about giving an education as I am in getting one."



Rating of Evolution Treatment in State Public School Science Standards



Well, he'd better be careful where he decides to move. Take a look at this map, from a recent issue of *Scientific American*. This shows how the states are doing in terms of their state mandates for the teaching of science, and in particular, evolution. The list was compiled by Lawrence Lerner, from California State University at Long Beach, and published by the Thomas B. Fordham Foundation. Red indicates states with failing grades regarding their mandates, and green those that are doing well (the report gives states grades from A to F). Although I'm happy to see that North and South Carolina appear to be doing well among all states, having good state mandates does not guarantee that they are implemented.

Poll on Teaching Evolution and Creationism

Teach Evolution to the exclusion of creationism	37%
Teach Creationism to the exclusion of evolution	16%
Teach both Evolution and Creationism	83%

Several years ago, I conducted a survey of some of my introductory biology students concerning how much time they spent on learning evolution in high school. Of those surveyed, nearly 68% reported that they received less than 2 weeks of instruction on the subject of evolution. In a later survey, I asked seniors here at ASU whether they had changed their opinions regarding the subject of evolution from those they had when they came here as freshman to those they now had after

having been exposed to it in our Introductory Biology course. Of those professing to have creationist leanings as entering freshmen, almost none found that taking the non-majors biology course had caused them to change their minds about evolution. This suggests to me that unless our students are exposed to evolution at an early age, we will never change their minds about it.

When People for the American Way conducted a nationwide poll of Americans' attitudes toward the teaching of evolution, they found that a huge majority, 83%, favored the teaching of evolution in the classroom, but most of these people also thought that creationism should be taught alongside evolution. Only 37% supported teaching evolution to the exclusion of creationism, while 16% wanted only creationism taught to the exclusion of evolution. It is clear that the majority of Americans do not clearly distinguish the two majesteria that Gould spoke so eloquently about.

It is clear that we have a long way to go. I suggest that one way to improve scientific literacy is to make sure that our very young children are exposed to the best science teaching that is possible. I was once told by a science educator that some elementary teachers chose teaching young children as a way of *avoiding* science. This is absolutely the wrong reason to go into teaching, and the worst thing that could happen to our kids. Yet, on occasion, the exceptional teacher does make a strong commitment to science at these early grade levels. And that can make all the difference in the world. We all saw the tremendous jobs that Mary Jo Pritchard and Judy Sink have done here in Watauga County, and what Marilyn Presnell has done in Iredell county. But they are, unfortunately, the exception rather than the rule.

I propose that elementary school systems consider hiring science specialists, just as they do for music, art, band, and physical education. Bring in those teachers for whom science is a joy and who have the enthusiasm to transmit that joy to their students. If we can do that, we can raise an entire generation of children who view science as a potential career to aim for, rather than something dreadful to avoid.

In a recent poll by the Bayer Corporation of young students' ideas toward science, nearly 90% of the children thought hands-on science was cool, hip, and not geeky. That innate enthusiasm for the scientific process must be nurtured all the way through the secondary school systems. And if we do that, then we may rest assured that science will continue to be a valuable and necessary component of our culture. And this new generation of scientists, our future ASB members, will find new and exciting avenues for inquiry, and build on the knowledge base that we and others have laid down. None of this nonsense about *The End of Science*, as John Horgan has written. Instead, it reminds me of my favorite scientific quote, from the science philosopher C.S. Sherrington who wrote in his book, *Man on his Nature*:

"And the pursuit whose quest is Nature's understanding, has among its rewards, that as it progresses its truth is testable. Truth is a 'value.' The quest itself therefore is in a measure its own satisfaction. We receive the lesson that our advance to knowledge is of the asymptotic type, even as continually approaching so continually without arrival. The satisfaction shall therefore be eternal." Thank you very much!

SYMPOSIUM

A symposium entitled "ENVIRONMENTAL PERSPECTIVES OF BIOTECHNOLOGY IN FOREST SYSTEMS" in the April, 2002 issue of *Southeastern Biology* was held Thursday afternoon, April 11, 2002, in the Integon Room of the Broyhill Inn and Conference Center of Appalachian State University. The symposium was organized and presided over by VIRGINIA TOLBERT, Oak Ridge National Laboratory, Oak Ridge, Tennessee, and featured four invited presentations by investigators in the field of forest biotechnology. A summary of each presentation follows plus an overall summary by the organizer.

Forecasting Social & Economic Consequences of Genetic Engineering in Forestry: Focus on the South

CONNER BAILEY (presenter)

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Genetic engineering (GE) could transform large parts of the South's forested landscape into a genetically identical patchwork of even-aged stands of trees. If regulatory and public concerns are overcome (Pew 2002), millions of acres—and the character of one of the rural South's most important industries—would be affected.

During the 1990s, the South became the nation's breadbasket, accounting for 58% of total timber harvests and 77% of total harvests of pulpwood (USFS n.d.). Existing plantations of loblolly pine (*Pinus taeda* L.) readily could be converted to production of GE trees. Region-wide, 32 million acres are in loblolly pine plantations, a figure projected to increase to 54 million by the year 2040 (Wear and Greis 2001).

The adoption of GE trees could lead to the concentration of economic and social power within the forest products industry. Most benefits would accrue to those who control genetic resources. Corporate managers could furnish their mills primarily or exclusively with GE trees grown on their own land, eliminating the market for wood grown by non-industrial private forest (NIPF) landowners. Alternatively, mills could rely upon NIPF owners willing to pay the price premium needed to obtain GE seedlings. Ownership of GE planting materials will make it possible to dictate production practices and marketing outlets available to growers, leading to a production system that resembles that used today in the poultry industry. GE pine plantations will serve the needs of industrial-scale operations (e.g., pulp and paper

mills). Smaller forest-based enterprises like small sawmills and furniture manufacturers will become increasingly marginalized.

Not all forest landowners will have equal access to this new GE technology. Owners of relatively small parcels are not likely to adopt GE forestry due to the costs involved. Similarly, landowners outside of the coastal plain, where plantation pines are most common, may not have access to these new cultivars. To the extent that major buyers like pulp and paper mills orient their production processes to take advantage of unique characteristics (e.g., reduced lignin content) of GE trees, landowners interested in producing pulpwood but who do not have access to GE seedlings will find they have no market, or that their timber will be sold at a discount. Thus, by reason of scale or physical location, certain classes of NIPF owners could find themselves with fewer options for earning income from their timber. They too will be marginalized.

Forecasting the likely impact of GE forestry involves considerable speculation. It may be that trees which channel growth towards wood rather than production of branches, seed and pollen will have consequences for wildlife (affecting both commercial and subsistence hunting). It may be that GE trees lead to the introduction of new genetic material into the wild, with potentially disastrous consequences. It may also be speculated that extensive plantations of GE pines in the future could be attacked by unanticipated pathogens, undermining the rural South's economy. But on the main points raised in this essay, there is little room for speculation. Based on the experience of GE in agriculture and the social science literature on the adoption and diffusion of technical innovations, we can predict with confidence that GE in forestry will lead to significant concentration of economic power within the forest products industry. While some will benefit, opportunities for others will be foreclosed. The consequences of economic concentration in the context of the rural South, where problems of persistent poverty are common, deserve careful consideration.

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Biotechnology in Tree Improvement: Controversy versus Capability

STEPHEN P. DIFAZIO

Environmental Sciences Division, Oak Ridge National Lab, Oak Ridge, TN 37831-6422

Tremendous advances have been made in forest biotechnology over the past decade, promising substantial enhancements in the productivity, management, and environmental characteristics of high-intensity forestry operations. However, there is also significant concern among some sectors of the public about potential negative impacts of cultivating transgenic trees. Major environmental groups such as Greenpeace and the Worldwide Fund for Nature have called for a moratorium on field trials of transgenic trees, and some extreme groups have even resorted to domestic terrorism, including fire-bombing of facilities that are suspected of being involved in forest biotechnology. Do the risks of this technology merit the level of controversy it has engendered? This question can be addressed by analyzing the current capability of genetic engineering to confer ecologically novel traits, and methods for assessing and mitigating the risks of undesirable impacts of transgenic organisms.

Genetic engineering usually involves the isolation, reconfiguration, and asexual transfer of DNA between organisms. The technology is revolutionary in the sense that evolutionary and biological constraints are circumvented, resulting in the creation of organisms with completely novel traits. Some notable examples include trees that express bacterial genes that confer complete resistance to defoliating insects, and genes that allow trees to tolerate direct application of normally lethal herbicides. Concerns have been raised that this technology will result in significant agronomic impacts, including the creation of more vigorous weeds, or the spread of herbicide and insecticide resistance among pests. There is also substantial concern about wider ecological impacts of transgenic forestry, including replacement of native trees by superior transgenic trees derived from plantations, degradation of the viability of native tree populations due to infiltration of transgenes, and unintended effects of transgenes on nontarget organisms (e.g., harm to beneficial insects by insecticidal proteins produced by transgenic trees).

Standard ecological risk assessment methods can be adapted to assess potential impacts of transgenic plantations. Ecological and agronomic impacts will depend on the specific hazards posed by transgenic organisms and overall exposure to the organisms. The hazards will depend on specific traits conferred by the transgene (e.g., enhanced growth due to insect resistance), the biology of the transformed species (e.g., invasive potential, outcrossing rate), and the environment of release. Exposure will be primarily controlled by the area of cultivation, the level of gene flow from plantations, and the ability of transgenic progeny to survive and spread in the wild.

All of the parameters affecting transgenic invasiveness can be estimate by field experiments. However, the process of biological invasion is extremely complex, with large spatial and temporal variability and multifaceted biological interactions between the introduced and native species. Therefore, spatial simulation modeling is required to integrate the disparate data and perform virtual experiments to identify

the primary factors controlling invasiveness. Modeling can help prioritize research efforts and identify means for preventing or mitigating undesirable ecological impacts of transgenic plantations. For example, simulation modeling with hybrid poplar transgenics indicated that reduced reproductive fertility could strongly inhibit the spread of transgenic trees, even in cases where transgenic competitiveness greatly outstripped that of native trees.

The question of ecological risks of transgenic trees is therefore extremely complex, and can only be meaningfully addressed with large field trials over multiple years, coupled with spatial simulation modeling and sensitivity analysis. However, as is the case for all technology, substantial uncertainty will remain about the safety of genetic engineering regardless of the scope and magnitude of risk assessment efforts. Therefore, decisions about deployment of transgenic trees will ultimately require balancing the incremental risks of this technology against the benefits compared to conventional forestry practices.

Hybrid Poplar in Minnesota

BILL BERGUSON, NEIL NELSON, AND JOANN HANOWSKI

University of Minnesota Natural Resources Research Institute, Duluth, Minnesota
55811

The large forest products industry faced serious issues of available aspen fiber sources and stumpage prices rising from \$5 in February 1991 to \$32 by February 1995. In addition, legislation for continued storage of spent nuclear fuel required that the Minnesota utilities purchase at least ten percent of their power resources from renewable energy. These two factors led to serious interest in growing hybrid poplar as alternative crops in Minnesota for both economic and environmental values. The Minnesota Hybrid Poplar Research Cooperative was formed by research and fiber industries in 1996 to study options for breeding, clone testing, and plantation management research that could improve yields and identify nutrient requirements. Nutrient requirements and responses were poorly understood and had both economic and environmental impacts from over application with no response. Exploring the habitat value for wildlife was an important component of the research both for developing plantation management strategies and for acceptance of plantations by public, environmental, and producer groups. Questions raised were species use, species replacement with land-use conversion to plantations, and how to increase plantation diversity. Results showed that the total number of individuals increase as plantations age, species richness remained relatively constant, and species that colonize plantations are generally found in adjacent habitats. The value and use of hybrid poplar plantations to provide fiber and energy resources while maintaining environmental benefits is dependent upon habitat location, replacement of cropland with poplar plantation to provide the greatest benefits, and maintaining a diversity of planting age to provide successive habitat resources. Environmental studies for sustainable production and use of hybrid poplar require matching site characteristics with use, avoiding production on highly erodible sites, fitting the plantations into the landscape to link forested areas rather than replacing forests, and avoiding large areas of single-aged plantations.

Intensive Forest Management in the South and Implications for Biological Diversity: An Industry Perspective

T. BENTLY WIGLEY

National Council for Air and Stream Improvement, Inc., PO Box 340362, Clemson, SC 29634-0362

For many reasons, forest management policies and practices are changing in the South on all ownerships. Management practices on industry lands, which represent about 20% of forests in the South, are evolving in response to market conditions (e.g., increasing demand), environmental objectives (e.g., those associated with certification programs), uncertainties about timber supplies from public and nonindustrial private lands, and increased competition. Because of these and other considerations, more forests in the South are coming under active management and the proportion of southern forests managed as plantations is projected to increase modestly. Future stand-level management strategies on some plantations will feature increased use of genetically improved planting stock, herbicides, and fertilizers, and less use of prescribed fire. These practices typically lead to more rapid tree growth, and potentially to more rapid canopy closure and abbreviated rotations. Usually, these practices also yield higher Net Present Values and Rates of Return than do less intensive forest management approaches (e.g., site prep plus planting only).

The overall impacts of these practices on stand-level habitat and wildlife communities are somewhat uncertain and may be attenuated by considerations at several scales. In stands on pulpwood rotations, earlier canopy closure and more vegetation control could diminish stand-level biomass and cover of understory vegetation, change its species composition (i.e., favor grass), and reduce the availability of soft mast and hardwood midstory vegetation. On the other hand, because of higher survival rates of genetically improved trees and more rapid growth, landowners may use wider tree spacings and more and earlier thinnings in stands on sawlog rotations. At the landscape level, the nature and scope of intensive management practices will continue to vary among ownerships, physiographic regions, and specific sites. Also, through involvement in forest certification programs, many forest products companies have committed to consider and contribute to the conservation of biological diversity at multiple spatial scales. For example, participants in the Sustainable Forestry InitiativeSM must have policies to promote habitat diversity, programs to protect threatened or endangered species, and plans that describe how they will retain stand-level habitat.

Because of these considerations, biological diversity at the regional level could remain largely unaffected by an increasing intensity of forest management and more use of genetically improved trees on selected areas. However, continued collaboration among landowners, natural resource agencies, and other partners is required to ensure that southern forests provide desired ecological and economic functions and values now and in the future.

Opportunities and Impacts of Forest Biotechnology Forest Biotechnology Session Summary

VIRGINIA TOLBERT

Bioenergy Feedstock Development Program, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831-6422; 2002 Chair, Association of Southeastern Biologists Conservation Committee

In October of 2001, The Pew Initiative, Society of American Foresters, and the Ecological Society of America looked at the opportunities and impacts of forest biotechnology in a conference "Biotech Branches Out" held in Atlanta, Georgia. This conference well defined the areas of concern for forest biotechnology from historical, public, environmental, economic, and regulatory perspectives. There were several key points from this conference, available at www.PewAgBiotech.org, that are applicable to the symposium held at the Boone meeting. The conference identified the need for new methods to analyze risks and benefits to address the uncertainties and subjectivity of risk decisions for use/adoption of biotechnology. The need to weigh environmental impacts versus the costs of not pursuing the technology, identifying the drivers for development and adoption of the technology, and the need for public/consumer input and value were identified as important components. Potential benefits identified by both conferences were the potential to increase wood yields and quality, reduce the pressure on natural forests through intensive management, provide alternative economic benefits for smaller landowners and for the forest industry. Concerns raised and discussed were the potential for these woody crops to become invasive as the result of inserting genetic material for insect or herbicide resistance and out crossing of the genetically modified plant material with natural populations. Issues raised were the long-term persistence of impacts because of the long life spans of trees, the difficulty of tracking "escapees" and reversing the damage, and the difficulty to predict long-term consequences on complex ecosystems, and potential inequities between large and small landowners. These questions will continue to be debated as genetic crosses are made to increase productivity and as unique genetic material is inserted into the best available genetic plant material to increase productivity and reduce disease and insect susceptibility. The need to meet economic fiber and energy requirements, reduce economic, social and environmental costs, and provide for public involvement will continue to be needed as researchers and producers continue efforts to identify the best approaches to increase productivity to meet current needs. This interaction and exchange will also need to be continued as researchers work to tailor tree crop composition for fiber, energy, industrial bio-products, and environmental remediation to meet future needs. The current genetic and biotechnology research will provide the hard data on productivity and how to minimize the potential for impacts of "escapes" on natural forests. While session participants and discussants agreed that there is a role for forest biotechnology to meet the fiber requirements in the Southeast, they identified the need to continue to address social, environmental, and economic questions in parallel with development of forest biotechnology is needed to ensure that there are no unacceptable long-term environmental consequences.

**ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
TREASURER'S REPORT, FY 1 JANUARY – 31 DECEMBER 2001**

I. BEGINNING BALANCE	(Actual bank balance, 31 December 2000)	\$73,391	
II. RECEIPTS			
Non-Patron Dues		20,290	
Patron Dues		2,000	
Meeting Revenue		28,503	
Enrichment Fund		1,585	
Interest		2,293	
Royalties		102	
Carolina Biological Supply Co., Meritorious Teaching Award		1,500	
TOTAL RECEIPTS			\$56,273
III. TOTAL RECEIPTS AND BEGINNING BALANCE			\$129,664
IV. DISBURSEMENTS			
1. Dues Notice		0	
2. Publications			
ASB Bulletin 47(4)	2,359		
ASB Bulletin 48(1)	2,196		
ASB Bulletin 48(2)	7,195		
ASB Bulletin 48(3)	4,934		
ASB Bulletin 48(4)	0		
Publications Total		16,684	
3. Office Expenses		309	
4. Official Travel		2,149	
5. Awards and Honoraria			
Graduate Student Support Grants	7,269		
Speaker Honorarium	0		
Speaker Travel	0		
Aquatic Biology Award	200		
ASB Research Awards	600		
Certificates/Plaques	163		
ASB Poster Award	300		
Carolina Biological Teaching Award	1,500		
Outstanding Science Teachers	500		
Total Awards		10,532	
6. Interim Meeting		526	
7. Miscellaneous			
Affiliations	300		
Local Committee	1,000		
Symposia, Workshops	0		
Bank Charges	481		
Web Site	420		
Liability Insurance	550		
Total Miscellaneous		2,751	
TOTAL DISBURSEMENTS			\$32,951
V. ENDING BALANCE	(Actual bank balance, 31 December 2001)		\$96,713
VI. NET CHANGE FOR 2001			\$23,322

**ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
2001 BUDGET ON 31 DECEMBER 2001**

	Budget	Actual	Variance
I. RECEIPTS			
Non-Patron Dues	18,000	20,290	2,290
Patron Dues	2,500	2,000	(500)
Interest	4,000	2,293	(1,707)
Meeting Revenue	5,000	7,312 C	2,312
		21,191 NO	21,191
Carolina Biological Supply Co.			
Teaching Award	1,500	1,500	0
Martin Microscope Student			
Research Award	600	0	(600)
WILDCO Aquatic Biology Award	200	0	(200)
Enrichment	0	1,585	1,585
Royalties	0	102	102
TOTAL RECEIPTS	31,800	56,273	24,473
II. DISBURSEMENTS			
1. Dues Notice	0	0	0
2. Publications			
ASB Bulletin 47(4)	0	2,359	(2,359)
ASB Bulletin 48(1)	3,000	2,196	804
ASB Bulletin 48(2)	8,000	7,195	805
ASB Bulletin 48(3)	3,500	4,934	(1,434)
ASB Bulletin 48(4)	3,000	0	3,000
3. Office Expenses	300	309	(9)
4. Official Travel	1,500	2,149	(649)
5. Awards and Honoraria			
Grad. Student Support Grants	7,500	7,269	231
Aquatic Biology Award	200	200	0
Speaker Honorarium	1,000	0	1,000
Speaker Travel	1,000	0	1,000
Research Awards	1,200	600	600
Certificates/Plaques	300	163	137
Poster Award	300	300	0
Carolina Bio Sup Teaching			
Award	1,500	1,500	0
Outstanding Teacher	0	500	(500)
6. Interim Meeting	500	526	(26)
7. Miscellaneous			
Affiliations	200	300	(100)
Local Committee	500	1,000	(500)
Symposia, Workshops	2,000	0	2,000
Bank Charges	250	481	(231)
Web Site	500	420	80
Liability Insurance	0	550	(550)
TOTAL DISBURSEMENTS	36,250	32,951	3,299
III. BALANCE	(\$4,450)	\$23,322	\$27,772

**ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
2002 BUDGET ON 10 APRIL 2002**

	Budget	Actual	Difference
I. RECEIPTS			
Non-Patron Dues	23,000	6,115	(16,885)
Patron Dues	3,500	2,000	(1,500)
Interest	4,000	273	(3,727)
Meeting Revenue	5,000	0	(5,000)
Carolina Biological Supply Co.			
Teaching Award	1,500	1,500	0
Martin Microscope Student			
Research Award	600	0	(600)
Aquatic Biology Award	200	0	(200)
Enrichment	0	795	795
TOTAL RECEIPTS	37,800	10,683	(27,117)
II. DISBURSEMENTS			
1. Dues Notice	0	0	0
2. Publications			
ASB Bulletin 48(4)	0	2,102	(2,102)
ASB Bulletin 49(1)	3,000	2,129	871
ASB Bulletin 49(2)	8,000	0	8,000
ASB Bulletin 49(3)	3,500	0	3,500
ASB Bulletin 49(4)	3,000	0	3,000
3. Office Expenses	300	127	173
4. Official Travel	1,500	0	1,500
5. Awards and Honoraria			
Graduate Student Support Grants	7,500	4,395	3,105
Aquatic Biology Award	200	0	200
Speaker Honorarium	1,000	0	1,000
Speaker Travel	1,000	0	1,000
Research Awards	1,200	0	1,200
Certificates/Plaques	300	0	300
Poster Award	300	0	300
Carolina Bio Sup Teaching Award	1,500	0	1,500
Outstanding Teachers	1,000	0	1,000
6. Interim Meeting	500	0	500
7. Liability Insurance	550	586	(36)
8. Affiliations	200	0	200
9. Local Committee (DC)	500	0	500
10. Symposia, Workshops	2,000	0	2,000
11. Bank Charges	250	134	116
12. Web Site	500	420	80
TOTAL DISBURSEMENTS	37,800	9,893	27,907
III. BALANCE	\$ 0	\$790	\$790

**ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
2003 PROPOSED BUDGET**

I. BEGINNING BALANCE		\$ 0
II. RECEIPTS		
Non-Patron Dues	23,000	
Patron Dues	3,500	
Interest	4,000	
Meeting Revenue	5,500	
Carolina Biological Supply Co.		
Teaching Award	1,500	
Martin Microscope Student Research Award	600	
Aquatic Biology Award	200	
Enrichment	1,500	
TOTAL RECEIPTS		\$39,800
III. TOTAL RECEIPTS AND BEGINNING BALANCE		\$39,800
IV. DISBURSEMENTS		
1. Dues Notice		0
2. Publication		
ASB Bulletin 50(1)	3,000	
ASB Bulletin 50(2)	8,000	
ASB Bulletin 50(3)	5,000	
ASB Bulletin 50(4)	3,000	
Total Publication		19,000
3. Office Expenses		300
4. Official Travel		1,600
5. Awards and Honoraria		
Graduate Student Support	7,500	
Aquatic Biology Award	200	
Speaker Honorarium	1,000	
Speaker Travel	1,000	
Research Awards	1,200	
Certificates/Plaques	200	
Poster Award	300	
Carolina Bio Teaching Award	1,500	
Outstanding Teachers	1,000	
Total Awards and Honoraria		13,900
6. Interim Meeting		500
7. Liability Insurance		550
8. Affiliations		200
9. Local Committee		1,000
10. Symposia, Workshops		2,000
11. Bank Charges		250
12. Web Site		500
TOTAL DISBURSEMENTS		\$39,800
V. NET BALANCE FOR YEAR		\$ 0
VI. ENDING BALANCE		\$ 0

**ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
ENRICHMENT FUND 1 JANUARY – 31 DECEMBER 2001**

I.	BEGINNING BALANCE		\$33,756
II.	RECEIPTS		
	1. Contributions	1,585	
	2. Interest	1,925	
	Total		3510
III.	TOTAL RECEIPTS AND BEGINNING BALANCE		\$37,266
IV.	TOTAL DISBURSEMENTS		\$ 0
V.	ENDING BALANCE		\$37,266
VI.	NET CHANGE		\$3,510

ASB BANK ACCOUNTS

31 DECEMBER 2000

I.	MERRILL LYNCH		\$65,438
II.	WACHOVIA		\$7,953
	TOTAL		\$73,391

31 DECEMBER 2001

I.	MERRILL LYNCH		\$41,392
II.	WACHOVIA		\$55,321
	TOTAL		\$96,713
INCREASE OF 2001 OVER 2000			\$23,322

**ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
MEMBERSHIP OFFICER'S REPORT**

2002 ASB DECEASED MEMBERS

Eugene T. Bergquist
C. Leland Rogers

2002 ASB EMERITUS STATUS REQUESTS

Vince Bellis	Larry Elliott
William R. Bowen	David A. Etnier
Robert Creek	Frank Golley
Armando A. de la Cruz	Donald C. Tarter
Gary Dillard	

CURRENT MEMBERSHIP

Complimentary	11
Contributing	7
Emeritus	55
Family	29
Library	46
Patron	5
Regular	513
Student	254
Sustaining	2
TOTAL	922

Respectfully submitted,
DEBORAH K. ATKINSON, ASB Membership Officer

MEMORANDUM FROM THE TREASURER

CHANGE OF MEMBERSHIP YEAR

Until now, it has been standard practice for ASB membership to run with the calendar year. Effective with 2002 memberships, the membership year will run from 1 May to 30 April. This will carry subscriptions through the April meeting issue and will avoid the problem of delinquent members missing their April issue because they have failed to pay for the current year. If you have any questions about this change, please contact Tim Atkinson, tim.atkinson@carolina.com, 336 538-6224.

ASB OFFICERS, COMMITTEES AND REPRESENTATIVES AND SOUTHEASTERN BIOLOGY STAFF, 2002-2003

Telephone numbers, FAX numbers and e-mail addresses can be found
on the inside front cover of each issue of the *Southeastern Biology*.

Southeastern Biology Staff

Print Editor	James D. Caponetti, Department of Botany, University of Tennessee, Knoxville, TN
Associate Editor	Terry Richardson, Department of Biology, University of North Alabama, Florence, AL
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2005:	Zack E. Murrell, Dept. of Biology, Appalachian State Univ., Boone, NC Thomas R. Wentworth, Dept. of Botany, North Carolina State Univ., Raleigh, NC

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AAAS - American Association for the Advancement of Science

Representative: Bonnie Kelley, Department of Biology, UNC Pembroke, One University Drive, P. O. Box 1510, Pembroke, NC 28372-1510; kelley@nat.uncp.edu.

ASC - Association of Systematic Collections

Representative: Nancy Coile, FDACS-22804 NW County Road 2054, Alachua, FL 32615; mcn836@alltel.net.

AIBS - American Institute of Biological Sciences

Representative: Geraldine Twitty, Department of Biology, Howard University, 415 College St., NW, Washington, DC 20059; (202) 806-6953; Fax (202) 806-4564; gtwitty@fac.howard.edu.

Committees

Auditing Committee

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2nd Year Member: Andy Ash, Department of Biology, UNC Pembroke, One University Drive, P.O. Box 1510, Pembroke, NC 28372-1510; (910) 521-6418, Fax (252) 328-4178; aash@nat.uncp.edu.

3rd Year Member: Cliff Hupp, USGS, 430 Natl. Center, Reston, VA 20192; (703) 648-5207; crhupp@usgs.gov.

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2nd Year Member: Lonnette Edwards, USDA Forest Service-Southern Research Station, P.O. Box 1387, Normal, AL 35762; (256) 858-4233 or 4201, Fax (256) 858-8275; ledwards@fs.fed.us. Chair in 2003.

New Member: Karen L. McGlothlin, Department of Biological Sciences, The University of the South, Sewanee, TN, 37383-1000; kmcglath@sewanee.edu.

Conservation Committee

Chair: Katie Greenberg, USDA Forest Service, Bent Creek Experimental Forest, 1577 Brevard Road, Asheville, NC 28806; (828) 667-5261 ext. 118 (phone); Fax (828) 667-9097; kgreenberg@fs.fed.us.

2nd Year Member: Drew Lanham, Forest Resources, 261 Lehotsky Hall, Clemson University, Clemson, SC 29634-1003; lanhamj@clemson.edu.

New Member: Ed Mills, Department of Biology, Wingate University, Box 3059, Wingate, NC 28174; (704) 233-8239; emills@wingate.edu.

Education Committee

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2nd Year Members: Co-chairs in 2003. Jennifer Davis, Shorter College, Rome, GA; (706) 233-7292; jdavis@shorter.edu. Catherine Newsome, Campus Box 2625, Elon College, NC 27244; (336) 278-6193; newsome@elon.edu.

New Members: John Aliff, Department of Biology, Georgia Perimeter College, 5155 Sugarloaf Pkwy., Lawrenceville, GA 30043; (770) 995-6953; jaliff@gpc.peachnet.edu.

Patrice Cole, Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville; (865) 974-4248; pcole2@utk.edu.

Enrichment Fund Board

Chair: Kim Marie Tolson, Department of Biology, University of Louisiana at Monroe, Monroe, LA 71209-0520; (318) 342-1805; Fax (318) 342-1755; bitolson@alpha.nlu.edu.

Finance Committee

Chair: Tim Atkinson, Carolina Biological Supply Co., 2700 York Rd., Burlington, NC 27215; (336) 538-6224, Fax (800) 222-7112; tim.atkinson@carolina.com.

Past President: Robert Haynes, Department of Biological Sciences, University of Alabama, Tuscaloosa, AL 35487; (205) 348-1826; Fax (205) 348-6460; haynes@bama.ua.edu.

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Executive Committee Member: Zack Murrell, Department of Biology, Appalachian State University, Boone, NC 28608-2027; (828) 262-2674; murrellze@appstate.edu.

Graduate Student Support Award Committee

Chair: Werner Wieland, Dept. of Biological Sciences, Mary Washington College, Fredericksburg, VA 22401; (540) 654-1426, Fax (540) 654-1081; wwieland@mwc.edu.

2nd Year Member: Zack Murrell, Department of Biology, P. O. Box 32027, Appalachian State University, Boone, NC 28608-2027; (828) 262-2683; Fax (828) 262-2127; murrellze@appstate.edu.

New Member: Neil Billington, Department of Biology, 321A McCall Hall (Math-Science Complex), Troy State University; (334) 670-3943; askdrb@troyst.edu.

Local Arrangements Committee

Chair: Lafayette Frederick, Department of Biology, Howard University, 2400 Sixth Street, NW, Washington, DC 20059; (202) 806-6931; Fax (202) 806-4564; lfederick@howard.edu.

Member: Gerry Twitty, Department of Biology, Howard University, 2400 Sixth Street, NW, Washington, DC 20059; (202) 806-6953; gtwitty@howard.edu.

Meritorious Teaching Award Committee

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2nd Year Member: Tom Wentworth, Box 7612, Botany Department, NC State University, Raleigh, NC 27695-7612; tom_wentworth@ncsu.edu.

New Member: Bonnie Kelley, Biology Department, UNC Pembroke, One University Drive, P.O. Box 1510, Pembroke, NC 28372-1510; (910) 521-6419; Fax (910) 521-6649; kelley@nat.uncp.edu.

Nominating Committee

Chair: Howard Neufeld, Department of Biology, Appalachian State University, Boone, NC 28608-2027; (828) 262-2683, Fax (828) 262-2127, neufeldhs@appstate.edu.

New Member: Cliff Hupp, USGS, 430 Natl. Center, Reston, VA 20192; (703) 648-5207, crhupp@usgs.gov.

New Member: Dwayne Wise, Department of Biological Sciences, Mississippi State University, Starkeville, MS, Drawer GY Mississippi State, MS 39762-5759; (662) 325-7579, daw1@ra.msstate.edu.

Past-President's Council

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Patron Member and Exhibitor Committee

Chair until 2003: Doug Rayner, Dept. of Biology, Wofford College, Spartanburg, SC 29303; (864) 597-4624, raynerda@wofford.edu.

Vice-Chair until 2003: W. Michael Dennis, Breedlove, Dennis and Associates, Inc., 330W.Canton Avenue, Winter Park, Florida 32789; (407) 677-1882, Fax (407) 657-7008; Mike@bda-inc.com;

3rd Member: Claudia Jolls, Department of Biology, East Carolina University, Greenville, NC 27858; (252) 328-6295, jollsc@mail.ecu.edu.

4th Member: Howard Neufeld, Department of Biology, Appalachian State University, Boone, NC 28608-2027; (828) 262-2683, Fax (828) 262-2127, neufeldhs@appstate.edu.

Place of Meeting Committee

Chair: Mark Schorr, Department of Biological and Environmental Sciences, University of Tennessee at Chattanooga, 615 McCallie Avenue, Chattanooga, TN 37403-2598; (423) 755-4149, Fax (423) 785-2285, mark-schorr@utc.edu.

2nd Year Member: Hank Bart, Tulane Museum of Natural History, Belle Chasse, LA 70037; (504) 394-1771, Fax (504) 394-5045; hank@museum.tulane.edu;

Member: Michael Windlespecht, Department of Biology, Appalachian State University, Boone, NC 28608-2027; (828) 262-2680 windlspchtm@appstate.edu.

Poster Awards Committee (do we need 6?)

Chair: Kathleen L. Hornberger, Department of Biology, Widener University, 1 University Place, Chester, PA 19013; (610) 499-4016, Fax (610) 499-4496; hornberger@pop1.science.widener.edu.

2nd Year Members: Rick Duffield, Dept. of Biology, Howard University, Washington, DC 20059; (202) 806-6127, Fax (202) 806-4564; rduffield@fac.howard.edu.

Dennis Haney, Department of Biology, Furman University, 3300 Poinsett Highway, Greenville, SC 29613-0418; (864) 294-2050, Fax (864) 294-2058; dennis.haney@furman.edu.

Victoria Turgeon, Furman University, 3300 Poinsett Highway, Greenville, SC 29613, (864) 294-3791; victoria.turgeon@furman.edu.

New Member: Mijitaba Hamissou, Jacksonville State University, Jacksonville, AL 36265, Jacksonville, AL (256) 782-5040 taba@jsucc.jsu.edu.

Publications Committee

Chair: Rebecca Cook, Biology Department, Lambuth College, Lambuth Blvd, Jackson, TN, (901) 425-3278, Fax (901) 988-4900, cook-reb@lambuth.edu.

Bulletin Editor: Jim Caponetti, Dept of Biology, 437 Hesler Hall, University of Tennessee, Knoxville, TN 37996, 865-974-6219 (his office), (865) 974-2256 (botany office), Fax (865) 974-2258; jcaponet@utk.edu.

2nd Year Member: Joe Pollard, Dept. of Biol., Furman University, 3300 Poinsett Highway Greenville, SC 29613-0418; (864) 294-3249, Fax (864) 294-2058; pollard@furman.edu.

New Member: Campus Box 7612, Department of Botany, North Carolina State University 27695

Research Awards Committee - Senior

Chair: Dwayne Wise, Department of Biology, P.O. Drawer GY, Mississippi State University, Mississippi State, MS, 39762; (601) 325-7579, Fax (662) 325-7939, daw1@ra.msstate.edu.

2nd Year Member: Cliff Hupp, USGS, 430 National Center, Reston, VA 20192; (703) 648-5207; crhupp@usgs.gov.

New Member: Ray Williams Appalachian State University, Boone, NC 28608-2027, (828) 262-6511, willmsrs@appstate.edu.

Research Awards Committee - Student

Chair: Ray Petersen, Dept. of Biology, Howard University, Washington, DC 20059, 202-806-6943, Fax 202-806-4564, rpetersen@fac.howard.edu.

2nd Year Member: L. J. Davenport, Department of Biology, Samford University, Birmingham, AL 335229; (205) 870-2584; Fax (205) 870-2479, lj@davenport@samford.edu.

New Member: George Cline, Department of Biology, Jacksonville State University, Jacksonville, AL 36265; (256) 782 5798, gcline@jsucc.jsu.edu.

Resolutions Committee

Chair: Robert Haynes, Department of Biology, University of Alabama, Tuscaloosa, AL 35487; (205) 348-1826; Fax (205) 348-6460, haynes@bama.ua.edu.

New Member: Geraldine Twitty, Department of Biology, 415 College St., NW Howard University, Washington, DC, 20059; (202) 806-6953, gtwitty@howard.edu.

New Member: Don Roush, Department of Biology, University of North Alabama, Box 5181, Florence, AL 35632-0001; (256) 765-4435; dhroush@una.edu.



Carolyn Shull (left) and Amy Van Devender.

2003 MEETING OF THE ASSOCIATION**CALL FOR PAPERS****THE 64TH ANNUAL MEETING****HOSTS: HOWARD UNIVERSITY, WASHINGTON, DC, AND
BOWIE STATE UNIVERSITY, BOWIE, MARYLAND****MEETING SITE: CRYSTAL CITY HYATT HOTEL
ARLINGTON, VIRGINIA 22202****DATE: APRIL 9-12, 2003**

Please note the following deadlines that are to be met before our 64th Annual Meeting hosted by Howard University/Bowie State University in the Washington metropolitan area.

18 November Titles and abstracts of papers and posters (use electronic submission format described below). They must reach the program chairperson by this date.

18 October Nominations for ASB officers and executive committee.

18 November – Submissions for research awards.
10 January

17 January Application for student travel awards.

MEETING WEBSITE

<http://www.biology.howard.edu/asb2003.htm>

**LOCAL COMMITTEE ASSIGNMENTS
FOR THE 64th ANNUAL MEETING
HOWARD UNIVERSITY/BOWIE STATE UNIVERSITY
WASHINGTON, DC 20059**

Addresses for Chairs/Co-Chairs not identified otherwise are: Department of Biology, Howard University, Washington, DC 20059. FAX number for the Biology Department is 202-806-4564.

Local Arrangements Co-Chairs:	Lafayette Frederick lfrederick@howard.edu	202-806-6931
	Geraldine Twitty gtwitty@howard.edu	202-806-6953
Early Registration	Geraldine Twitty gtwitty@howard.edu	202-806-6953
Program Chair:	Elaine Davis* edavis@bowiestate.edu	301-860-3876
Beta Beta Beta:	Lafayette Frederick lfrederick@howard.edu	202-806-6931
Commercial Exhibits:	Geraldine Twitty gtwitty@howard.edu	202-806-6953
	Arthur Williams awilliams@howard.edu	202-806-4609
Field Trips:	Raymond Petersen rpetersen@howard.edu	202-806-6943
Posters and Audiovisuals:	William Gordon wgordon@howard.edu	202-806-6945
	Norma Williams nwilliams@howard.edu	202-806-6941
On-Site Registration, Meeting Statistics:	Franklin Ampy fampy@howard.edu	202-806-6952
	Marjay Anderson manderson@howard.edu	202-806-6744
Social Arrangements:	Broderick Eribo beribo@howard.edu	202-806-6937

Transportation and Volunteers:	Mary McKenna mmckenna@howard.edu	202-806-6103
	Clarence Lee cllee@howard.edu	202-806-6948
Website Coordinator:	George Middendorf gmiddendorf@howard.edu	202-806-7289
	William Lawrence** wlawrence@bowiestate.edu	301-860-3338

*Address for Dr. Elaine Davis: Director, Model Institutions for Excellence Program, 14000 Jericho Park Road, Bowie, MD 20715.

**Address for Dr. William Lawrence: Department of Natural Sciences, Bowie State University, 14000 Jericho Park Road, Bowie, MD 20715.

PAPER & POSTER SUBMISSION DOCUMENTS FOR 2003 MEETING

DEADLINE: 18 NOVEMBER 2002

**Individuals presenting papers or posters are expected to be
members of ASB!**

INSTRUCTIONS FOR SUBMITTING ABSTRACTS

Submit the following information and your abstract via e-mail to: asb@bowiestate.edu. The information in items 1-9 below and the abstract should be submitted as two separate attachments to a single e-mail message. If you do not have access to e-mail, or cannot attach documents to an e-mail, then mail your abstract and information to the Program Chair, Dr. Elaine J. Davis, Director, MIE Program, Bowie State University, 14000 Jericho Park Road, Bowie, MD, 20715. They must reach the Program Chair by the deadline specified above.

Your attachments should be prepared in Microsoft Word (Version 2000 or earlier). Convert all MacIntosh documents to Word for Windows before sending the attachments. Information must be received by 18 November 2002, for the title and abstract to appear in the April, 2003, issue of *Southeastern Biology*. In the event of a last-minute cancellation or other problem, please notify the Program Chair, Dr. Elaine Davis, MIE Program Director, Bowie State University, 14000 Jericho Park Road, Bowie, MD 20715; Tel: 301-860-3876; FAX 301-860-3887; edavis@bowiestate.edu.

Please type the following information concerning your presentation and send it as an attachment to an e-mail message. Provide the phone/fax numbers for the primary author. If you are submitting on behalf of another person, make sure you clearly indicate contact information for the primary author.

1. **AUTHOR(s):**

2. **INSTITUTION(s):**

3. **1st AUTHOR PHONE/FAX:**

4. **1st AUTHOR E-MAIL:**

5. **TITLE:**

6. **PRESENTATION:** Paper ____ Poster ____

7. **PROJECTION EQUIPMENT:** 35 mm slides ____ Overhead ____

Video Projector (for PowerPoint Presentations) ____

8. **RECOMMENDED SECTION:** Check appropriate section(s) to which your paper/poster should be assigned. If you check more than one, rank sections as to your preference (with "1" being first preferred). Paper sections will be established based on needs. Posters will be grouped by subject area.

____ Animal Behavior

____ Genetics, Cell & Molecular Biology

____ Ornithology

____ Animal Ecology

____ Herpetology

____ Parasitology

____ Animal Physiology

____ Ichthyology

____ Plant Biology

____ Aquatic, Wetland & Marine Ecology

____ Invertebrate Zoology & Entomology

____ Plant Ecology

____ Developmental Biology

____ Microbiology

____ Plant Systematics

____ Teaching Biology

____ Other (specify) _____

9. **AWARDS:** If you intend to apply for one of the following awards, please indicate this below so the Program Committee can schedule talks appropriately. See this issue of *Southeastern Biology* for specific application instructions (including contact persons and addresses). You must check off on the abstract submission form that you want to be considered for the poster award. Only student authors who request consideration for the poster award will be judged **FIRST AUTHOR MUST BE THE STUDENT TO BE CONSIDERED.** Posters

may be submitted by all members of ASB and affiliated societies; however, only students who are first authors on the posters are eligible for the poster award.

- _____ ASB Senior Research Award (\$600)
- _____ ASB Student Research Award (\$600)
- _____ ASB Student Research Award in Aquatic Biology (\$200)
- _____ ASB Student Poster Award (\$300)
- _____ Eugene P. Odum Award (\$500)
- _____ NC Botanical Garden Award (\$200)
- _____ SEASIH Student Travel Award (\$50)
- _____ SEASIH Ichthyology Award (\$100)
- _____ SEASIH Herpetology Award (\$100)
- _____ ASIH Gibbs Memorial Award (\$7,500)
- _____ SAC/SWS Student Travel Award (\$100)

ABSTRACT REQUIREMENTS

PLEASE FOLLOW THESE FORMATTING INSTRUCTIONS EXACTLY, OR YOUR ABSTRACT WILL BE RETURNED TO YOU FOR REVISION. IF IT IS RESUBMITTED AFTER THE DEADLINE, THE ABSTRACT WILL NOT BE ACCEPTED.

ABSTRACT: Please send the abstract as an attached file to an e-mail message to the following address: asb@bowiestate.edu. Do not paste the abstract into the body of the e-mail message. The file must be in 9-point Arial (if your computer does not have Arial, send it in Times Roman), with **margins of 1.75 inches right and 1.75 inches left** (*this is a change from previous years since we are submitting the journal to the printer on disk*). Do not place hard returns at ends of lines—allow word-wrapping. The abstract must not exceed 250 words. Directions for formatting the abstract are given below and at the meeting web site: <http://www.biology.howard.edu/asb2003.htm>. If you have any additional questions, you may contact the Program Chair, Dr. Elaine J. Davis, e-mail edavis@bowiestate.edu; phone (301) 860-3876; fax (301) 860-3887.

1. Indent author, institution, and title information 1 tab stop (1/2 inch). Type in the following order: AUTHOR'S NAME(S) all capitalized; last name first for first author, other authors' names (if any), first names first. If two authors, separate names with "AND". In the case of more than two authors, separate all but the last name with a comma and separate the last two with "AND". End with a period.
2. Institution(s) follow authors' names directly. Maintain the same indentation as names and end with a dash (--). In the case of two or more authors from different institutions, place all author names together first, followed by all institutions in the same order. If necessary, key the authors' names to the institution by a superscript number. See example below or on the website.

3. Start the title immediately after the dash without a space. Capitalize the first letter of the first word, then only proper and scientific names as customary. Underline all of the title, and maintain the same indentation as name and institution. End with a period. Leave one full blank line between title and abstract text.
4. Start text of abstract on a new line. Do not indent first line. Use one paragraph for entire text. Do not put any reference citations in the abstract. Justify both left and right margins for best appearance.
5. Single space all typing. Put all taxonomic names in *italics*.
6. If a grant source is acknowledged, place at end of text without a new paragraph.

EXAMPLES

RADENBAUGH, TODD A. United States Peace Corps, Jamaica--Major plant community types of Ducan Bay, Jamaica, West Indies.

There is an urgent need to record and describe the coastal ecosystems on the North coast of Jamaica before they are severely altered by human influences. A new escalation in housing and resort developments, especially in the western parishes of St. James and Trelawny, is severely threatening the....

DAVIS, JENNIFER¹ AND DWAYNE WISE². Shorter College and Mississippi State University--Causes and consequences of elevated levels of meiotic abnormalities in laboratory colonies of the crane fly *Nephrotoma suturalis*.

Progeny of five wild-caught crane flies were compared to a laboratory colony of *Nephrotoma suturalis* for mean % chromosomal abnormalities, mean % survival, and parameters indicative of developmental rate.

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7. **NOTE:** Prior to the meeting, the program will be posted on the meeting website <http://www.biology.howard.edu/asb2003.htm>. You can check there to see the day and time of your presentation.
 8. Reprints of abstracts are not available. You may duplicate the printed abstracts from *Southeastern Biology*.
 9. **IMPORTANT:** In case of error in your name, title, or questions about your presentation, please notify the Program Chair, Dr. Elaine J. Davis, as soon as possible

PRELIMINARY AUDIO-VISUAL INSTRUCTIONS FOR THE 2003 ASB ANNUAL MEETING

Listed below are the preliminary instructions for prospective presenters at the 2003 Annual Meeting. We are planning to equip each presentation room with an overhead projector, slide projector, data projector, and laptop computer (see below). All presenters are asked to be at the presentation room 30 minutes *prior to the start of the session* to load their presentation. An audiovisual assistant will be available in each room to assist with loading the material.

An update on the audiovisual aspects of the conference, including the instructions for poster presentations and availability of electronic resources, will be made in the January 2003 edition of *Southeastern Biology* and will be available online at <http://www.biology.howard.edu/asb2003.htm>. Specific questions on audiovisual topics may be directed to Dr. William Gordon, Howard University (wgordon@howard.edu).

Format of electronic presentations:

Each presentation room will be equipped with a data projector connected to a laptop computer. **All audiovisual equipment used will be provided by the Hyatt Hotel audiovisual company.** Personal audiovisual equipment cannot be used.

1. All presentations must be in Microsoft PowerPoint format. If you use Windows 2000, you should save the presentation in a Windows 97/95 format to ensure compatibility with the projection systems.
2. The presenters must arrive 30 minutes before the start of the session to load their presentation to the laptop. All presentations will be loaded directly onto the hard-drive of the laptop.
3. The presentation must be brought to the meeting in PC format, and loaded onto a CD-ROM, Zip disk, or floppy disk. Mac platforms will not be supported.
4. Internet access will not be available in any conference room. Presenters should make provisions to load web sites directly into the presentation, or screen capture images prior to arriving at the conference.

All presenters should be prepared for possible technological problems. Each presenter who intends to use an electronic format should have a backup system consisting of slides or overheads. If for some reason an electronic presentation cannot be started within the first *two minutes* of the allocated time slot, the moderator of the section will ask the presenter to switch to the alternate format (slides or overheads).

ASB 2003 FIELD TRIPS

PRELIMINARY INFORMATION

Plan to thoroughly enjoy a **Capital Experience**--the beauty, stately grandeur, and history of our nation's capital. Diverse field trips have been planned since families are expected. Tours (FT 1-10) depart from the Hyatt Hotel.

"Motorized trolleys", more commonly called tourmobiles are franchised by the National Park service. These open-air, articulated buses frequent 18 sights around the Mall, Capitol Hill, and Arlington Cemetery from 9 a.m. to 5 p.m. Ticket booths are located at several sites or boarding can be achieved at any tourmobile stop sign on the route. For additional information, call 202-554-5100.

FIELD TRIPS

(Current days and times are tentative)

FT1. Washington Afterdark

See the magnificently illuminated memorials and the Capitol, White House, Lincoln, Jefferson, Iwo Jima, Vietnam, and Korean Memorials, and the Watergate. Take a ride to the Kennedy Center roof-top terrace for a breath-taking view of Washington, Virginia and the Georgetown Waterfront. Remember, the Cherry blossoms may cooperate.

Evening tours on Wednesday, 9 April 2003 following the Plenary session and Saturday, 12 April 2003

FT2. U.S. National Arboretum

Visit this spectacular 444-acre collection of azaleas, Fern Valley, hundreds of varieties of daffodil, hardy Asiatic trees and shrubs, the National Bonsai collection, and the Penjing Museum.

Thursday afternoon, 10 April 2003

FT3. National Zoological Park

A half-day tour to one of the top Zoological Parks in the world will include visits to the Panda enclosure, Think Tank, Amazonia Science Gallery (biodiversity along with a working electron microscope and a Geosphere), Pollinarium (a lush garden within a greenhouse featuring zebra long-wing butterflies and a glass-enclosed beehive), and an Open-air Aviary.

Friday afternoon, 11 April 2003

FT4. Patuxent Wildlife Research Center

Visit the nation's first wildlife experimental station and research refuge to see the multitude of programs conducted by the U.S. Geological Survey--Biological Resources Division Science Center. Get a close look at the research that is responsible for some of the most significant advances in wildlife conservation.

habitat improvement, and population monitoring/analysis. Outdoor wear recommended.

Wednesday, 9 April 2003 8:00-4:00 PM

Saturday, 12 April 2003 8:00-4:00 PM

FT5. National Museum of Natural History (Smithsonian Museum)

One of the nation's premier chests of natural science and human culture is distinguished by the huge bull elephant in the rotunda. The collection includes a spectacular dinosaur collection, an Insect Zoo (an extraordinary assemblage of live insects, spiders, and other creepy critters), the Hall of Gems and Minerals (including the Hope Diamond, Star of India Sapphire, and a bit of the moon you get to touch), a walk-through mine, a re-created cave, and plate tectonics gallery, an IMAX Theatre, and the Discovery Room for the younger Biologists.

Thursday, 10 April 2003 morning

FT6. Behind the Scenes at the National Museum of Natural History (Smithsonian Museum)--Beta, Beta, Beta

Guided tour of the research collections and laboratories of the NMNH specially organized for Beta Beta Beta Society.

Friday, 12 April 2003

FT7. The National Gallery of Art: East Building

This museum has a most comprehensive collection, housing 20th century art and special exhibitions. Of special note is its collection of early Italian Renaissance paintings, portraits by Leonardo da Vinci, Durer, and Vermeer, and a wonderful collection of French Impressionists. The East Building of the museum by architect Ian Pei is a work of art in and of itself.

Friday, 12 April 2003

FT8. Great Falls and the Billy Goat Trail

-Great Falls Park is located north of Washington on the Virginia side of the river. Here the Potomac River roars over a series of steep, jagged rocks and flows through a narrow gorge. Hiking trails follow the river, offer views of Mather Gorge, and provide a bridge between geology and biology.

Thursday, 11 April 2003

FT9. Downtown D.C. & Arlington Cemetery

The Lincoln, Vietnam War, Iwo Jima and Korean Memorials, Arlington Cemetery (Kennedy Gravesite), Pentagon, Embassy Row/Georgetown, White House, and Watergate are among the historical sites included in this half-day afternoon tour.

FT10. National Museums: Half-Day Morning Tour

This tour visits the President's Box and Lincoln Museum at Ford's Theatre, the Air & Space Museum (see how things fly and touch a moon rock), the National History Museum, Downtown DC/Chinatown, the National Archives, and National History Museum.

Friday, 12 April 2003

PLENARY SPEAKER FOR THE 2003 MEETING

The announcement of the plenary speaker for the 2003 meeting will be made at a later date.



Dr. Frank Borkowski (at podium), Chancellor of Appalachian State University, welcome attendees at the annual meeting.

**Nomination for ASB Officers and Executive
Committee Positions**

DEADLINE: 18 OCTOBER 2002

To members of the Nominating Committee: I wish to suggest that you consider the following ASB member(s) in selecting nominees for officers and executive committee positions. *(Please include the institutional address of each nominee.)*

PRESIDENT-ELECT _____

VICE-PRESIDENT _____

SECRETARY _____

EXECUTIVE COMMITTEE *(two will be elected for three-year terms)*

MAIL TO: DR. HOWARD NEUFELD, Department of Biology, P. O. Box 32027, Appalachian State University, Boone, NC 28608-2027; 828-262-2683; FAX 828-262-2127; neufeldhs@appstate.edu.

NAME & ADDRESS OF NOMINATOR _____

**“TRAVEL” SUPPORT AWARDS FOR GRADUATE
STUDENT MEMBERS OF ASB**

DEADLINE FOR POSTMARK: 17 JANUARY 2003

Limited funds are available to partially defray the expenses of graduate students attending the Annual Meeting. **The awards are for lodging and meals only, including the ASB Banquet.** Departments are urged to provide transportation for their graduate students. *Recipients must be members of ASB.* The guidelines for application are as follows:

- (a) *The recipient is a current member of ASB.*
- (b) The recipient must be presenting a paper or poster at the Annual Meeting and must include a separate copy of the abstract of the paper or poster to be presented along with the application.
- (c) The recipient must be currently enrolled as a graduate student in the department where he/she conducted this research.
- (d) Student travel awards are granted on a competitive basis. Applicants must document expected expenses and list other sources of financial support for this meeting, including institutional aid, shared lodging and shared transportation.
- (e) In a paragraph, give a brief history of your education to date: indicated how many years you have been in graduate school and the expected date of completion of work for your degree, your major field of study and research, publications including those in press and in preparation, degree sought, name of major professor and any other pertinent details.
- (f) Give your source(s) of support while in graduate school: e.g. NSF, NIH, USDA, Teaching Asst., Research Asst., etc.
- (g) Include a letter of recommendation for an ASB support award from your faculty research advisor. This letter should comment on the work being presented and indicate the financial need of the student presenter. It should also indicate whether any departmental or other funding is available to the student.
- (h) Send application with supporting letter to: Dr. Werner Wieland, Department of Biological Sciences, Mary Washington College, Fredericksburg, VA 22401; Tel. (540) 654-1426; FAX (540) 654-1081. In addition, e-mail a copy of your completed application documents without the supporting letter to: wwieland@mwc.edu.
- (i) Applicants will be notified of the decision of the Committee as soon as is practical. Recipients of the award will receive their checks at the meeting.

Guidelines for Student Poster Session and ASB STUDENT POSTER AWARD (\$300)

Poster sessions have been incorporated as a regular means of scientific presentation at the annual ASB meetings. Poster sessions are limited to student participants. This type of presentation provides a more informal environment that encourages a direct interchange of ideas and discussion between student and audience. In order to stimulate greater use of posters as an effective means of presenting research results, ASB awards a \$300 cash prize to the best poster presentation with a student as the senior author. This year, you must check off on the abstract submission form that you want to be considered for the award. Only student authors who request consideration for the poster award will be judged. Adherence to the following guidelines will help ensure the effectiveness of the poster presentation and consideration for the award.

- (a) Posters must fit in an area 8 feet wide and 4 feet high. Presenters must provide their own pins to attach posters to poster boards.
- (b) Posters must be displayed from 10:00 a.m. Thursday through 5:00 p.m. Friday. Authors will be required to be present at specified times during the annual meeting.
- (c) Posters should be carefully planned to maximize clarity and simplicity in conveying information.
- (d) Posters should have a heading including a title, author, and author's institution(s). This heading should be placed at the top in letters no less than 3 cm high.
- (e) The body of the poster, including text, figure legends and table captions, should be in type no smaller than 18 pt (3-4 mm) and *must* be legible from a distance of about 1-2 meters.
- (f) The body should be self-explanatory and should include figures, tables, graphs, maps, or photographs displayed in a well organized, coherent, and easy-to-follow sequence from top to bottom. Each illustration should contain a caption. *Do not over crowd the display.*
- (g) A limited degree of text may be included, but care should be taken not to overwhelm the audience.
- (h) A large, abbreviated version of the abstract should be presented at the top of the poster, but below the heading. A clear listing of specific conclusions should appear at the bottom or end of the presentation.
- (i) In addition to adherence to the above-listed guidelines, poster presentations will also be judged using the following specific criteria:
 - (i) overall aesthetics and attractiveness of presentation.
 - (ii) ease of reading from a distance (1-2 meters).
 - (iii) clear and concise organization.
 - (iv) clearly stated hypothesis.
 - (v) soundness of methods for testing hypothesis.
 - (vi) how well conclusions are supported by results.

Further inquiries may be directed to the chair of the ASB Poster Award Committee: Dr. Kathleen L. Homberger, Department of Biology, Widener University, 1 University Place, Chester, PA 19013; Tele: (610) 499-4016; Fax (610) 499-4496; homberger@pop1.science.widener.edu.

RESEARCH AWARDS

ASB SENIOR RESEARCH AWARD (\$600)

Given for an especially meritorious manuscript presented orally by the author(s) at the Annual Meeting of ASB. In order to qualify for this award, the author(s) must have presented the work orally at any previous annual meeting or have submitted an abstract by the November abstract deadline for an oral presentation at the next annual meeting. The manuscript must either have been submitted for publication or be ready for submission and carry the format of the journal to which it will be (or has been) submitted. Author(s) must submit four copies of their manuscript and short biographical sketches of each author. Manuscripts received by 10 January 2003 will compete for the 2003 Senior Research Award. Manuscripts not received by this deadline (but submitted by 10 January 2004) will remain in competition for the 2004 Senior Research Award, subject to the following condition, which applies to ALL manuscripts eligible for this award: manuscripts may be in press, but not published prior to the last annual meeting. Only members of ASB are eligible. Judges will use a standard evaluation form that includes the following criteria: significance of ideas, soundness of hypotheses, originality (creativity), quality of methodology, validity of results, soundness of conclusions, clarity, completeness, organization, and contribution to the field. At the discretion of the Senior Research Award Committee, the award may be withheld or it may be split in case of a tie.

Committee Chair: Dr. Dwayne Wise, Department of Biology, P. O. Drawer GY, Mississippi State University, Mississippi State, MS 39762; Tele. (601) 325-7579; FAX (662) 325-7939; dawe@ra.misstate.edu.

ASB STUDENT RESEARCH AWARD (\$600)

Given for an especially meritorious manuscript presented orally by the author(s) at the Annual Meeting. In order to qualify for presenting the paper, the author(s) must submit an abstract by the November deadline. Papers submitted for the competition must be received in triplicate and in their entirety by the January deadline and must be journal-ready manuscripts worthy of publication. The student award (sponsored by Martin Microscope Company) is given to the senior author if she/he is a graduate or undergraduate student at the time of presentation. To qualify, author(s) must submit an abstract, title form, and application for the award by 18 November 2002, and four copies of the journal-ready manuscript with abstract, title form, and short biographical sketches of each author by 10 January 2003. Only ASB members are eligible. Judges will use a standard evaluation form that includes the following criteria: significance of ideas, soundness of hypotheses, originality (creativity), quality of methodology, validity of results, soundness of conclusions, clarity, completeness, organization, and contribution to the field. At the discretion of the Student Research Award Committee, the award may be withheld or it may be split in the case of a tie. Papers may be in press, but not published prior to the previous annual meeting.

Committee Chair: Dr. Raymond Petersen, Department of Biology, Howard University, Washington, DC 20059; Tele. (202) 806-6943; FAX (202) 806-4564; rpetersen@fac.howard.edu.

ASB STUDENT RESEARCH AWARD IN AQUATIC BIOLOGY (\$200)

The purpose of the award is to encourage excellence in aquatic biology research by undergraduate and graduate students. Students who are members of ASB and whose work is sponsored by a professional biologist who is also an ASB member are eligible. The paper must be based on research designed and completed by the student and it must be presented orally by the student as senior author at the Annual Meeting. To be eligible, author(s) must submit an abstract, title form, and application for the award by 18 November 2002, four copies of the journal-ready manuscript with abstract, title form, and short biographical sketches of each author by 10 January 2003 and a letter from the sponsor affirming student status at the time the research was completed and sponsorship of the student to the chair of the Student Research Award Committee. Judges will use a standard evaluation form that includes the following criteria: significance of ideas, soundness of hypotheses, originality (creativity), quality of methodology, validity of results, soundness of conclusions, clarity, completeness, organization, and contribution to the field. At the discretion of the Student Research Award Committee, the award may be withheld or it may be split in the case of a tie. It is intended that aquatic biology be broadly interpreted. For example, research projects on aquatic organisms, wetland biota, and water quality are all eligible.

Committee Chair: Dr. Raymond Petersen, Department of Biology, Howard University, Washington, DC 20059; Tele. (202) 806-6943; FAX (202) 806-4564; rpetersen@fac.howard.edu.

EUGENE P. ODUM AWARD (\$500)

Given by the Southeastern Chapter of the Ecological Society of America for the best ecological paper presented by a student. Undergraduate and graduate students are eligible and the student must be the sole or senior author. The paper must deal with a clearly ecological topic and should be presented in any of the following sessions: Aquatic Ecology, Plant Ecology, or Animal Ecology. One copy of the title and abstract should be sent to the Program Chair by November 18, and a second copy to Dr. Michael Held, Department of Biology, Saint Peter's College, Jersey City, NJ 07306; Tele. (201) 915-9187; FAX (201) 915-9191; mhsavanna@aol.com.

THE NORTH CAROLINA BOTANICAL GARDEN AWARD (\$200)

Given by NCBG (through the Southeastern Section of the Botanical Society of America and the Southern Appalachian Botanical Society). This is awarded for a paper presented at the annual ASB meetings that best advances our understanding of the biology and conservation of the southeastern plants and thus contributes to the mission of the North Carolina Botanical Garden. Of special interest to the Garden are the rare plant species of the Southeast: why they are rare; how they interact with plants, animals, and their environment; and what can be done to ensure their survival. The paper may deal with a broad area including systematics, ecology and conservation. All individuals who are eligible to present at the ASB meetings are eligible for this award. They may be students, faculty or others.

Awards Committee Chair: Dr. John Randall, Department of Biology, University of North Carolina, Greensboro, NC 27412, (919) 962-0522, FAX (919) 962-3531, jrandall@email.unc.edu.

**TRAVEL SUPPORT AWARDS FOR STUDENT MEMBERS OF THE
SOUTHEASTERN DIVISION, AMERICAN SOCIETY OF
ICHTHYOLOGISTS AND HERPETOLOGISTS**

Travel grants of \$50 each are available to a limited number of student members of SEASIH to attend the ASB annual meeting on 9-12 April 2003. Applicants must be presenting a paper or poster at the meeting. Students seeking travel awards should provide a brief justification for their request and an abstract of their paper/poster by 17 January 2003. Recipients must be present at the SEASIH business meeting to pick up their award.

**SOUTHEASTERN DIVISION, AMERICAN SOCIETY OF ICHTHYOLOGISTS AND
HERPETOLOGISTS OUTSTANDING STUDENT PAPER AWARDS
ICHTHYOLOGY (\$100); HERPETOLOGY (\$100)**

Students who are sole or senior authors on papers, and who are members of SEASIH may compete for this award in one of these two subject areas. To be considered, submit a copy of the abstract that was submitted to ASB to the SEASIH president at the address below by 17 January 2003. Send applications for both awards to: Dr. Jeffrey D. Camper, Department of Biology, Francis Marion University, Florence, SC 29501; Tele. (843) 661-1418; jcamper@fmarion.edu.

**GIBBS AWARD FROM THE AMERICAN SOCIETY OF
ICHTHYOLOGISTS AND HERPETOLOGISTS FOR
EXCELLENCE IN SYSTEMATIC ICHTHYOLOGY**

Nominations are invited for the American Society of Ichthyologists and Herpetologists (ASIH) Robert H. Gibbs, Jr., Memorial Award for Excellence in Systematic Ichthyology.

The prize is awarded for an outstanding body of published work in systematic ichthyology to a citizen of a Western Hemisphere nation who has not been a recipient of the award. The award is offered annually and consists of an appropriate plaque and a cash award (approximately \$7500). The award recipient is announced at the annual meeting of the American Society of Ichthyologists and Herpetologists.

Nominations may be made by any ichthyologist, including self-nominations, and should include the nominee's curriculum vitae, details of the nominee's specific contributions and their impacts on systematic ichthyology. Nominations should be submitted by 28 February 2003, in order for the nominee to be eligible for that year's award. Nominations will be effective for three award periods (2003-2005). Four copies of each nomination should be sent to Dr. Maureen A. Donnelly, Department of Biological Sciences, Florida International University, 3000 NE 151st St., North Miami, FL 33181-3000.

**SOCIETY OF WETLAND SCIENTISTS
SOUTH ATLANTIC CHAPTER
STUDENT TRAVEL AWARD**

The South Atlantic Chapter of the Society of Wetland Scientists (SWS) will again offer its student travel award to support students presenting wetland research at the ASB annual meeting. We will award at least \$100 to a maximum of five students. The Chapter's Awards and Executive Committees will judge the applicants based on the scientific quality and importance of their research as described in the abstract. All students presenting research on a wetland topic are eligible; membership in SWS is not required. Please check the appropriate box on the ASB registration form and submit the abstract as instructed in the ASB call for papers. Further, applicants must also submit their abstract, by electronic mail, to Cliff R. Hupp at crhupp@usgs.gov. Award winners will be invited to the Chapter's luncheon meeting (no charge for awardees) held during the ASB annual meeting.

Honor Thy Teacher!

ASB MERITORIOUS TEACHING AWARD: DEADLINE JANUARY 17, 2003

Each year the ASB recognizes one of its members for especially meritorious teaching. Carolina Biological Supply Company, Burlington, NC, has generously sponsored this \$1500 award, which will be presented together with an appropriate citation at the Annual Banquet in Arlington, VA, in April 2003.

Nominees must be members of ASB who are actively engaged in, or recently retired from, the teaching of biology in any southeastern college or university. Successful candidates typically have been teaching for at least 10 years, but there are no restrictions on size of the institution, presence of graduate program, etc. The Award simply is for highly effective teaching. There are many deserving members of ASB. However, they cannot nominate themselves, so former students or colleagues must take an active role in assembling the materials that the Committee then will evaluate.

Take the lead, pass the word—serve as the coordinator and nominate a deserving teacher! Solicit supporting letters from the nominee's present and former students. Contact his or her colleagues for additional endorsements. Be sure to include any form of recognition by the nominee's home institution of excellence in teaching, or special assignments or mentoring roles facilitating good teaching. Of special note would be the number and quality of students for whom the nominee provided primary inspiration to continue in biology, especially for students who subsequently earned advanced degrees. In short, document the educational impact this individual has made by virtue of his or her role as a biology professor.

Nominators should send a current *curriculum vitae* and all relevant documents, together with the Nomination Form for the Meritorious Teaching Award, to: Dr. Diane Nelson, Department of Biological Sciences, East Tennessee State University, P. O. Box 70703, Johnson City, TN 37614-0703; Tele. (423) 439-4376, FAX (423) 439-5958, nelsond@etsu.edu. Submit all materials in triplicate by the January 17 due date. If you have any questions, please call me or send e-mail. Previously nominated candidates who did not receive the award may be re-nominated, with

updated supporting materials. The Committee would welcome the task of deciding among several candidates.

Thanks for taking this initiative.

Dr. Diane Nelson, Chair
Meritorious Teaching Award Committee

NOMINATION-ASB MERITORIOUS TEACHING AWARD, 2003

NAME:

ADDRESS:

TEACHING INTEREST:

NOMINATOR NAME/ADDRESS:

SUPPORTING DOCUMENTATION: Letter of nomination _____

(enclosed, in triplicate _____) Supporting letters _____

Curriculum Vitae _____ Additional Information (list) _____

ASB Enrichment Fund Award

ASB maintains an enrichment fund to support long- and short-range objectives to advance biological education through teaching and research. The Enrichment Fund Board is chaired by Kim Marie Tolson. As has been the custom for the past several meetings, ASB recognizes individuals for their achievements and dedication to biology education at the secondary school level. The awardee is invited to attend the annual meeting and be honored. Expenses for attendance at the meeting are defrayed by the Enrichment Fund. The use of money from this fund shows appreciation for excellence in teaching at the secondary level, and to reach out to our colleagues in the teaching profession. Contributions to the fund can be made at the annual meeting or can be sent to the Treasurer of ASB whose address can be found in the inside front cover of this issue.



Appalachian State University graduate students selling ASB T-shirts at the annual meeting.

OBITUARIES

Eugene Bergquist, 1929-2001

Eugene Bergquist, 71, 806 St. Thomas Court, died Sunday night, September 23, 2001, at Flowers Hospital, Dothan, Alabama, following an extended illness.

Dr. Bergquist was born November 13, 1929, in Chicago, Illinois. He grew up in Niles, Michigan, where he graduated from Niles High School and was a member of Coulter's Chapel. He attended MMTS and Faith Bible Institute where he received his ministerial training in Plymouth, Indiana. Dr. Bergquist received his bachelor's degree from Trevecca University in Nashville, Tennessee, and was awarded a master's degree in Biology at George Peabody College for Teachers (now part of Vanderbilt University) in 1957.

Dr. Bergquist was a faculty member of the University of Tennessee, Knoxville, and received an award from the U.S. Public Health Service to complete his doctorate. The Ph.D. was awarded from UT with a major in Botany (Fresh Water Ecology) in 1970. During the interim period of completing his education, he was a faculty member of Marshall University, Huntington, West Virginia and the State University of New York at Buffalo (SUNY), and later at Georgia Southern College in Statesboro, Georgia.

Upon completion of his doctoral program, Dr. Bergquist joined the Governor's staff in San Juan, Puerto Rico, as a consultant to assist in the development of the Environmental Quality Board (La Junta de Calidad Ambiental), patterned after the stateside EPA. The Board, established by the Public Environmental Policy Act of 1970, had broad statutory responsibilities from policy overview to implementation through programs, regulations and other measures. It combined at the state level, functions of the U.S. Council on Environmental Quality and the U.S. Environmental Protection Agency.

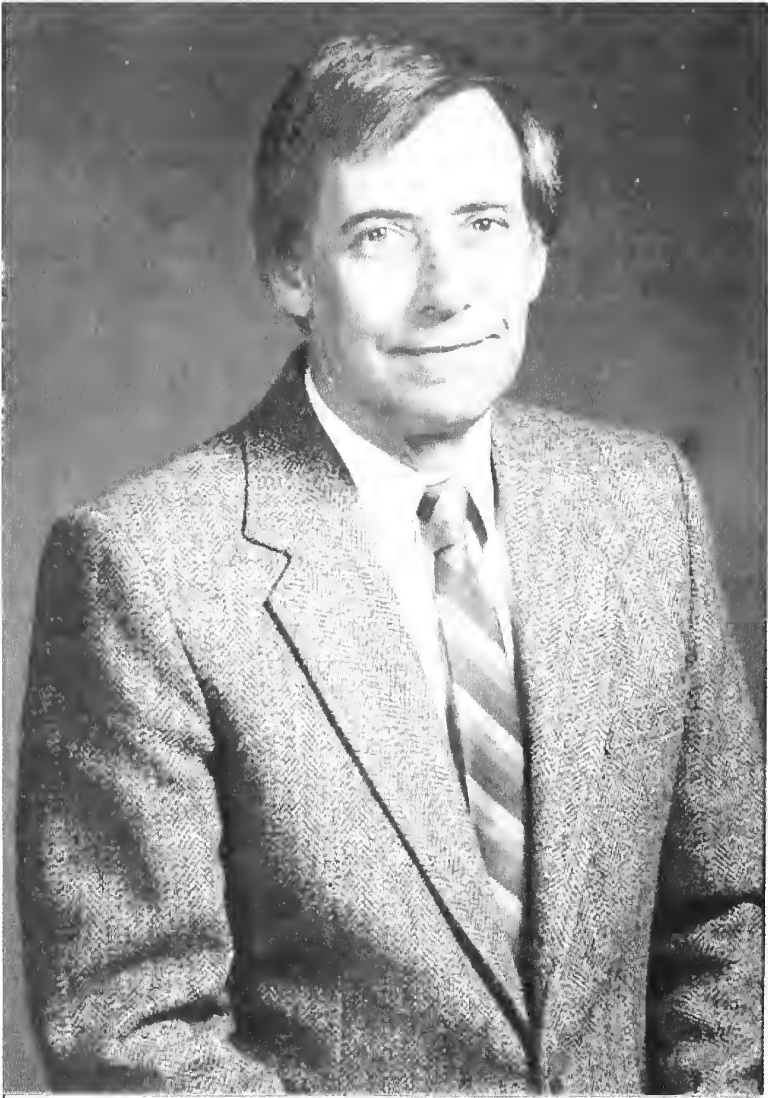
His association with the Board encompassed its major developmental phases and involved a wide range of activities and responsibilities in scientific assessment, administration and operations. He then became Director of Scientific Assessment for Puerto Rico.

Dr. Bergquist returned to the states and moved to Dothan, Alabama, in 1982 where he accepted a position at Troy State University Dothan. He retired in 1998 and became very active in the community and local church affairs. He was an active member of Christ Church International (CCI) where he served as an elder and Dean of the Ministerial Training Program (CLST).

Survivors include his wife, Joyce D. Bergquist of Dothan; two sons, Tim Bergquist (Joyce W.) of Branson, Missouri, and Dr. Stephen Bergquist (Margaret) of Murray, Kentucky; two daughters, Catherine Reynolds (Stanley) of Atlanta, Georgia, and Victoria McCormack (John) of Boise, Idaho; ten grandchildren, Jeremiah Bergquist, Ty Bergquist, Katelyn Bergquist, Miranda Bergquist, Aaron Bergquist, John Chandler Reynolds, Alicia Reynolds, Brittany McCormack, John-Michael

McCormack and Zachariah McCormack; a cousin, Kenneth Bergquist, Lansing, Michigan; several nieces and nephews.

*Joyce Bergquist and
Dr. William Dapper, Professor of Biology, Troy State University, Dothan, Alabama*



The late Professor Eugene Bergquist.

C. Leland Rogers, 1918-2001

He met me as I stepped into the Greenville-Spartanburg Jetport terminal. I was an anxious graduate student who had never been on South Carolina soil and who didn't have a job for the next year. He was C. Leland Rodgers, native of Greenville County, perhaps the most knowledgeable field botanist in several states, and chair of the department with which I was to interview. Within minutes, this soft-spoken gentleman had made me feel welcome and considerably more amenable to the idea of beginning an academic career in the Deep South.

Leland, who died October 26, devoted 32 years of his life to teaching at Furman University. Before that, he had already taught at every level, from high school through college. A 1939 Furman graduate, he earned a master's degree at Duke University and began his postsecondary teaching career at North Greenville College. In 1942 he married Jean Holliday (Furman '59), who remained his companion for the next 59 years. She passed away just over a month after his death.

Leland's plan to earn a doctorate was held up by World War II, during which he served as a naval officer in the South Pacific. He received his Ph.D. from the University of North Carolina in 1950, and after teaching briefly at Carson-Newman College, he came back to alma mater, where he taught until his retirement in 1988.

His lifelong passion was the study of the plants of the Piedmont and mountains of the Carolinas. He was intrigued by their great diversity in this area, where the cooler climes of the Appalachian chain meet the year-round warmth of the lower regions and thus create a wide range of habitats.

When development began to devour the woods and fields, he resolved to make people aware of the botanical loss that was occurring, becoming active in such groups as The Nature Conservancy. He was often asked to conduct botanical surveys and worked closely with the South Carolina Department of Natural Resources. He discovered the locations of many rare plant species, including Furman's endangered Bunched Arrowhead.

Leland was also well known beyond the campus through his publications. He authored or co-authored over 30 scholarly articles and several books, two of which are still in print. He was active in the South and North Carolina Academies of Science and was a member for over 30 years of Sigma Xi, The Southern Appalachian Botanical Club (which he served as president), and the Association of Southeastern Biologists.

In the late 1960s he created the Ives Herbarium within Furman's Biology Department, contributing many specimens from his field work. With over 20,000 specimens, this facility is an invaluable resource for Furman students and faculty and for botanists throughout the country.

An intensely private person, Leland blossomed when standing before students in the classroom or leading them through fields and swamps. Those who took a class with him will remember the sudden halting of the van as Leland, having spied a rare plant, leaped out for a closer investigation. His dedication to science and teaching inspired many students to follow him into similar careers. Furman honors him each year by presenting the C. Leland Rodgers Biology Award to the biology student graduating with the highest grade average.

During Leland's tenure as department chair, seven faculty members were hired, including three who later became chairs themselves. His ability to blend teaching and research involving students was a model for the department, long before Furman came to be known as the engaged learning campus. Although he acted as a mentor for younger teachers, he always insisted that the classroom was a professor's domain, within which he or she should have the last word as to what was taught and how it was presented. He was a man of integrity and humility, who will be missed by friends and family.

He is survived by two sons, Charles and David; a daughter, Rachelle Knight; a sister, Virginia Riddle; and a brother, Alton.

Dr. John Snyder, Professor of Biology, Furman University, Greenville, South Carolina. Reprinted with permission from *Furman Magazine*, Winter 2002.



The late Professor C. Leland Rodgers

REVIEWS

James Ross, *Review Editor*
7196 College Station Dr., Cumberland College
Williamsburg, KY 40769-1382

Wood, Don A. 2002. **Florida's Fragile Wildlife: Conservation and Management.** University of Florida Press, Gainesville. \$39.95 cloth. 212 pages.

Burrowing owls and gopher tortoises have more in common than underground living quarters: both are species teetering on the edge of a slippery slope to environmental disaster in Florida. Big Cypress fox squirrels, sandhill cranes, and a variety of bats are also in the mix, as discussed in *Florida's Fragile Wildlife: Conservation and Management*, written by Don A. Wood and published in 2002 by the University of Florida Press. The book gives an accounting of the environmental status of more than a dozen vertebrates, mostly birds and mammals, native to Florida as well as suggestions on how to improve their circumstances.

The news, like most environmental reports from Florida these days, is disquieting if you appreciate wildlife. The upside, however, is that books like this provide a valuable service by making us all a little more familiar with the natural history and plights of particular species. First, people cannot address environmental problems if they are not aware of the problems or potential solutions. Second, finding out about the haunts and habits of any wildlife species usually brings us closer to a kinship and caring about what might happen to it.

Wood took a pragmatic approach from a conservation perspective in selecting species to cover in the book, choosing ones whose life history traits and habitat preferences would be most likely to make them responsive to management. The species encompass a wide range of Florida habitats, which the author indicates was intentional during the selection process. Another criterion was to select species for which federal, state, and local governments receive numerous requests for guidance about their protection and welfare. Another feature of each species is that they frequently occupy public lands in Florida.

Wood does not get far into the Preface of the book before accurately pointing out the factors that have placed Florida's wildlife in such a fragile condition, which he notes is "heightened by the marooning effect of the state being a peninsula." The major environmental problems he identifies are standard ones throughout the world at one level or another, namely, an expanding human population, the press of urban and industrial development, and the establishment of exotic species. He has no panacea for these problems, but neither has anyone else.

I enjoyed the species accounts, although picking a favorite would be difficult. Who could not appreciate the Florida burrowing owl, a tiny dynamo of a bird that stands less than eight inches high and weighs less than two ounces? These little owls dig their own burrows usually but are not averse to using the burrow of a gopher tortoise, a culvert, or a piece of PVC pipe. Considering the development underway in Florida, this last microhabitat should be on the increase. Of particular interest is

that burrowing owls are the only U.S. owls that are active in the day as well as at night. Ironically, great horned owls, crows, and a variety of hawks and falcons are among the chief predators of these tiny owls.

Another featured fowl is the crested caracara, the national bird of Mexico, which became federally threatened in Florida in 1987. Caracaras are in the falcon family, and the U.S. species will take live prey but is actually closer to vultures in eating habits. A two-foot-tall, big-beaked bird with a black body, white neck, and a black coif that looks like it's been caught in a wind tunnel is not likely to be mistaken for any other bird. They are majestic looking in flight and carry food in their mouths instead of in their talons like most falcons. When they join vultures to feed on a dead animal, caracaras are dominant. Caracaras in Florida now possibly number fewer than 500 pairs due primarily to habitat loss and degradation.

The book can be ordered in hardcover directly from www.upf.com. A lower-priced paperback would be a preferred option, but the book provides information that will be of general interest to conservationists and of particular interest to anyone seeking information on the species discussed in the text.

J. WHITFIELD GIBBONS, Professor of Ecology, University of Georgia's Savannah River Ecology Laboratory, Aiken, SC 29803. gibbons@srel.edu.

Porcher, Richard D. and Douglas A. Rayner. 2001. A Guide to the Wildflowers of South Carolina. University of South Carolina Press.

Although I have a personal copy of almost all wildflower guides available, this one is far superior to the others. It is much more than a book of color pictures of showy wildflowers.

This guide has an extensive introduction giving the purpose of the book and its 711 photographs as "primarily to help amateur botanists identify many native and naturalized wildflowers that grow in South Carolina and surrounding states." It adds information natural history and plant uses that will help stimulate interest in the appreciation and conservation of South Carolina's flora. The book contains essays on 11 groups of plants such as native orchids, duckweeds, etc. This section is followed by a history of field botany in the state. Next comes a discussion on selected topics on natural history and ecology. I particularly enjoyed the one on economic and cultural notes.

The next large section of the book, pages 69-106, covers the natural wildflower communities. The state is divided into five of these: the mountains, the piedmont, the fall-line sandhills, the coastal plain, and the maritime strand. Each of these five larger communities is divided up into smaller ones. The mountains, for example, include six smaller communities. One of these, the deciduous forest, includes four forest types: cove, chestnut oak, woodland margins, and montane oak-hickory. Each of these communities is described giving habitat characteristics and common as well as indicator species present.

The wildflower communities are color coded the same code (blue for mountains and green for coastal plain, etc.) that is followed in the treatment of individual species. Each taxon that is pictured has the common name(s), scientific name, pronunciation guide for the scientific name, the Latin and common family names, a description of distinguishing characteristics, comments on range and use. The range information includes the overall geographic range and the specific habitats and distribution within South Carolina. Non-native taxa are indicated. Comments include cultural and economic uses, origin of names, and common synonyms. The pictures are clear and very adequate. Their size allows for more area for written text. The separation of the weedy, non-native taxa into the ruderal community is helpful.

The next section of the book, pages 409-455, gives a concise yet detailed treatment of the places in South Carolina where one can visit and observe the plants in their natural plant communities. The sites are arranged under the five large categories followed throughout the book. Under each province, such as the mountains, the sites are arranged under the county in which each is found. Detailed information tells the "wildflower person" how to locate the desirable viewing sites within each locality. The natural areas include state parks, national forests, state forests, and other protected natural areas.

The last part of the book, pages 457-551, includes a glossary, addresses of the South Carolina herbaria, keys to three difficult genera (*Hexastylis*, *Trillium*, and *Rhododendron*), drawings of plant structures, extensive references on plants of the region (both popular and technical), literature cited, and indices to scientific names, common names, and general information.

The authors and the publisher are to be commended for producing an outstanding book on South Carolina plants. It will have a wide audience. I have been teaching plant identification in Louisiana for over 30 years and would thoroughly enjoy having the kind of information about our flora and ecology that is presented by Porcher and Rayner for the Southern Carolina flora. I grew up in East Tennessee and learned how to find a particular wildflower by first learning habitats. It is refreshing to find such a well-done book on wildflowers that arranges the treatment by habitat rather than by some catchy gimmick such as flower color. I see this book as being an exceptional guide, and it should become the standard by which future wildflower guides are judged. I think that it is the best available today and that it should be available to the public in such places as the natural history shops in the Smokies and the Blue Ridge Parkway. It should be on the bookshelf of each professional and amateur botanist of the eastern United States.

R. DALE THOMAS, *University of Louisiana at Monroe.*

Ross, Stephan T. 2001. **Inland Fishes of Mississippi**. University Press of Mississippi/Mississippi Dept. of Wildlife, Fisheries and Parks, Jackson Mississippi. 624 pp. illus. \$50.00. ISBN 1-57806-246-2.

With *Inland Fishes of Mississippi*, Stephan Ross and co-authors William Brennehan, William Slack, Martin O'Connell and Tanya Peterson make an excellent addition to the current generation of keys to the fishes of southeastern U.S.A. states. This book is on par with *The Fishes of Tennessee* (Etnier and Starnes 1993) and *Fishes of Alabama and the Mobile Basin* (Mettee et al. 1996). The book provides detailed descriptions of the ecology/biology, distribution, conservation status and, where appropriate, the fisheries importance of the 204 native freshwater species, 69 estuarine/marine species frequently found in freshwater and 15 introduced species that are currently recognized within the state of Mississippi.

The authors wrote the book for both the professional ichthyologist/ fisheries biologist and the amateur enthusiasts. For the enthusiast (and the professional), the book contains a very useful chapter on fish identification, complete with a glossary of terms used in the dichotomous keys. The book also contains a description of the photographic techniques used by the author to obtain the high quality photographs of freshly collected specimens that appear throughout the book.

As an aquatic ecologist, I found the descriptions of the biology/ecology of each species to be extensive and thorough. The keys to the species of each family are easy to follow and supported by good artwork that illustrates specific distinctions that are made in the couplets. I tested the keys with three novice students from my Limnology class. All three were able to correctly identify the families of the spotfin shiner, golden redhorse and rainbow darter that I gave them with no assistance from me. They only needed minor assistance to identify the shiner and darter to species.

The only difficulties that I've had with this book concern the distribution maps. The distribution maps for those species that occur only in the far northeastern corner of the state show only that corner of the state. I found this to be confusing at first since I do not live in the state and didn't immediately recognize the region of the state represented by the maps. I also found it difficult to locate the distributions of some rare species. In particular, the symbols marking the distributions of the rainbow trout and rainbow smelt are hard to find. A pointer showing the location of the symbol would have been helpful on these maps and a few others.

These minor difficulties aside, as I said at the start, this is an excellent book. It will serve as a very useful resource for both amateurs and professionals from the state of Mississippi and all surrounding states, especially at the very reasonable price of \$50.00.

Dennis Mullen, *PROFESSOR OF BIOLOGY, MIDDLE TENNESSEE STATE UNIVERSITY, MURFREESBORO, TN 37132-0001.*

Bertness, M. D., Steven D. Gaines, and Mark E. Hay. 2000. **Marine Community Ecology**. Sinauer Associates Inc., Sunderland, MA, USA. \$72.95. 550 pages.

This text will interest advanced graduate students and professional marine biologists. Some of the chapters are redundant, others poorly written or organized; however, the text is current, has some excellent chapters and coverage of a wealth of the literature of many marine fields. The text is organized in three sections which explore community processes, types and problems. Opening from the perspective of the processes that shape marine communities rather than a description of the community types themselves reflects the general activist and experimental approach of the authors. The section on processes has eight chapters and unfortunately starts with a demanding chapter on physics. Readers without a sound grounding in the subject will probably never really get through this chapter but hopefully will not miss the author's note at the end reminding the reader that it is the interaction of physics and the biology of organisms that is important in ecology.

Chapter 2 is a beautifully written piece on marine communities from a geologic perspective and would have served as an excellent opening for this text. Vermeij provides a broad-brush description of hypotheses regarding processes that shape marine communities by comparison of the historical development of communities of the North Pacific, North Atlantic and Tropics. The comparison of these different systems serves as good example of the importance of striving to generalize our understanding of marine communities among different systems. He also introduces two themes evident in much of text: he limits the discussion to shore biota (reflecting the understandable bias of the text towards shore communities) and stresses the importance for generalizing our knowledge in terms of geography.

Chapter 3 on genetics is difficult, suffering from some of the same problems of Chapter 1 but is thankfully shorter. Chapter 4 on natural disturbance is much too long. At 46 pages this is the longest chapter and can be very dull. Example: Page 99, the paragraph headed *Substrates Affect Disturbance Rates*, concludes: "When the rock or host organism breaks, the attached individual is carried away" (there are 4 citations dating 1973-97).

Chapter 5 gets things back on track with a well-written and provocative chapter on predator/prey interactions. Another important theme of the text is strongly introduced in this chapter: the assertion that communities are controlled by a combination of processes, for example, top down and bottom up processes should be viewed as interacting to mold communities rather than representing alternative explanations for how communities are controlled. Another important introduction in this chapter is the challenge to investigate the extent to which short-term manipulative experiments can be extrapolated to predict long-term impacts.

Chapters 6 and 7 both deal with the importance of processes occurring in the plankton to those in the benthos. Though these chapters are concerned with essentially the same subject, redundancy is not a problem due to the very different points of departure of the authors. Both of these chapters provide strong evidence for the importance of considering reproductive, transport and behavior processes that occur in the plankton in the establishment of benthic communities.

The final chapter in the first section of the book is an excellent discussion of the importance of facilitation as a process important in structuring communities. The chapter is short making the important point that facilitation receives little attention and that studies should focus on potential conditionalities of positive interactions.

In Section 2, Chapters 8-16, the types of habitat currently receiving scrutiny, their communities and important processes of respective systems are reviewed. Though there is considerable redundancy, these chapters are informative and occasionally excellent, especially discussions of the rocky subtidal, deep-sea and coral reef communities. The geographic scope of some of the chapters was disappointing as authors stuck to what they knew best rather than providing a more generalized picture. For example, Lenihan and Micheli present schematics the soft bottom communities of temperate and polar latitudes leaving one wondering how they would present the tropics.

Section 3 includes three chapters united under the heading Conservation Issues. Chapter 1, human "Alteration," limits the discussion of the impact of "Overextraction" and exotic introductions on the Gulf of Maine. Despite this limitation, the authors are able to conclude that humans have altered most marine communities through overfishing and species introductions. This may well be false in absolute terms and the presentation of a broader review would be expected. Three other stressors on marine ecosystems referred to but not discussed for the Gulf of Maine are picked up in a very long chapter by Peterson and Estes on conservation and management. Pollution, habitat destruction and climate change are discussed, "Overharvest" is revisited, the Poverty of Past Paradigms gets us into modeling adaptive management and finally marine reserves which is the subject of the final chapter. Many good points are made in this review but their power is lost due to the poor organization of the text. An example is that within a section entitled *Modification of Bottom Habitat by...* a section labeled *Habitat Fragmentation* is included with sections on dynamiting, dredging, and trawling. More work at generalizing community types and impacts would improve this chapter. The final chapter on Marine Protected Areas accomplishes several useful goals: a simplification of the "Taxonomy" of MPAs to three; fisheries, ecosystem diversity and geography, a clear discussion of the evidence on impact of MPA establishment, and an excellent discussion of the importance of "Connectivity" among habitats systems ect to the function of MPA. The final section on MPA design is disappointing, as discussion is limited to how big an individual MPA should be and what percentage of overall habitat should be protected. This largely avoids the important questions: What types of habitat require protection if a given management objective is to be met? Are there geographic generalities that can be made relative to where should we protect marine communities with MPAs?

Conclusion: With some notable exceptions, I found this text to be poorly organized and often redundant. The text is current and contains a wealth of ideas for the consideration of advanced students and professionals.

JOHN SELDEN BURKE, NOAA Research Fishery Biologist, Center for Coastal Fisheries and Habitat Research, 101 Pivers Island Road, Beaufort, NC 28516. E-mail: john.burke@noaa.gov.

Julian-Fralish, C. J., S. L. Julian-Fralish, and J. S. Fralish. 2001. *The Porcupine Wilderness Journals. The Stacis Group, Ltd. Carbondale, IL. \$15.95. 353 pages*

This is a delightful little book that tells the stories of the visitors to the Porcupine Mountains Wilderness State Park. This park borders Lake Superior in the upper peninsula of Michigan and encompasses about sixty thousand acres. It has a number of streams, hills, a few lakes and sixteen rustic cabins scattered around the park. Apparently, the Porkies (as they are affectionately called) is a pristine example of a wilderness for this part of the country. The cabins have interesting names (e.g., Little Carp Cabin, Buckshot Cabin, Gitchee Gumees Cabin) and are reserved and used by visitors year round. It appears that most of these cabins, if not all of them, have to be hiked or backpacked into. Each of the cabins contains a log in which visitors can record their thoughts on various topics such as their joys, fears, trials, adventures, romance(s) (good and not-so-good), life philosophies, poetry (good and bad), helpful hints, folklore, humorous and not-so-humorous stories, recipes and artistic renderings of whatever is on the visitor's mind. This book is a series of selections taken from the log books kept in the sixteen cabins. The logs stay in each cabin and the visitors can read the comments from past visitors. Apparently the log books have been a part of these cabins for over fifty years.

A couple of short examples of journal entries are:

March 19, 1996

Gitchee Gumees Cabin

Old Indian Trick #36:

"Do not go to the outhouse in your underwear and boots and leave the camera with someone else. Same goes for firewood."

Greg & Carol

January 15, 1970

Mirror Lake 4-Bunk Cabin

"We are quite cozy now, and enjoying the great peace. How beautiful the pines are blanketed with snow. I ventured out through giant drifts of snow - four inches of snow carpet the floor. This morning it's beautiful. The sun is shining making the snow appear sprinkled with diamonds. The ice on the cabin hangs to the ground. It's probably ten below zero. Cozy inside. We were very warm sleeping due to the fact we had two in one sleeping bag. Kind of "survival of the fittest." We fitted!"

Sally

This book is divided into 16 chapters. Some of the chapters are devoted to the log entries at specific cabins and the others to specific themes (e.g., Wonders of Winter, Recipes to Die From... Er For, Nightscapes, and Youthful Insight). Another nice thing about the book is that it is not a book that you pick up, start reading at page 1 and continue until you get to page 353. You can pick it up, crack it open and begin reading anywhere without concern of "missing" anything. The next time you pick it up, just find a different beginning point. The log entries make for interesting reading but, more importantly, they provide a wonderful insight into the sometimes life changing impact these short stays in the Porkies have had on people. A few days filled with beautiful sunrises and sunsets, without street noise and television and with the unspoiled beauty of nature soothes and heals the soul. Also, it seems to

bring home to most people the importance of maintaining the wilderness areas we have left in our nation.

It is likely that not many people in the Southeast are familiar with the Porkies. This book is a nice introduction. I do not think this book is appropriate for much academic classroom use, although I could see it being used as supplemental reading in a few classroom situations. I do think this book would be a nice addition to one's personal library and it would be a great gift. My copy is already dog-eared.

JIM ROSS, *Cumberland College, Williamsburg, KY.*



Ten-year-old Chase Headrick—future biologist. He attended the annual meeting as the guest of Kenneth Shull.

NEWS OF BIOLOGY IN THE SOUTHEAST

Jon R. Fortman--News Editor
Division of Science and Math
Mississippi University for Women
Columbus, MS 39701

ABOUT PEOPLE AND PLACES

ALABAMA

Dr. Michael Stewart and students of the Department of Biological and Environmental Sciences, Troy State University, Troy, are currently performing an ecological assessment of the Conecuh River, located in the Coastal Plains of Southern Alabama. We are researching water quality, mussels, snails, crayfish, aquatic plants, and fish. In addition, we are looking for several new graduate students. Funding is available. Call Dr. Stewart at (334) 670-6373 or email him at mstewart@troyst.edu.

MUSEUMS AND BOTANICAL GARDENS

ALABAMA

Anniston Museum of Natural History. The Museum celebrated its 72nd birthday with Museum Day on Saturday, August 10. Festivities included games and crafts, Middle Eastern dance and music, and live animals from Africa and Egypt. The celebration also included a talk by Egyptologist Betsy Troupe of the Michael C. Carlos Museum at Emory University about the mysteries of the Anniston Museum's 2,300-year-old mummies. Guests took a guided tour of ancient Egypt through artifacts, exhibits, and objects in the new permanent exhibit hall "Ancient Egypt." On September 28, the Museum hosted Collectors' Day in celebration of one of our nation's favorite pastimes: collecting. Amateur and professional collectors of all ages are invited to display their treasures for the public. Also, curators from the museums were on hand to identify the collectibles, artifacts and antiques.

NOTE FROM THE NEWS EDITOR--News for the January, 2003 issue of *Southeastern Biology* should be sent to Jon Fortman by October 28, 2002.

SO, YOU WANT TO HOST AN ASB MEETING . . . ?

J. Kenneth Shull, Jr.
Appalachian State University

Many universities may want to host an ASB meeting but do not know if there are adequate facilities at their institution and/or in their community. When the Biology Department at Appalachian State University was thinking of hosting the ASB meeting in 1991, we did not know what was required to host such a convention, even though all of us had been to professional meetings. We did not know how many participants to expect, how many hotel/motel rooms would be needed, how many meeting rooms would be required, *etc.* After some conversations with John Herr, who proved most helpful, we made a study of our convention facilities, the availability of hotel and motel rooms, *etc.* and decided that we could, indeed, host an annual meeting of ASB. I promised John that I would write a summary of what we had learned to compliment his book *The ASB Meeting - 1986: University of South Carolina, Columbia*, which is a guide of what you should do after ASB has accepted an invitation from your institution. This is that long-promised summary which is written with the help of Howard Neufeld.

TIME OF THE MEETING

ASB meetings are held in the Spring, usually in early April, but not the week before Easter Sunday, nor the third week in April when the Appalachian Wildflower Pilgrimage is held. The first events will occur on Wednesday afternoon and Wednesday evening. The paper sessions will be held on Thursday and Friday morning and afternoon and most of the field trips will be held on Saturday morning. You should invite ASB at least two years before you plan to host the meeting.

EVENTS

An ASB meeting is really several meetings in one. Events to be planned include the paper sessions, the Thursday night social event, the Friday night banquet, business meetings of various societies that meet with ASB, various breakfast meetings, field trips, the ASB business meeting, the Wednesday evening and Saturday morning meetings of the ASB Executive Committee and the paper sessions, teaching workshop on Friday, general meeting and special events of Beta Beta Beta. The societies that meet with ASB will vary from year to year, but six such societies would be about average.

FACILITIES

The convention facilities need to be able to handle a meeting of about 850 participants. Most ASB meetings are not that large but can range in size from 600 to 850. Since the size of any meeting cannot be predicted, plan for the maximum. This could mean up to seven concurrent paper sessions at any one time. Each room should seat a minimum of 60 people in theater style and two or three rooms should seat 85 - 150. Some symposia draw 150 to 200 people and need a banquet hall or theater. In recent years some symposia and special interest sessions have been held on Wednesday evening, so one or two rooms that hold 75 people should be available for that night. There is usually a Wednesday evening mixer with a cash bar. One small room is needed for presenters to review slides, and another for

informal meetings or interviews for jobs. The ASB business meeting on Friday at 11:00 AM will have about 150 attendees. It must be possible to light-proof the rooms for slide presentations. Do not take the word of the convention center that it is possible -- check for yourself. Convention center personnel often do not understand how important this is nor how dark the room must be.

Various societies will hold breakfast or luncheon meetings on Thursday and Friday. If these meetings must be held in the rooms where the paper sessions take place then the convention center staff will have to be given about an hour to set up and thirty minutes to break down the room for a meal, but you will have to check with your convention center for exact requirements. If too many meeting rooms are used in this way there will be some problems in scheduling paper sessions and two or three additional rooms may be required. If the noon meal takes too long it becomes a problem for the participants to get back in time for afternoon meetings, so it is necessary for restaurants to be nearby. Two hours for lunch is ideal, but if necessary, one and one-half hours will do.

The convention center should have projectors and screens to accommodate all concurrent sessions as well as slide preview sessions. If these are not available at the center, your own AV department should be able to supply them. Do not forget extension cords and multiple receptacles for the paper sessions and the commercial exhibitors. Some presenters will need overhead projectors and/or VCRs and monitors. PowerPoint presentations have become very popular, but it may be too expensive to provide them. Check with your university and the convention center. If they cannot be provided, the participants can bring their own. Contact Dr. Michael Windlespecht at Appalachian State University about provisions for PowerPoint set-ups, those you may provide or those where the participants provide them.

Commercial exhibitors need a large space that can be locked at night since many exhibitors will have very expensive equipment in their spaces. An alternative is to supply a security guard at night. You need to plan for 30 exhibitors, each with an 8' X 12' booth and about 6' aisles between rows of booths. A rectangular room would need to be about 72' X 84', but each floor plan will differ, so it is wise to draw off the plan of your room and draw in the booths and aisles to make sure you have enough space. Plan for about 12-15 booths with electricity. If your convention center does not provide pipes and drapes for the exhibitors, be sure you can find a company who does. For the 1991 Boone meeting we had to hire a company out of Charlotte, NC, about 100 miles away, and they were very expensive. Our convention center had them for the 2002 meeting. The commercial exhibitors' fees pay for the meeting, so you must plan carefully for them. They need to be near the center of the activities, close to the registration desk, if possible, and should not be placed in a basement or in a separate building. If possible, the break refreshments should be located so that participants must pass through the commercial exhibits in order to get to them. Commercial exhibitors will set up on Wednesday afternoon and evening and will break down Friday about 11:00 AM.

Until recently it was the custom to hold the meetings on campus, either at a student union building or in the biology or science building. We find that ASB members really do like to meet on the campus or at least have an opportunity to tour the college. Campus convention centers are acceptable, but if no place on campus is available, the meeting can be held at a local hotel or convention center, which has been the norm in the recent past.

HOUSING

To accommodate 850 participants the community needs to have about 500 -600 hotel/motel rooms within a 15 minute drive, or about one room for each 1.5 participants. Your chamber of commerce or tourist information center can provide a good count. If you notify the hotels and motels in time you can usually get discounts for participants. If the convention center has motel rooms, you can ask for two or three complimentary rooms for the featured speaker, president, president-elect, *etc.*

THURSDAY NIGHT SOCIAL AND FRIDAY NIGHT BANQUET

For an 850 member meeting you can expect to have up to 550 participants at the Thursday night social, depending on the entertainment. A Friday night banquet of 250 would be a large banquet.

THE LOCAL ARRANGEMENTS COMMITTEE

Before you invite ASB to meet on your campus be certain that your faculty will agree to play a major part in the plans and the meeting. The chairs of the Local Arrangements Committee and the Program Committee should have some release time, especially in the Fall Semester. These will be busiest from the last week in November through the first week in December and again the two weeks before the meeting itself. Even if your convention center or office of conferences assures you that they do not need any help, appoint faculty to chair AV, social, transportation, registration, entertainment, housing and commercial exhibitor committees. These people will help you spot any problems and can act as liaison between the participants and the convention center staff. The Commercial Exhibitors Committee is an extremely important committee, and you should be certain you have very active people to agree to serve. It takes special people to plan a good Thursday evening social, so the Social Committee should be chosen carefully. The chairs of all committees should be tentatively set by the time you invite ASB. A formal invitation from the President of the University, the Provost, or the dean of the college is required by the Association.

TRANSPORTATION

If the convention center is not near convenient parking and public transportation you might consider using shuttle busses to and from the major hotels. If the Thursday night social is not at the center you will need to provide transportation to and from the event, especially if alcohol will be served. The same is true of the Friday night banquet. Very few participants fly to the meeting, but you do need to provide shuttle service to the airport if requested.

FIELD TRIPS

Every place in the Southeast has something around it that biologists find interesting. Ask the field biologists on your faculty for ideas for outdoor activities. Many local industries have interesting tours as was demonstrated in Baltimore. National and state parks, science museums, public gardens, *etc.* offer a good variety of trips, and in some cases, a good place for the Thursday evening social. Good guides are important and your faculty and graduate students are an excellent source of such talent. We offered a shopping/sightseeing tour for spouses and friends of participants at the Boone meeting and the turn-out was very good.

COSTS

The ASB meetings have traditionally been relatively inexpensive and it is the desire of the association to continue that tradition. Check with your convention center about costs, but if the center is in conjunction with a hotel and you reserve rooms for participants you will probably have no charge for meeting rooms. In Boone we used our office of Conferences and Institutes to handle many of the local arrangements and their help was invaluable. Such offices can assist you in calculating the registration fee, plan break snacks, luncheons, the banquet, help arrange for AV services, etc. For the 2002 meeting our office cost us \$8.50 per registrant per day, or \$25 per person. That cost, obviously, must be included in the registration fee.

To summarize, the following facilities are needed to host an ASB meeting:

- Meeting rooms for concurrent sessions: 5 to seat 60 people, 2 to seat 85-150.
- Meeting rooms for symposia: 2 to seat 150-200.
- Other rooms: 2 or 3 small rooms for slide previews and interviews.
- Banquet facility: To seat 250.
- Breakfast and luncheon rooms: 3 to seat 25 at breakfast, 2 to seat 100 at lunch.
- Commercial exhibitor space: A secure room to place 30 8X12 foot exhibit spaces, 12-15 with electricity.
- Thursday evening social: Plan for 550.
- Hotel/motel rooms: 500-600 in the community.

Adequate parking and/or public transportation.

Hosting an ASB meeting is a lot of work, but there is help available in John Herr's *The ASB Meeting - 1986: University of South Carolina, Columbia*, as well as from former chairs of Local Arrangements Committees and Program Committees. The benefits of the effort are great. By hosting ASB you will get the name of your institution before the biologists of the Southeast and advertise any of your special programs or facilities. You may attract graduate students to your program (we did) and the turn-out will likely impress your administration. There is a more important benefit. By hosting ASB you will be contributing to the organization and to the exchange of ideas among biologists in the Southeast.

Presentations at the Forty-Fifth Annual Meeting of the Southeastern Region of Beta Beta Beta in Association with the Sixty-Third Annual Meeting of the Association of Southeastern Biologists, Boone, North Carolina

Abstracts: District I Papers

CONDJELLA, RACHEL. Sigma Psi, Florida Institute of Technology—Timing of IHF binding to the origin of replication in *E. coli*.

In order to reproduce, cells must first duplicate all of their components, including their genomes. In *E. coli*, DNA replication begins at a unique chromosomal site, *oriC*. Initiation of DNA replication is precisely timed in the cell cycle, and in order to achieve this timing, nucleoprotein complexes triggering initiation must be assembled at the correct time, and then taken apart to prevent over-initiation. The first step of initiation of DNA replication is the unwinding of the DNA duplex in *oriC*, which requires a nucleoprotein to *oriC* only around the time of initiation. After the initial unwinding step, DNA helicase is loaded onto the complex to increase the open region, followed by primase (DnaG), which makes the primer needed to start DNA synthesis. After priming, the DNA polymerase holoenzyme enters the complex, and bidirectional DNA replication begins. At some point after the initial opening of the DNA duplex, IHF is lost from the complex, and the complex is reset, avoiding extra initiations. The purpose of this study was to define when IHF is removed from the complex. Dimethylsulfate *in vivo* footprinting was used to examine IHF binding in temperature sensitive DnaG mutants conditionally defective in priming. IHF binding was analyzed in exponentially growing cells, as well as cells halted just before the priming step by holding DnaG mutants at non-permissive temperature. IHF binding was detected in the cells stopped before priming, indicating that IHF is removed and the complex is inactivated after the priming step. Mutants defective in DNA synthesis are currently being examined to determine if replication fork movement is needed to inactivate the initiation complex.

**POCHELON, PATRICIA N. Sigma Psi, Florida Institute of Technology—Selective tidal-stream transport behavior of ovigerous blue crabs *Callinectes sapidus*: role of circatidal activity rhythms.

Prior to larval release, ovigerous blue crabs *Callinectes sapidus* migrate seaward from low-salinity areas of estuaries to spawn. Previous studies found that ovigerous crabs use selective tidal-stream transport (STST) to enhance the rate and efficiency of down-estuary migration. Crabs enter the water column during nocturnal ebb-tides but remain near the bottom at other times. This tidal vertical migration pattern can be caused by (1) a circatidal rhythm in swimming or (2) behavioral responses to environmental factors associated with the tides. This study tested the hypothesis that active upward movement into the water column on ebb tides is the result of an endogenous activity rhythm. Ovigerous crabs were collected near Beaufort, NC, from July-August 2001 and migratory activity was recorded for 3 to 5 d under constant conditions. Crabs displayed a circatidal activity rhythm with two activity peaks per lunar day that were synchronized with the time of expected ebb currents. A second circatidal rhythm in abdominal pumping was also observed, yet peaks in activity were synchronized with flood currents. These results are consistent with field observations of migrating crabs and support the hypothesis that a tidal activity rhythm is the behavioral basis of ebb-tide transport in ovigerous *C. sapidus*.

**Brooks Award Winner.

LAWRENCE, BRENNAN L. Tau Eta, Catawba College—Lactoferrin is an *in vitro* inhibitor of biofilm production in *Streptococcus mutans*.

Biofilms are colonies of microorganisms that secrete a polymer matrix and attach to a substrate. Lactoferrin (LF) is an iron-binding glycoprotein found in mammalian secretions. LF has been shown to inhibit the growth of *E. coli* biofilms *in vitro*. I examined the effect of LF on biofilm production by *Streptococcus mutans* a major causative agent of dental caries. The effect of LF on biofilm growth was determined in 24 well micro-titer plates. *S. mutans* was cultured in Todd Hewitt Broth (THB) containing either 0% or 1% sucrose. Lactoferrin at 100 µg/mL was added to the THB, or used to coat the wells of the micro-titer plate. The plates were incubated at 37° for 48 hours and examined with a dissecting microscope. *S. mutans* grown in 0% sucrose THB produced an even film on the bottom of each well. In 1% sucrose THB *S. mutans* produced small colonies attached to the bottom of the well. LF inhibited biofilm growth by *S. mutans* in 1% sucrose THB in both coated and dissolved treatments. These results suggest LF may have potential as a prophylactic treatment for dental caries.

BOONE, SHAUN. Tau Kappa, Georgia Southern University—Occurrence of the commensal crab *Dissodactylus mellitae* on the sand dollar *Mellita isometra*.

The presence of the small ectosymbiont *Dissodactylus mellitae* on the five-lunule sand dollar *Mellita isometra* was studied over an eight-week period at Tybee Island in Georgia. The size of sand dollars, and the number, size, and gender of crabs found on sand dollars were noted. Infestation rates of crabs on sand dollars were higher in September than October. More female-female crab pairs were found on sand dollars than male-male or male-female pairs. Female crabs were significantly larger than male crabs, with the carapace width of the largest female crab being 4.6 mm and the largest male 3.1 mm. The sex ratio of crabs was not 1:1. Sand dollar sizes ranged from 50-90 mm, with the mode being 60-70 mm. Over time, the number of sand dollars found between 60-70 mm increased, but crab infestation rate on sand dollars within this size class decreased. The distribution of crabs on sand dollars was random in September and repulsed in October. When data for both months were combined, the distribution of crabs on sand dollars was clumped. The maximum number of crabs found on a sand dollar was five.

LEWIS, STACI. Beta Alpha, Salem College—The length reduction of *Hermodice carunculata*.

This study focuses on the effects of diminished food resources on phenotypic changes. The coral reef invertebrate, *Hermodice carunculata*, is a widely dispersed coral predator, which has been exposed to habitat degradation. Previous to worldwide coral reef destruction the *H. carunculata* had an average body length of 20 cm and the digestive system was found to consist mainly of polyps and nematocysts.¹ Surveys performed on three reefs on the west coast of Barbados documented current levels of low density and established a 5.187cm decrease in the average length of *H. carunculata*. Also, the *H. carunculata* distribution on one reef was studied to determine regions of higher densities. Digestive contents of collected specimens will be used to analyze current diet. In 1962, the diet of *H. carunculata* was based on coral polyps¹ and the recent reduction in average length may be a result of the decrease in nutrients available for consumption.

¹Marsden, Joan. The digestive tract of *Hermodice carunculata* (Pallas). Polychaeta: Amphinomididae. Canadian Journal of Zoology. **41**, 169-183.

GROOMS, M. PAIGE. Tau Omicron, Francis Marion University—Movements and habitat use of two semiaquatic snakes, the Redbelly Water Snake (*Nerodia erythrogaster erythrogaster*) and the Eastern Cottonmouth (*Agkistrodon piscivorus piscivorus*).

During the summer of 2001, three Redbelly Water Snakes (*Nerodia erythrogaster erythrogaster*) and one Eastern Cottonmouth (*Agkistrodon piscivorus piscivorus*) were captured at the Clemson Pee Dee Recreation and Education Center in Darlington County, South Carolina. After capture, each of the snakes were anesthetized and implanted with Holohill radio transmitters (model SB-2). The snakes were then released at the location of capture, where they were tracked daily by radiotelemetry, using a Communication Specialists R-100 receiver and a Yagi antenna (model RA-150). The exact latitudinal and longitudinal positions of the snakes were recorded via a global positioning systems receiver (Garmin GPS III Plus). The data collected will be analyzed with the help of geographic information systems, which will be used to calculate activity range. Statistical analysis of the number of observations in habitat relative to the amount of habitat available will also be performed.

BARTE, BONNIE JEAN. Sigma Gamma, Erskine College—Seasonal demographic survey for potentially pathogenic antibiotic resistant staphylococci.

Fifty subjects from four different age groups of an upstate South Carolina population were surveyed in summer and winter for the occurrence of potentially pathogenic staphylococci on their fingertips. Subjects pressed 3 fingertips (first, second, and third fingers) to the surface of Mannitol Salt Agar. Plates demonstrating mannitol fermentation were selected for colony isolation, and isolates were Gram stained and tested for antibiotic sensitivity using the Kirby-Bauer Method. Antibiotics tested included: penicillin, oxacillin, erythromycin, neomycin, streptomycin, and tetracycline. Isolates were identified to species using the Rapidec system for staphylococci, and included *Staphylococcus aureus*, *S. epidermidis*, *S. saprophyticus*, *S. intermedius*, and *S. xylosus*. Carriers of staphylococci and occurrence of antibiotic resistance were reported by season, age, and staphylococcal species.

VREELAND, KATHRYN. Tau Xi, Meredith College—Alterations in cardiac intracellular signaling pathways by fuel oil combustion particles.

Cardiac effects of particulate air pollution have become a public health concern because of the association with increased human mortality and morbidity as reported in recent epidemiological studies (Peters et al, 2001; Pope et al, 1999; Samet et al, 2000). The mechanism by which particulate air pollution adversely affects human health is unknown. The present study examines the ability of fuel oil combustion particles, such as residual oil fly ash (ROFA), to alter cardiac intracellular signaling pathways. Cardiofibroblasts were exposed to saline or ROFA *in vitro*. Proteins extracted from these cells were analyzed by Western Blot technique for changes in intracellular signaling pathways using phospho-specific antibodies. Increased levels of p-Tyr and p-Thr phosphoprotein were evident after 0.5h of exposure to ROFA-Leachate (ROFA solution with all non-soluble constituents removed). After 3h exposure no increases in levels of p-Tyr, p-Thr, or p-Ser phosphoprotein were observed. In addition, no activation of the Akt pathway was detected. Preliminary findings indicate that soluble constituents of ROFA can induce early molecular effects through alterations in signaling pathways within cardiofibroblasts. The cellular consequences of these effects have yet to be determined.

CRAIG, NOELL. Beta Rho, Wake Forest University—The effects of molluscan neurotransmitters on isolated hearts of the freshwater mussel *Elliptio complanata* (Bivalvia: Unionidae).

A number of authors have examined several species of marine bivalve molluscs to determine the patterns of responsiveness of the isolated heart ventricle to various molluscan neurotransmitters. Since few investigators have experimented with freshwater mussels, the objective of this experiment was to determine the patterns of response of isolated hearts from the freshwater mussel *E. complanata* to acetylcholine, 5-hydroxy-tryptamine, and dopamine. The isolated ventricle was suspended in a tissue chamber, linked to a force transducer, and exposed to molar serial dilutions of one of the three neurotransmitters. The data from the force transducer was recorded using Biopac A/D hardware and Acqknowledge software on an IBM ThinkPad. Both the inhibitory and excitatory effects of the drug on frequency, amplitude, and tone were examined. The responses of the isolated hearts to Ach, 5-HT, and dopamine were highly variable among individual mussels. None of these molluscan neurotransmitters was exclusively cardio-excitatory or cardio-inhibitory. In general, lower concentrations caused inhibition, and higher concentrations caused excitation. These results are consistent with published data for a wide diversity of bivalve species among which the same dose of a given drug might elicit excitation, inhibition, or have no effect.

Abstracts: District II Papers

WORRELL, ANTIONETTE. Mu Chi, Midway College—*Cryptosporidium parvum* in the domestic dog population of central Kentucky.

Cryptosporidium parvum oocysts were identified in the fecal material in 4 out of the 26 samples obtained from domestic adult and puppy dogs from the population in central Kentucky. The positive results account for 15.4% of the obtained specimens. The samples were collected and preserved in 10% formalin, concentrated by the formalin-ethyl acetate procedure, and stained using the Meriflour *Cryptosporidium/Giardia* Direct Immunofluorescent Detection procedure. The oocysts found in the domestic dog population may suggest a possible reservoir for infection of immunocompetent and immunocompromised individuals.

**BRUNO, ARIANNA K. Pi Delta, East Tennessee State University—Developing a tissue culture system for the study of xylogenesis in *Arabidopsis*.

Xylogenesis (formation of tracheary elements) is an example of cytodifferentiation in plants. Cells that become tracheary elements undergo a sequence of events that leads to secondary wall thickening and apoptosis. Studying xylogenesis is difficult *in vivo*; however, cytodifferentiation can be visually followed in relatively homogeneous cell suspension cultures. This method is successful when applied to *Zinnia elegans*. My research question is: Can this method be used with *Arabidopsis thaliana*? A xylogenesis culture system for *Arabidopsis* could be used with the plentiful molecular genetic information on *Arabidopsis* to contribute to our understanding of cytodifferentiation. The published protocol with *Zinnia elegans* was used as a control. The cell suspension medium, which contains nutrients, a carbon source, and hormones to trigger the induction of xylogenesis, was then used to grow cell suspension cultures of *Arabidopsis* mesophyll cells. Variables for the *Arabidopsis* cultures include different cell isolation procedures, temperature, osmotic strengths, and time in culture. Optimization is defined as conditions that result in similar or higher levels of tracheary cell differentiation compared to published *Zinnia elegans* data. Variables of osmotic strength, temperature, and harvesting methods have been tested; cells in suspension culture have not yet shown significant induction of xylogenesis, and experiments are ongoing.

**Brooks Award Winner.

SEXTON, CHRISTI AND CARRIE COLEMAN. Mu Upsilon, University of Tennessee at Martin—Synergistic effects of vitamin E and vitamin C in tumor formation.

Vitamin E has been shown to be an effective chemopreventive agent against various carcinogenesis. It scavenges free radicals and active oxygens that may cause many pathophysiological conditions, including inflammation, Alzheimer's disease, and cancer. However, high concentrations of vitamin E are also known to be toxic to the cell. The oxidized form of vitamin E can be regenerated by a variety of agents, including selenium and vitamin C; therefore, vitamin E will still be effective at much lower concentrations when coupled with such agents. We report the synergistic effect of vitamins E and C in mouse fibroblasts that have been mitogenically induced to hyperproliferate by tetradecanoylphorbol-13-acetate (TPA). Identification of the formation of foci in tissue culture and immunoblot against cyclooxygenase-2 (COX-2) were the methods used to determine the anti-proliferative, thereby chemopreventive, activity of the vitamins. Dot blot against prostaglandin E₂ was the method used to determine indirectly the activity of COX-2. Immunoblot against Bcl-2 was the method used to detect apoptotic events.

CLARDY, TODD. Mu Epsilon, Troy State University—The effects of short-term sediment fertilization and water-column shading on the density and growth of *Halodule wrightii*.

Two of the most preponderant factors that limit seagrass growth are light and nutrient availability. The study of these limitations have received wide attention, particularly under the current tendency towards a worldwide eutrophication of coastal water bodies, which increases nutrient and reduces light availability for seagrasses. However, little is known about the concomitant effects of enhanced nutrient and reduced light availability on the growth of the common seagrass *Halodule wrightii*. In this study, we examine the impact of short-term sediment fertilization and water-column shading on the summer and fall density and growth of *H. wrightii* in a pristine lagoon of Perdido Bay (FL). Four fertilization treatments (control, nitrogen, phosphorous, and nitrogen+phosphorous) were applied in homospecific and heterospecific (i.e. mixed with *Thalassia testudinum*) meadows. Three shading treatments (control, 50% reduction, and 90% reduction) were applied only in the heterogeneous meadow. The results show no effect on density or growth due to nutrient enrichment. A clear decrease in growth due to 90% light reduction was observed in summer, and in fall a decrease in growth was observed for both the 50% and 90% treatments. The results indicate that light is a more important control of short-term summer changes in density and growth.

GRIFFIN, TONEY R. Mu Omicron, Columbus State University—Diet of the nine-banded armadillo, *Dasypus novemcinctus*, through stomach analyses.

The nine-banded armadillo, *Dasypus novemcinctus*, has a range from Texas to Florida and north to Kansas. In an ongoing study of this mammal in west-central Georgia, stomachs were removed from 14 road-killed specimens. The contents were examined and identified revealing a variety of invertebrates, vertebrates and reptile eggs. Identification was made to the closest taxon possible. A total of 7649 specimens from stomach analyses were identified and the results compared to a similar study in Texas reported in 1944.

HOLLOWAY, STACY M. Mu Omicron, Columbus State University—Effects of intermittent impoundment on benthic invertebrate stream communities.

Effect of intermittent stream inundation by impoundment on the development of benthic macroinvertebrate communities was compared using Hester-Dendy multiplate samplers in

two abandoned millruns in west Georgia. The impoundment of West Point Lake on the Chattahoochee River causes one of these streams to be periodically inundated, but not the other. During the fall and winter of 2000-2001, 20 samplers were placed in each stream every 30 days. Ten samplers were retrieved from each location after 15 days and those remaining after 30 days. This cycle was repeated four times between October and February. Colonizing insects were identified into 7 taxa and communities were evaluated using density, similarity, and diversity measures. Macroinvertebrate density patterns could not be correlated to location, time of year, or water chemistry. However, richness was lower at the periodically inundated site than at the control and declined with time. EPT ratios were also lower at the test site than at the control site. While both sites are impacted, the results suggest that the control site supports invertebrate communities with greater ecological integrity.

THOMAS, ANGELA. Mu Iota, Northern Kentucky University—Role of tissue culture in cryopreservation of endangered plant species of Kentucky.

Cryopreservation of plant tissues is becoming an increasingly valid option for conservation of threatened and endangered plant species. Meristem tissues are an option for preserving species that have poor seed germination or recalcitrant seed characteristics. In Vitro Collection (IVC) allows the researcher to collect tissue samples in the field and move them into a lab setting in order to cultivate the species in tissue culture. IVC involves the use of portable collection kits that are used to bring tissues into culture from small amounts of leaf or bud tissue. Once in culture, the plants are grown on media with hormone levels that encourage shoot growth. The shoot tips are then excised and processed for freezing in one of several ways: slow freezing, encapsulation-dehydration, vitrefication, or encapsulation-vitrefication. These methods utilize different types of chemicals that act as antifreeze and allow the tissues to be stored in liquid nitrogen (-160° - -196°C) for long periods of time. Viability of tissues is tested with a set of standard controls at different steps of the freezing process. Eight first run samples of eight different species were collected in the field in two different northern Kentucky locations in June. The tissue lines are being monitored for shoot development with the eventual goal of freezing and banking of the tissues at Northern Kentucky University.

BLAKER, ALICIA L. Mu Iota, Northern Kentucky University—Effects of predation on population structure of the cave cirolanid isopod, *Bahalana geracei*, on San Salvador Island, Bahamas.

Bahalana geracei populations are present in Lighthouse Cave and in Major's Cave on San Salvador Island, Bahamas. Earlier studies show a distinct decrease for females in Lighthouse Cave between 9.6 to 12.0mm, and then a rise after *B. geracei* reaches 12.0mm. The population in Major's Cave does not reflect this trend. Structural variations in population are attributed to predation. Major's Cave is 70%, while Lighthouse Cave is full ocean salinity, allowing for different predators. Major predators in Major's Cave are *Armases miersii* (marsh crab) and *Barbouria cubensis* (red shrimp); Lighthouse Cave are *Rivulus marmoratus* (killifish) and *B. cubensis*. Earlier studies of *R. marmoratus* show gape-limited predation on *B. geracei*. *Armases miersii* predation (using chelipeds) exhibited greater success on larger *B. geracei*. If *A. miersii* more easily catches larger prey, then the distribution of sizes in the population would be more even and not reflect the dip that is characteristic in gape limitation predation. Predator/prey relationships of marsh crabs on *B. geraceia* were tested and video taped for analysis.

LOBO, STEPHEN A. Mu Iota, Northern Kentucky University—The toxicological effects of microcystin-LR on neoplastic cells.

Cyanobacteria are a prevalent group of organisms in the environment that have the potential for producing toxins, called the cyanotoxins. Microcystin-LR is a known hepatotoxin and a potent inhibitor of phosphatases 1 and 2A. Primarily *Microcystis aeruginosa* and some members of the genera *Oscillatoria* and *Anabaena* produce it. In this investigation, the amount of cell death experienced by the hepatocarcinoma HepG2 and the fibrosarcoma HT1080 was observed in vitro at varying concentrations of and incubation periods of 24, 48, and 72 hours with microcystin-LR. A range of toxin concentrations from 0.3 mg/L to 40 mg/L was used based on the World Health Organization's guideline value of 1.0 mg/L for microcystin-LR. Additionally, the activity of the proapoptotic protein caspase-3 was measured at microcystin concentrations of 1, 18.75, and 75 mg/L at the same incubation periods. Results obtained from a MTS proliferation assay showed toxicity at concentrations at and above 9.375 mg/L in both cell types. Caspase-3 activity varied based on incubation period and toxin concentration. Microcystin-LR appears to have high acute toxicity at high concentrations. Lower doses seem to induce measurable apoptosis in both HepG2 cells and HT1080 cells. These data indicate that microcystin-LR induces necrosis via an apoptotic reaction cascade.

Abstracts: District I and II Papers

WARMUTH, THOMAS. Tau Gamma, East Carolina University—Mosquito surveillance, control, and education in the town of Simpson, NC.

Not Presented

RASMUSSEN, JULIA E. Tau Xi, Meredith College—The effect of aging on spontaneous mutation frequencies in mouse spleen and sperm.

As scientists are beginning to understand the relationship between mutation and disease, much effort is being focused on defining sources and causes of mutations through the use of mouse models. This study uses the Φ X 174 transgenic mouse and the Single Burst Assay of Malling and Delongchamp (2001) to study the relationship between spontaneous mutations and age. The spontaneous mutation frequency in mouse spleen and sperm from four age groups was ascertained. Preliminary data suggests that there is not a significant increase in mutation frequencies through the life of the mouse in either tissue.

HV Malling and RR Delongchamp. "Direct Separation of *in vivo* and *ex vivo* am3 reversions in transgenic mice carrying the phiX 174 am 3, cs70 vector", Environmental Mutagenesis 37 (4): 345-355, 2001.

PARKER, MEGAN A. Beta Omega, Mercer University—A tale of two seasons: herpetofaunal species distributions in managed piedmont forests.

One goal of timber management practices in the Southeastern United States has been to improve habitat for larger vertebrate organisms. For example, in the Southern Piedmont region of Central Georgia, management practices have been influenced by the presence of the endangered Red-Cockaded Woodpecker. I have examined the effects of some management practices on the native herpetofaunal (i.e. reptiles and amphibians) populations, in terms of species distribution,

abundance, and movement patterns within the Piedmont National Wildlife Refuge. I established pit-fall arrays (PFA) and funnel traps (FT) within four distinct 1000-acre compartments on the refuge. These forest compartments vary in frequency of burning and mechanical thinning. For two years, I calculated the trap effort for PFA's and FT's, as well as the relative frequencies of each species caught for each compartment. In 2000, I captured 223 individuals of 28 species, and in 2001, I captured 297 individuals of 32 species. The two-year results show a correlation of species preference (i.e. presence/absence) for certain compartments, seasonal variations in terms of species presence throughout the study, and differences in compartment structure (i.e. mid-story vegetation). To further quantify the effects of compartment management on the native herpetofauna, vegetational surveys are underway.

SWANSON, BRYAN M. Sigma Nu, University of Tampa—The effects of tide, temperature and light on the direction of vertical movements in the mangrove tree crab *Aratus pisonii* (Brachyura, Grapsidae).

A field study was performed to test the effects of light, temperature and tide on the direction of the vertical migrations in the mangrove tree crab *Aratus pisonii*. The movements of *A. pisonii* were recorded over a one-day cycle in the mangrove area of St. Petersburg, Florida just off of the Gandy Bridge. Four migration patterns were observed throughout the one-day cycle. The morning upward migration took place as soon as light appeared. Then a morning downward migration began as the temperature increased. An evening upward migration started at the same time tide and light levels decreased. The evening downward migration took place when the tide exposed the root system. Never before had *A. pisonii* been found to show distinct patterns of vertical movement effected by these abiotic factors.

**GRIM, JEFFREY M. Sigma Nu, University of Tampa—The distribution and abundance of the pea crab, *Tumidotheres* (=Pinnotheres) *moseri* (Crustacea: Decapoda: Brachyura: Pinnotheridae) and its relationship with the sea squirt host, *Styela plicata*.

This study examined samples from six populations of *Styela plicata* in Tampa Bay for the presence or absence of the symbiotic crab *Tumidotheres moseri*. Between twenty-five and thirty representatives of *S. plicata* were selected at each site by random sampling. The Mean Total Length (mm) of *S. plicata* for each site will be compared against the others using an ANOVA. The prevalence of *T. moseri* was found to be thirty-three percent at a northern jetty and thirty-three percent at a southern jetty of the Sunshine Skyway Bridge. Of the six sites sampled, the Skyway Bridge was the only locale in which the symbiont occurred. Since two sites housed infected *S. plicata* and four did not, it is possible that an abiotic factor (possibly salinity) limits the growth of *S. plicata* and the distribution of *T. moseri*. The effects of salinity on the growth of *Styela* and the prevalence of *Tumidotheres* will be tested using a regression. The presence of *T. moseri* is thought to be adversely affecting its host's growth, making the nature of the relationship parasitic. Seasonal analysis of crab prevalence between the infected locales will also be discussed.

**Brooks Award Winner

QUAMMEN, JENNIFER K. Mu Iota, Northern Kentucky University—Diet comparison in three tadpole species, *Rana sylvatica*, *Bufo americanus*, and *Pseudacris crucifer*, in a northern temperate climate.

The natural diet of northern temperate tadpoles is a largely neglected area of study. We investigated the natural diets in three anuran larvae, the wood frog (*Rana sylvatica*), the american toad (*Bufo americanus*), and the spring peeper (*Pseudacris crucifer*) from several

ephemeral ponds in northern Minnesota. Previous laboratory studies suggest that these species as well as others with similar mouthparts are suspension or filter feeders. Our results suggest that all three species are active grazers upon the aufwuchs (periphyton) or material found on aquatic vegetation and submerged substrates. The diet of these tadpoles is primarily comprised of detritus, more than 70% in all three species. Prior investigators suggest that *R. sylvatica* tadpoles are facultative predators on *B. americanus* tadpoles, resulting in differential breeding pond selection by adult *B. americanus*. Our study confirms this separation of tadpole populations. Of the invertebrate food in the diets, significantly greater percentage was found in *R. sylvatica* than in the other species, lending support to their suggested predacious behavior. The remainder of the identifiable organic foodstuffs were counted and analyzed to find possible interspecific trends.

HUBERT, LEROY, JR. Eta Mu, Southern University (Baton Rouge)—Antibacterial drug Taurolidine as an anticancer drug.

Taurolidine was developed as a drug against a broad spectrum of microorganisms including aerobic and anaerobic bacteria, yeast, filamentous fungi, mycobacteria, and protozoa. In the clinic, it has been used for the post-operative prevention of peritonitis either alone or in combination with other antibiotics. The Taurolidine treatment significantly reduces postoperative morbidity and mortality, with no local or systemic toxic effects on patients. Our recent work has demonstrated that Taurolidine, at doses far below those used in the clinic, induces apoptosis in a variety of cultured human tumor cell lines including many leukemia cell lines, suggesting that it may be used as a safe anticancer drug. To understand the mechanism that mediates the apoptotic effect of taurolidine, we used the human promyelocytic leukemia HL-60 cell line as a model system. Our study showed that treatment of HL-60 cells with Taurolidine rapidly induced, in a sequential order, mitochondrial cytochrome c efflux into the cytosol, activation of the key apoptotic caspase-3 in the cytosol, and apoptosis. Over expression of the apoptosis suppressor Bcl-2 in HL-60 cells significantly delayed the apoptotic effect of Taurolidine on the cells. Taken together, these results demonstrate that Taurolidine induces apoptosis by a cytochrome c-dependent pathway that can be regulated by Bcl-2.

ABRAMS, BRANDON. Mu Iota, University of Northern Kentucky—Stromelysin II gene knockout from HT 1080 fibrosarcoma cells.

This is an experiment that proposes to identify and manipulate the stromelysin II gene located on the q arm of the 11th chromosome of human DNA (HT 1080 11Q23). Manipulation includes inhibition or even elimination of the stromelysin II gene expression. This particular line of fibrosarcoma has been found to produce rare enzymes such as matrix metalloprotease, or MMP, that allow them to digest connective tissue and dissolve matrix. Metastasis is the invasion of surrounding matrix previously occupied by normally functioning cells. Many researchers believe, that the growth rate of these cancer cells is directly induced by the expression of the stromelysin II gene that is present. Preceding identification of the gene, a knockout will be created, which is a component that is hypothetically designed to inhibit the ability of this genes' expression. Therefore, by decreasing the expression of the undesired gene, the cells that contain this gene will not have the ability to mutate and metastasize as rapidly. The hypothesis that is being tested is will a specific anti-sense probe eliminate the expression of the stromelysin II genes in the HT 1080 fibrosarcoma cells.

SUCAET, YVES. Mu Epsilon, Troy State University—Termination sequences in ARSs in *Saccharomyces cerevisiae*.

In the genome of *S. cerevisiae*, termination sequences mediate the termination of RNA transcription. ARS (autonomous replication sequence) elements mediate replication. The goal of this project is to determine if termination sequences are more prevalent in the ARS regions. We hypothesize that termination sequences will occur with higher frequency in the ARSs than in other regions of the genome because the termination sequences act as molecular shields to protect the replication process from interference by transcription. The *Saccharomyces* Genome Database was used to retrieve the sequences and construct a local database. The location of all the termination sequences on chromosome III was determined and the ratio of termination sequences in the intergenic regions in general and the ARS in particular was assessed. Results indicate that there are more than two times as many termination sequences in the ARSs as in the rest of the genome. In conclusion, this data supports a role for the transcription termination sequences in protecting (or shielding) replication.

Abstracts: District I Posters

1. MASSE, DELPHINE. Sigma Psi, Florida Institute of Technology—A study on the reproduction of an endangered plant: the effects of artificial pollination on the rare scrub mint, *Dicerandra thincicola* H.A. Miller (Lamiaceae).

Dicerandra thincicola, an endangered plant endemic to only a few acres in Brevard County, Florida, has a poor reproductive rate, including a low seed germination rate. This study tested for a pollinator deficit, using ten plants in two sub-populations: eight in Titusville and two in the smaller Mims sub-population. The following treatments were applied, each to one stalk per plant: (1) control (2) self-pollination using pollen from the same plant (3) cross-pollination using mixed pollen from plants of the same sub-population and (4) on the Mims plants, outcross pollination using mixed pollen from plants from Titusville. The pollination was performed by hand, and the plants were left to further natural pollination. It was hypothesized that a strong pollinator limitation would cause a significantly lower number of seeds/flower and seed quality in controls than in pollen supplemented stalks. There was no significant difference ($p=0.45$) in number of seeds/flower between control and supplemented groups (ANOVA, plants treated as blocks), indicating that pollinator abundance does not limit significantly seed quantity in *Dicerandra thincicola*. The viability of the seeds produced is currently assessed to see whether the pollination influenced the quality of the seeds.

2. LEBLEU, VALERIE. Sigma Psi, Florida Institute of Technology—Cyclin D2 expression and cancer.

Cancer often results from a deregulation of the cell cycle. Determining the mechanisms of cell cycle control can contribute to the discovery of oncogenes whose mutations may lead to cancer. I have studied cell cycle expression of cyclin D2, a gene implicated in the regulation of the G1 phase of the cycle and in tumor development, in synchronously growing cultures of human leukemic lymphocytes. Expression of cyclin D2 mRNA was found to vary periodically in the cycle with a peak in G1 phase. It was also found that cyclin D2 mRNA levels increased in successive cell cycles, as well as in asynchronous cultures, which was not the case for other

cyclins examined. Therefore, cyclin D2 may be unusually responsive to extracellular growth factors that might change during culture growth. The increase in mRNA levels could be explained by an increase in the transcription of the gene, or increase in the stability of the mRNA. Experiments currently in progress are consistent with an increase in cyclin D2 mRNA stability during culture growth. The unusual responsiveness of cyclin D2 to changes in the cellular environment may have implications in cancer cell proliferation in humans and the development of new therapies.

3. Rouskin, Silvia R. Sigma Psi, Florida Institute of Technology—Chromosome segregation in mouse leukemia cells.

Chromosome segregation into daughter cells during cell division is an important process because abnormal chromosome number can lead to various defects in the cell, including cancer. The purpose of my study was to determine if chromosomes are segregated randomly or nonrandomly in mouse leukemia cells, that is, if chromosomes containing the oldest template DNA strand were preferentially segregated into one of the two new daughter cells. To accomplish this, the cells were pulse-labeled with bromodeoxyuridine (BrdU) and then grown attached to a membrane filter such that only one of the two newborn cells formed at each division was released from the filter. The level of BrdU in the DNA of the released cells was measured by flow cytometry. Three possibilities were tested. Firstly, if the bound cells always kept the template DNA strand, BrdU would only be detected in the released cell during the first and the second generations of growth and division. Secondly, if the bound cells always kept the newly synthesized DNA strand, BrdU would be detected in the first and the third generations. Finally, if chromosome segregation were random then BrdU would be observed in all generations. The results suggest that chromosome segregation is random since BrdU was observed in each generation.

4. CHANG, EUN. Beta Alpha, Salem College—Factors affecting transmission or development of isoniazid-resistant and multidrug-resistant tuberculosis.

Drug-resistant tuberculosis has grown to be an alarming global threat. Drug-resistant strains of TB are either transmitted from one patient to another (primary resistance) or developed in a patient's body from an initially drug-sensitive strain (acquired resistance). There are many factors that influence either the transmission or the development rate of drug-resistant TB. These factors include age, HIV, TB treatment regimens, presence of accompanying diseases, environmental or living conditions, and prior exposure to TB. This study focuses specifically on what affect prior exposure to TB has on primary and acquired rates of isoniazid resistance and multidrug resistance. Combined data of 24 countries, published by World Health Organization, will be used to determine how drug-resistance became a problem in a population. Three potential causes will be examined: high transmission rate (primary), inadequate treatment regimen or misuse of drugs (acquired). Furthermore, I will examine whether an exposure to TB bacilli results in increased susceptibility or immunity to drug-resistant tuberculosis. Susceptibility to simple reinfection or to reactivation from prior maltreatment will be determined by analyzing primary and acquired rates observed in retreatment cases.

**5. VONCANNON, JESSICA. Beta Alpha, Salem College—Site-directed mutagenesis of the *Pseudomonas aeruginosa* algZ gene.

Cystic Fibrosis (CF) is a recessive genetic disorder leading eventually to lung failure and death of the patient. *Pseudomonas aeruginosa* is a predominant lung pathogen of CF individuals. Strains infecting CF patients can accumulate mutations that lead to expression of

a mucoid phenotype making *P. aeruginosa* difficult to treat. An exopolysaccharide, alginate, makes up this mucoid coating. AlgD is the first enzyme in the biochemical pathway to make alginate and AlgZ is an essential activator of *algD*. AlgZ is part of the ribbon-helix-helix family of DNA binding proteins, and is 30% identical to a well-studied member of this family, Mnt. When Mnt contacts the DNA it will bind at amino acid residues 2, 6, 8, and 10. It has been hypothesized that corresponding residues on AlgZ will also be essential for DNA binding. Three of these residues have been mutated to alanine, and the mutants showed reduced or abolished DNA binding activity. Site-directed mutagenesis was used to engineer a mutation in *algZ* to change the fourth of these corresponding residues to alanine. Results were successful, finding two clones containing the R14A mutation.

**Johnson Award Winner

6. Not Presented

7. CLOY, JESSICA A. Psi, Winthrop University—Determination of population dynamics of de Brazza's Monkeys, *Cercopithecus neglectus*.

The de Brazza's monkey (*Cercopithecus neglectus*) population is dwindling rapidly due to animal trade, habitat destruction, range fragmentation, and cultivation. To maximize the success of conservation efforts, population dynamics of de Brazza's must be fully understood. Field studies have yet to determine conclusively the social dynamics of this group, however observations do suggest both male and female dispersal. If female dispersal occurs in this species it would have a major influence on the fate of animals introduced into areas with established groups. In order to test the hypothesis of female dispersal, we are establishing molecular techniques to determine genetic relationships of captive de Brazza's of known genealogy. Mitochondrial DNA was isolated from hair samples derived from a family of de Brazza's living at Riverbanks Zoological Park, Columbia, South Carolina. We successfully amplified, subcloned, and sequenced a region of the displacement (D) loop from the mitochondrial genome (460 bp). Currently we are collecting hair samples from other zoos in the United States and amplifying the entire D-loop (1250bp). Amplification of the entire D-loop ensures that both conserved and variable regions are included in our analysis. Results from this research will act as preliminary data for proposals to conservation-oriented granting agencies.

8. STEIGERWALD, WILLIAM, SHEILA REILLY, AND MICHAEL MCLEOD. Tau Upsilon, Belmont Abbey College—Preliminary allozyme analysis of *Magnolia macrophylla* Michaux in Gaston County, North Carolina.

Magnolia macrophylla Michaux (Magnoliaceae) or Big Leaf Magnolia is known for its large showy leaves and flowers. It grows well in temperate climates, favoring acidic soil and north facing slopes near creek beds. Populations of the Big Leaf magnolia are geographically clustered in the southeastern United States. In North Carolina the range of *M. macrophylla* is limited, with some exceptions, to Gaston County in the western Piedmont where the French explorer and botanist André Michaux first discovered and named the tree in 1789. Because populations are generally separated from each other, the question of genetic variability within and among populations is of interest. Previous reports from allozyme studies of Big Leaf Magnolia over a wide geographic area indicate that low levels of genetic variation occur within and among populations of *M. macrophylla*. This preliminary study investigates allozyme variation in three populations of *M. macrophylla* in Gaston County, North Carolina. Data thus far from the sites analyzed indicates that there is no allozyme variation in the ten enzymes studied. The lack of intrapopulation variation can be explained by several possibilities

including bottleneck effect, self-fertilization or outcrossing with close relatives, or vegetative reproduction through the generation of ramets from more mature trees.

9. AMBROSE, ANDREW A. Tau Rho, St. Andrews Presbyterian College—Comparative study of four PAH-degrading soil pseudomonads on substituted two and three ring structures.

Polyaromatic hydrocarbons (PAHs) and substituted analogs are ubiquitous environmental contaminants found in all environmental areas. They are persistent xenopollutants that both bioaccumulate and possess carcinogenic profiles; their polyaromatic structure is the primary force behind their longevity. Pseudomonad strains 18G, 19SBJ, 57RV, and 32SP are known to degrade two and three ring polyaromatic hydrocarbons (PAHs). This study focuses on the extended ability of these strains to bioremediate substituted ring structures. Halogen, hydroxyl, and alkyl substituted rings were used. Experimental growth studies were done using the aforementioned strains in minimal media supplemented with a PAH substrates. Cultures inoculated with naphthalene derivatives demonstrated different patterns of growth than with naphthalene alone. 1-naphthol, 2-naphthol, and 1,5-naphthalendiol showed reduced growth while 1-naphthoic acid showed no growth. Spray plate testing was also employed. Strains were streaked onto minimal plates and exposed to aerosoled PAH substrates. Coloration changes and/or clearing zones indicated the bacteria were degrading and/or solubilizing the substrate. Biphenyl, fluorine, 2,5-dinitrofluorene and 1,2-dimethylnaphthalene demonstrated change for all strains. 1-bromonaphthalene and 2-bromonaphthalene plates demonstrated change for all strains except 32SP. PAH-degrading pseudomonads have potential for the large scale, noninvasive clean up of contaminated sites. Strains possessing expanded substrate usage are, therefore, favored choices for further study.

**10. HOPKINS, JILL. Rho Kappa, Widener University—Correlation between ploidy and guard cell area in *Sisyrinchium atlanticum* Bickn. in eastern U. S. coastal populations.

The genus *Sisyrinchium* (Iridaceae) consists of 80 species commonly known as Blue-eyed-grasses. Approximately 50% of these species occur in North America, growing in various habitats. Species identification is often difficult because hybridization is known to occur. Chromosome numbers range from $2N=10$ up to $2N=96$. One eastern species, *S. atlanticum* Bickn., occurs from the Gulf Coast northward into Canada. Chromosome number reports indicate that several levels of ploidy exist within this species. A preliminary study suggested that these ploidy levels may have a geographic basis, i.e., a higher ploidy level was present in a SC Atlantic Coast population versus a lower ploidy level in a FL Gulf Coast population. The significantly different stomate areas were $111 \mu\text{m}^2$ and $422 \mu\text{m}^2$, respectively, as determined from leaf peels made from herbarium specimens. The current study examined 18 additional populations of *S. atlanticum* Bickn. representing these coasts from Nova Scotia to FL. Stomate area ranged from $81 \mu\text{m}^2$ to $135 \mu\text{m}^2$. The data suggests two distinct ploidy levels, possibly three as reported in the literature, although the data does not support the hypothesis that ploidy level is correlated with geography.

**Beta Beta Beta Research Foundation Award 2001-2002

11. Keck, Courtney & John Mecham. Tau Xi, Meredith College—What is the shape of a snail?: Testing predicted mass exponents in the snail, *Biomphalaria glabrata*.

The relation between body size and metabolic rate is of interest because most organisms increase in size with age and life on Earth varies greatly in mass. Patterson (1992) predicted mass exponents for aquatic vertebrates based on shape and water flow. The purpose of our

research was to test Patterson's numbers by using Ca^{45} uptake as a measure of mass transfer in the aquatic snail, *Biomphalaria glabrata*. Snails of different sizes and weights were exposed to turbulent flow, laminar flow, and standing water conditions. Mass exponents were predicted to be 0.5 for laminar flow and 0.6 for turbulent flow. Measured mass exponents for standing water, laminar and turbulent water flow was 0.65, 0.89, and 0.73 respectively.

12. Grant, M. Susannah. Tau Xi, Meredith College—Risk factors for ovarian cancer: the fertility drug link.

As the availability of fertility treatments continues to increase, there has been much controversy over the safety of fertility drugs. Three of the most commonly used fertility drugs are clomiphene citrate, bromocriptine, and human menopausal gonadotropin. It has been proposed that because of the ovulation inducing nature of fertility drugs and the increased levels of estrogen present when undergoing these treatments, women are at higher risk for developing ovarian cancer. There has always been a small amount of concern about the possible risk, but this concern was dramatically heightened several years when a series of three publications from the Collaborative Ovarian Cancer Group were released. This group found that infertile women using fertility drugs had a risk of almost three times higher of developing epithelial ovarian cancer than women with no history of infertility. However, many other studies also state that there is no relationship between fertility drugs and ovarian cancer. So while the debate continues it is important for all women considering fertility treatments to do so carefully and to weigh all the evidence before making a final decision.

13. MARY BETH NEWSOME. Tau Kappa, Georgia Southern University—Flash behavior of the synchronic North American firefly *Photuris frontalis*.

Photuris frontalis is one of only two species of firefly in North America that is known to flash synchronically. In my experiments, two fireflies were used to study this synchrony (earlier work had used a light emitting diode to simulate a firefly's flash). Two fireflies were placed in containers on separate sides of an opaque barrier, and allowed to flash, both with the barrier in place and with the barrier removed. A photometer (connected to a computer) was placed with each firefly to record the flashes. The flashes appeared to be random with respect to one another when the barrier was in place and the animals could not see one another. Phase locked synchrony only occurred when the barrier was removed. When the barrier was removed, almost invariably one firefly was initially inhibited (either for a "short-term" duration of only a few seconds, or "long-term", for several seconds). The animal that showed this period of inhibition was also the one to "lag" behind the other during subsequent flashes (i.e. it would flash a few milliseconds after the other firefly). In other insects, precedence effect has been shown in mate selection. While the exact role of initial inhibition and lag behavior is unclear, it could indicate the matter of flash leadership. Therefore, the flash behavior of *Photuris frontalis* may be involved in some aspect of sexual selection in the animal's mating behavior.

14. LUNDY, TAMEKA D. Tau Eta, Catawba College—Effects of intercalating agents on DNA amplification using PCR.

Polymerase Chain Reaction (PCR) is technique used to amplify a specific sequence of DNA. I examined the effects of the DNA binding dyes; ethidium bromide (EtBr), bisBenzimide (Hoechst 33342), and propidium iodide (PI) had on DNA PCR amplification of bacteriophage lambda. These three dyes are intercalating agents, the most important group of compounds that interact reversibly with the DNA double helix. Intercalating agents are used to stain DNA in electrophoretic and histological preparations. Primers were selected to amplify a 1106-

base pair sequence from the bacteriophage lambda DNA. This experiment examined the effects of the EtBr, Hoechst 33342, and PI directly in the PCR mixture at different concentrations. The concentrations used were 0 μ g/mL, 1 μ g/mL, 10 μ g/mL, 25 μ g/mL, 50 μ g/mL, 100 μ g/mL of EtBr, Hoechst 33342, and PI. DNA samples produced by PCR in the presence of the EtBr had an apparent size of 1200 base pairs. This increase in size is due to EtBr binding to DNA after amplification and slowing its movement through the gel. Intercalating agents at a concentration up to 100 μ l/mL do not inhibit PCR amplification of lambda DNA.

15. EASLER, JEFFREY J. Beta Rho, Wake Forest University—The effects of the tight junction blocker LaCl₃ on ethmoid nerve responses to noxious chemicals.

Chemoreceptive fibers from the ethmoid branch of the trigeminal nerve innervate the epithelium of the nasal cavities. These fibers terminate in free nerve endings and respond to noxious chemical compounds. The pathway irritants use to reach these free nerve endings is not entirely clear. Tight junctions may play an important role in providing a paracellular pathway through the epithelium for hydrophilic compounds. The degree to which paracellular pathways play a role in the transport of weakly hydrophilic and hydrophobic compounds is not yet understood. The present study examined the effects of the tight junction blocker LaCl₃ on ethmoid nerve responses to stimuli of varying lipophilicity. Multi-unit neural responses were recorded from the ethmoid nerve of Sprague-Dawley rats. An olfactometer delivered measured vapor phase doses of carbon dioxide, nicotine, and hexyl acetate into the rats' nasal cavity. A 10mM solution of LaCl₃ was introduced into the rats' nasal cavity through a nasopharyngeal tube. The neural response to CO₂, but not to hexyl acetate or nicotine, decreased after the introduction of LaCl₃. A saline control had no effect on the response to CO₂. These results suggest that tight junctions play a role in how ionic compounds reach trigeminal free nerve endings.

16. DAVIS, HAROLD, III. Psi, Winthrop University—A modular screen for epidermal patterning mutants in *Drosophila*.

The conventional loss-of-function screen is a useful approach to determining gene function. However, there are drawbacks, which warrant an alternate method to discovering both genes and the function of the proteins they code for. Using the technique developed by Pernille Rørth, we performed a gain-of-function genetic screen in *Drosophila* for genes involved in epidermis patterning. Rørth generated P-element vectors inserted into about 2300 independent target sites, each carrying an upstream activation sequence (Gal-4 dependent promoter). When a Gal-4 driver line is crossed with the P-element target line, the offspring misexpress genes that neighbor the P-element. Using this method we hypothesized that the misexpression of genes that are required to pattern/organize the epidermis would disrupt embryonic development. In a pilot screen, we tested 154 lines, four of which produced candidates that warrant further study. NSF Grant 9978874 & NIH Grant GM47857.

Abstracts: District II Posters

1. COCKLEY, JESSICA A. Mu Chi, Midway College—Comparing the prevalence of parasites in canines of Franklin County Kentucky.

Ascarid and cestode eggs were recovered from twenty-five of forty-five adult and puppy dogs in central Kentucky. Ascarids were found in 44.4% (20 out of 45) and cestodes were found in 11.1% (5 out of 45). The incidence of ascarid and cestode eggs were categorized by age, biological sex, spayed/neutered or not, and environment. The procedure used was a formaldehyde/sugar flotation on the fecal samples collected at Frankfort Animal Clinic. The results indicate that puppy dogs and country dwelling canines have a higher rate of infection.

2. AUSTIN, ANNA. Mu Chi, Midway College—Preference for cover type by the crayfish (*Orconectes rusticus*): A laboratory experiment.

In streams crayfish (*Orconectes rusticus*) are found under or within rocks, wood debris, and vegetation. The purpose of my study was to determine in the laboratory whether crayfish show a preference for cover type under which they have been seen in the wild and to monitor the effect of time of day on that preference. The number of entries and the amount of time spent in each cover type were the criteria for preference. Overall, crayfish preferred vegetation. During the day crayfish preferred vegetation to rocks. At night they preferred vegetation to either rocks or wood. For day to night comparisons made within cover type, crayfish were just as likely to be found within vegetation both day and night; but they preferred both rocks and wood during the day compared to night.

3. KUNTZ, KARA L. Pi Delta, East Tennessee State University—The murine cGMP-gated cation β -subunit gene is alternatively transcribed in a tissue-specific manner.

Functioning of the mammalian visual system is reliant upon cGMP-gated cation channels (CNCG), heteromeric complexes consisting of α - and β - subunits. While both subunits contain channel-like domains, in photoreceptors the role of the β -subunit is to modulate the activity of the α -subunit. We previously identified the murine and human β -subunits and determined that human homolog is expressed from a complex transcription unit comprised on non-overlapping transcription units. In order to begin to investigate the transcriptional regulation and potential alternative roles of the murine β -subunit its tissue- specific expression patterns were determined. Probes specific for the 5' and 3' ends of the murine β -subunit were generated and used to screen a multiple tissue northern blot. Multiple splice variants of the subunit were expressed at low levels in heart, kidney, liver, skeletal muscle and testes. Analysis of the transcripts reveals unique expression patterns in each of the tissues examined. The abundance of transcripts suggests the murine CNCG β -subunit is encoded by a complex locus, which uses alternative tissue-specific promoters. In addition, the identification of β -subunit transcripts in tissues in which do not express the α -subunit indicates an alternative role for the β -subunit in these tissues.

4. NETHERLAND, BRANDI P. Pi Delta, East Tennessee State University—Phylogenetic analysis of the bryophytes and pteridophytes using the psbA gene sequence.

Bryophytes, the first land plants, are at least 450 million years old, and include the hornworts (presumed basal), liverworts, and mosses (presumed sister to the vascular plants).

Pteridophytes, the earliest vascular plants, are paraphyletic to seed plants, with a proposed lineage of whisk ferns being basal, followed in order by the lycopsids, horsetails, eusporangiate ferns, and leptosporangiate ferns. Many studies have been performed to examine these proposed family lineages, and the studies give conflicting results. The purpose of this research is to generate DNA sequence data for the highly conserved chloroplast *psbA* gene from several species of pteridophytes. These data will be incorporated into a larger data set, and will be used in a phylogenetic study to test the above relationship hypotheses. Total cellular DNA was isolated from three plants. The *psbA* gene was PCR-amplified from three cellular DNAs and the products were cloned. DNA sequence data were obtained for the cloned inserts from *Botrychium* (a fern) and *Selaginella* (a lycopsid) and are currently being compiled using the computer software, BioEdit. Due to the unexpected length of these inserts, additional sequencing primers will be used, in order to clarify uncertain regions.

5. BLEVINS, ASHLEY. Pi Delta, East Tennessee State University—Sequencing the *psbA* gene from representatives of the major lineages of land plants.

The phylogenetic relationships and evolutionary histories of early land plants (bryophytes and pteridophytes) are unresolved. The use of morphological characteristics to determine relationships gives conflicting results. Molecular analysis of gene sequences provides a promising method to resolve these issues. The highly conserved chloroplast *psbA* gene should be excellent for use in examining early land plant relationships. Phylogenetic analysis by means of the *psbA* gene will be most effective if conducted using a multi-gene approach. Gene sequences from three rRNAs and one protein are available for several land plants. Obtaining the sequence of the *psbA* gene from representatives of each major land plant lineage is the goal of this research. Adding the *psbA* gene sequence to the multi-gene analysis will provide a more complete data set to test proposed relationships of bryophytes and pteridophytes to each other and to other land plants. PCR-amplified *psbA* gene products from a variety of land plants were obtained from Pike (ETSU) and Nickrent (SIU). Ten of these products have been gel-purified; five have been cloned and characterized. Obtaining the DNA sequences is an ongoing effort. The comparison of these gene sequences with other known sequences will be the focus of future research.

6. GRAHAM, PAT. Beta Phi, University of West Alabama—Restriction enzyme survey of halophilic and halotolerant bacterial isolates from diverse saline environments.

Using a high NaCl concentration selective complex growth medium, we have cultured a number of unique and interesting bacterial isolates from three different saline ecosystems: an inland salt spring near Jackson, AL, an estuary near Pensacola Beach, FL, and seawater off Pensacola Beach, FL. Our laboratory has previously characterized their ability to produce different exoenzymes and to grow in a complex growth medium containing several different inorganic components at different concentrations. These halophilic and halotolerant isolates may also produce potentially useful biological molecules such as restriction enzymes with unique properties and unique nucleotide sequence sites. We investigated three extract preparation methods: sonication of broth grown cells, Triton-X100/lysozyme lysis of agar grown cells, and Triton-X100/lysozyme lysis of agar grown cells with subsequent viscosity reduction by repeated passing through a 26-30 gauge needle. The extracts were assayed by incubating with lambda DNA in a commercial restriction enzyme buffer at 37°C for 1.5 hours, and then analyzed for products of DNA degradation by agarose gel electrophoresis and ethidium bromide staining. Twenty-four isolates were screened by these three extract preparation methods and the standard assay. Extracts prepared by the third cell breaking method seem to give more consistent results, was easier to perform, and required less time to complete. One isolate, PG9A, prepared by the third cell breaking technique produced

a restriction enzyme that excises lambda DNA into 10 or more DNA fragments. Future research will emphasize re-testing the isolates with the third extract preparation method and determine whether any of the restriction enzymes are unique and potentially useful tools for the biotechnology industry.

7. SEWELL, ANGELA. Beta Phi, University of West Alabama—Detection and partial characterization of plasmids in bacterial isolates from saline environments.

Our laboratory has cultured a number of halophilic and halotolerant bacterial isolates from three different aquatic saline environments: an inland salt spring near Jackson, AL, an estuarine environment near Pensacola Beach, FL, and from the Gulf off Pensacola Beach, FL. Thirty isolates were screened for the presence of plasmids using standard molecular techniques. Ten isolates appeared to contain one or more plasmids. One interesting isolate from the estuary, PG16B, was further investigated since it contained at least six DNA bands as determined by gel electrophoresis in 1% agarose in TAE buffer. Digestion of total plasmid DNA from PG16B with several common restriction enzymes and subsequent gel electrophoresis revealed DNA-banding profiles that are consistent with the presence of at least two different plasmids in this isolate. Since PG16B can grow in widely varying inorganic and organic components and concentrations, it was of interest to investigate the DNA-banding profiles of total plasmid DNA from PG16B grown under similar conditions. The DNA banding pattern varied in number of DNA bands and copy number when grown under different NaCl concentrations from 0% to 15% and when the organic components were varied. Future studies on PG16B's plasmids will be centered on further characterization of the DNA bands to confirm our initial observation and to continue investigation the influence of different environmental conditions on the DNA-banding profile.

8. ALEXANDER, KATHRYN. Beta Phi, University of West Alabama—Succession in fish communities of an ephemeral stream in Sumter County, Alabama.

The reestablishment of the fish community in an ephemeral stream in Sumter County, Alabama, was followed over a period of 12 months in 2000-2001. Ponkabia Creek is part of the Suwannee River drainage in west-central Alabama. In the early fall of 2000, the stream bed east of Sumter County Highway 28 was completely dry. Rains in late fall of that year flooded the stream bed, and allowed reestablishment of the fish community to begin. Monthly sampling was conducted of the fish community at five sites within the stream. Environmental parameters were also measured. Although a relatively diverse community was established at most sites by the following summer, community composition and diversity continued to fluctuate widely at all sites throughout the course of the study. This suggests that a stable community structure had not been achieved, and that short-term environmental fluctuations may exert significant control on community composition.

9. BRANSON, SARAH. Beta Phi, University of West Alabama—Morphometric variation in bluegill sunfish from lotic and lentic environments in Sumter County, Alabama.

Current velocity can be expected to be a significant factor affecting the fitness of fish. For a fish species that is found in both stream and pond environments, morphometric variation might well be expected between populations in these respective habitats. Bluegill sunfish (*Lepomis macrochirus*) collected in lotic and lentic environments in Sumter County, Alabama, were examined for variation in body and fin dimensions. Similarly-sized bluegill were sampled from non-flowing habitats within the Alamuchee Creek drainage and from a flowing environment in Ponkabia Creek. Body and fin dimensions were measured and ratios

developed to allow comparison of body and fin shape. Statistical analysis revealed that fin shape differed significantly between the two populations. Both pectoral and pelvic fins were relatively longer in bluegill collected in lotic environments. Differences existed, as well, in the shape of the dorsal, anal, and caudal fins.

10. MORGAN, AMBER. Beta Phi, University of West Alabama—A comparison of the physical and chemical parameters of two streams in West Central Alabama.

Alamuchee Creek and Bodka Creek are two streams in Sumter County, Al that flow through different geologic substrates. The physical compositions of the streams are influenced mainly by temperature, stream flow, turbidity, pH levels, and hardness. Most of these depend heavily on the substances dissolved in the water. Important chemical parameters include dissolved oxygen, reactive phosphorus, nitrate, and tannin/lignin. Water samples were collected from each creek once a month for one year to determine the effects of seasonal changes and to compare the physical and chemical parameters. In both streams, phosphorus levels were lowest in the summer months and highest during the winter. Nitrate levels followed a similar pattern. Although these parameters did show seasonal variations, overall seasonal changes played a minor role in the physical and chemical composition of the streams. Changes in the water quality appear to be the result of more short-term events such as rainfall and runoff. In both streams, rainfall was distinctly correlated with the amount of tannin/lignin present. This is more apparent in the Alamuchee Creek because pine trees surround it, whereas the Bodka Creek runs mainly through farmland. Rainfall was also inversely correlated with water temperature and pH. Other significant correlations existed between stream flow and turbidity, and tannin/lignin and turbidity. Water temperature was inversely correlated with stream flow and turbidity.

11. KAISER, JUSTIN RYAN AND GREGORY ADAM REDDEN. Mu Iota, Northern Kentucky University—A study on arsenic contamination in Northern Kentucky surface waters due to cemetery leachate.

Arsenic is a known carcinogen once used in the embalming process and still used today in many wood preservation techniques. Due to the deterioration of both human remains and wooden caskets this arsenic is spread throughout the environment by means of the watershed and cemetery leachate. This study looked at arsenic concentrations in various cemetery ponds throughout Northern Kentucky. Open water and mud samples were collected by use of common limnological techniques, and tested using Hach EZ Arsenic kits, atomic absorption, and atomic mass spectrophotometry. The analysis of these samples shows there is arsenic present in these ponds at concentrations higher than recommended by the EPA for safe consumption. Analysis of samples from control ponds did not show any detectable concentration of arsenic, showing possible cemetery leachate as the source of this contamination.

12. ATIKOVIC, EMINA. Mu Iota, Northern Kentucky University—Evaluation of a new DNA amplification technique to screen cyanobacteria isolated from drinking water sources for Microcystin toxin.

The quality of drinking water may be significantly reduced by the presence of cyanobacteria capable of producing toxins, and taste and odor compounds. Several different genera of cyanobacteria are capable of producing microcystin toxins. Moreover, toxin producing cyanobacteria share specific rRNA sequences not found in non-toxin producing strains. Consequently, a rRNA gene probe can be a useful tool for distinguishing potential toxin producing strains of cyanobacteria from non-toxin producing strains, regardless of genus. This study included eight strains of cyanobacteria belonging to three different genera isolated

from drinking water sources at the Metropolitan Water District of Southern California. The cyanobacteria were cultured in Carolina Spring Water and Alga-Grow Concentrate. Enzyme Linked Immunosorbent Assay (ELISA) was used to evaluate the level of microcystin toxin present. Although, all isolates tested negative by ELISA, the organisms may still have the genetic capacity to produce toxin. To address this issue, the polymerase chain reaction was used to amplify 16S rRNA sequences specific to toxin producing strains. Based on our data, we conclude that the cyanobacterial isolates tested from the Metropolitan Water District of Southern California do not have the genetic capability of producing microcystin toxins.

****13. TROUT, AMANDA.** Mu Iota, Northern Kentucky University—Toxicity of blue green algae dietary supplements.

Blue green algae (cyanobacteria) are sold as dietary supplements in the U.S.A., Canada, and Europe. They are consumed for their putative anti-cancer, immune-enhancing, and antiviral effects, as well as an aid in lowering cholesterol and controlling weight. These supplements are also promoted for the treatment of Attention Deficit Disorder (ADD) in children. The algae are often harvested directly from a lake's algae bloom and flash aired dried. Supplements claiming to contain *Aphanizomenon flos-aqua* and *Spirulina spp.* were rehydrated, examined microscopically for taxonomic verification, and tested for toxins and coliform bacteria. All supplements tested were found to contain a mixture of cyanobacteria and not necessarily of the species listed on the label. Cyanobacteria, in particular *Anabaena* and *Microcystis*, are known to produce microcystins, which are potent hepatotoxins and tumor promoters. The supplements were tested for microcystin using enzyme linked immunosorbent assay (ELISA). Microcystin toxin was detected in all the pills. The World Health Organization has set a limit of .04µg/kg of body weight per day for the microcystin toxin. The microcystin content in each pill was below this limit. **Johnson Award Winner.

14. THOMPSON, REBECCA. Mu Iota, Northern Kentucky University— Exploring cryopreservation as a method for germplasm preservation of endangered plant species.

Seed banks are being created to preserve plant biodiversity. Cryopreservation is an innovative technique being investigated to store germplasm at extremely low temperatures (-196°C) resulting in lab-created dormancy. Germination studies must be conducted to quantify the efficacy of this method. During seed germination trials, seeds are desiccated, exposed to liquid nitrogen for specified periods, and then rehydrated. The seeds are then either placed directly into a growth chamber with specific temperature and photo period settings or cold-stratified. Germination results are checked weekly for 12 weeks. Preliminary results suggest that most orthodox seeds will germinate after exposure; but some require cold-stratification (e.g., *Eryngium yuccifolium*, *Aconitum uncinatum*). Only one species tested (*Echinodorus berteroi*) did not germinate. Currently, there are 13 threatened and endangered plant species banked at Northern Kentucky University. Of the 10 species tested, 4 (e.g., *Liatris cylindracea*, *Solidago rigida*, *Echinacea Tennesseeensis*, *Gentiana Andrewsii*) are currently growing in plots at a habitat restoration nursery. Those plants not used as voucher specimens will be reintroduced into suitable habitats.

15. MITCHELL, JOANN. Beta Phi, University of West Alabama—The interplay of nutrients and grazers as controlling factors of epiphyte biomass on *Ruppia maritima*.

Sea grass beds play a vital role in marine ecosystems. They serve as nurseries for many marine creatures and cycle large amounts of nutrients that enter the water. Epiphytes are plants that commonly grow on sea grass blades and seaweed. Epiphytes play a large role in keeping these sea grass communities healthy. Other factors affecting the health of these communities are grazers and nutrients. This experiment was done to see what impact nutrients and grazers have on epiphyte biomass on *Ruppia maritima*, a common sea grass of the gulf coast. As a result of this experiment, it was found that nutrients did not have a significant impact on epiphyte biomass, while the amount of grazers did.

16. Not Presented.

17. Not Presented.



Pat Parr, Make Baranski, and Andy Ash at the annual banquet.

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