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A Message from the Head - Stan Faeth

Like the mythical firebird phoenix arising from the ashes ...

As Head of the Department of Biology, I am pleased to announce the rebirth of the Department of Biology's quarterly newsletter, Symbiosis. The last issue of Symbiosis appeared in 2002, long before my arrival at UNCG as Head in 2008. I hope you will forgive the long interlude. Henceforth, we plan to produce print and e-versions of Symbiosis each quarter.

Symbiosis is a fitting name for our newsletter. Symbiosis is a biological term for living together in a prolonged and tight-knit fashion. Biologists know that nearly all plant, animal, and fungal and microbial species harbor symbiotic species that are often essential to their growth and survival. Examples include Rhizobium bacteria in legumes that fix nitrogen and rumen bacteria in cows that break down cellulose. Our own bodies are replete with symbiotic microorganisms necessary for digestion and resistance to disease.

But as humans, our symbiotic interactions also extend to our fellow humans with whom we live, work, play, and study. The goal of our newsletter is for you - our current students, our alumni, faculty, staff, friends and benefactors - to stay connected with each other and with the department. The success of the newsletter is dependent on you. Therefore, I ask you to send us (Anna Smith - AGSMITH5@uncg.edu) updates and stories of interest to your friends and colleagues.

Much has happened since our last newsletter in 2002. Here are a few of the highlights.

The number of our undergraduate majors has grown to about 875 students. The 21st century has been termed the age of life sciences due rapid to and remarkable discoveries in biomedicine, healthcare, genetics, neurosciences, cell biology and environmental sciences. Our increasing undergraduate population reflects this demand for expertise and careers in the life sciences.

Biology continues to provide basic life science courses for not only our own majors but also for those in many other majors in the College of Arts and Sciences and across UNCG, such as Nursing and Genetic Counseling. Each year, we teach more than 20,000 student credit hours in hundreds of sections of scores of courses. We are proud of our long tradition of excellent and innovative instruction in the classroom and laboratory for both major and non-major undergraduate students. Many of our undergraduates now experience biological research firsthand by becoming student researchers in the laboratories of our faculty. Indeed, our faculty have secured external funding, such as the Math/Bio grant from National Science Foundation, to train undergraduate students in scientific and quantitative research. The students have presented their research at regional and national professional meetings and publish their results in peer-reviewed scientific journals.

In 2009, the PhD in Environmental Life Sciences was approved by the UNC system and the first cohort of PhD students began in 2010. We expect our first PhD graduate in 2014. Meanwhile, our already strong MS program continues to grow, with now more than 30 students.

Since 2002, we've added many new faculty. Recent assistant professors in Biology include Gideon Wasserberg in 2009, Zhenquan Jia in 2010 and Tsz-Ki Tsui will join us this upcoming August. We note with sadness the passing of John O'Brien, a professor in the department, and Chancellor Pat Sullivan, who held a faculty appointment in Biology, in 2009. We also remember emeritus faculty members Laura Anderton, Paul Lutz and Ned McCrady who passed in 2011, 2012 and 2013, respectively. All of them contributed in unique ways to what the department is today.

The research portfolio of the department continues to expand. Biology now consistently ranks among the top three departments in submission and acquisition of external grants for research. Our faculty publish frequently in the leading scientific journals, present papers at national and international meetings, serve as editors for scientific journals, and engage the community and local K12 schools in science education and outreach. One National Science Foundation award for 2.9 million dollars, the GK 12 project (http://gk12.uncg.edu), trains the next generation of scientists by placing graduate students as resident scientists into K-12 classroom in Guilford Co. schools.

Certainly, we live in interesting times from a biological standpoint, with the promise of new discoveries that will undoubtedly change our, and our children's, lives. I hope that our newsletter will keep you informed of the teaching, research and community activities in the Department of Biology and connected with your colleagues and friends.

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Cheers, Stan Faeth, Head and Professor of Biology

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Meet our Staff Paul Hidalgo - Administrative Assistant



Whenever you visit the Biology Department, Paul's face is the first one you see. Paul joined us on November 25th, 2010 and since then he has been an invaluable asset to the daily functioning of the department. Paul was recognized for his excellent contributions to the department by the College of Arts & Sciences on April 5th, 2012 and was awarded the Staff Excellence Award! Paul works tirelessly to assist all faculty, staff, and students of the Biology Department with all of their general and administrative needs.

Paul is originally from Lutherville, Maryland and he graduated from Greensboro College in 2007 with a degree in History. He then spent 2 years working in the judicial branch of the State of North Carolina. He finds the biology department much less stressful and cites this as the reason for his recent drop in blood pressure. In his free time Paul coaches middle school lacrosse and runs with his dog, Moses.

Biology Seminar Series

UNCG Biology Department seminars are held on Wednesdays, whenever classes are in session, from 4-5 PM in room 200 of the Sullivan Science Building.

The biology department seminar series is open to the public and we invite alumni to attend.

Parking is available in the McIver Street Parking Deck and refreshments are served at 3:45 PM prior to seminar.

The current semester's seminar schedule can be found at the biology department website:

http://www.uncg.edu/bio/bioseminars.html

For directions to the department or other general inquiries about the seminar series please email the Biology department:

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Dr. Kirchoff's Award Winning Software

By: Anna G. Smith & Bruce Kirchoff

UNCG Biology Professor, Dr. Bruce Kirchoff, was recently awarded the first ever 'Innovations in Plant Systematics Education' prize by the American Society of Plant Taxonomists for his visual learning software.

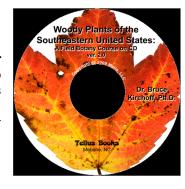
Dr. Kirchoff began development of his software in 2005 and his company that produces and develops the software, Metis LLC, was incorporated in 2007.

The software utilizes techniques from cognitive psychology to enhance visual learning.

Dr. Kirchoff's website on his teaching methods (http://www.uncg.edu/bio/faculty/Bruce_Kirchoff/lab/teaching.html) summarizes these changes:

"...inspired by recent research in cognitive psychology, a completely new approach to computer-based keys has been developed. These keys are primarily visual; they use images instead of text, and thus are not dependent on the arcane terminology of plant taxonomy. The keying method involves (a) visual displays from which the user selects images similar to the unknown; (b) a Bayesian substructure that tracks the selections; (c) an adaptive similarity database that "learns" as program components are used; (d) a game-like element based on the work of Luis von Ahn at Carnegie Mellon, which is used to create the initial similarity matrix."

The software, called ImageQuiz, currently has many different versions that have been adapted to teach many different topics. There are currently two different plant versions — one that teaches students to identify woody plants of the SouthEastern region of the US and another one that is used in Australia to identify agricultural plants. There is also a version that teach teaches amino acid structure and functional groups on organic molecules, and one version that teaches medical students to recognize tumors from normal neurological tissue for a neuropathology class. There is even a new version in development that will be used for the HERP Project (The pet project of a fellow Biology peer that focuses on the conservation of local reptiles and amphibians).



ImageQuiz is provided free of charge to end-users and can be downloaded from the Metis, LLC website (http://metisllc.com). There is currently a cost for labor to develop custom versions of the software but once development is completed the software is provided at no cost. At this time the company, Metis LLC, is supported by Dr. Kirchoff's own funds but he does accept donations to support the work.

Praise for the software:

"I feel as though the Woody Plants CD was an effective way of reinforcing the material. Visuals are an easy way of remembering especially in a class like this where you have to know both visual and text information. I think this should be used in the future. Overall, great program for this course."

"I thought Woody Plants was a very effective tool to use while studying. The repetition of naming the plants made it stick in my head better. Also, it helped in allowing us to visualize the plants outside of lab, and we could use it anytime we wanted to. I use the program to study for every quiz and the exam."

Dr. Kirchoff has been with the Biology Department since 1986 and currently teaches several plant biology classes -- Plant Diversity (BIO 322) and Plant Systematics (BIO 354) -- along with Biological Evolution (BIO 430). His research focuses on plant evolution from structural and developmental standpoints. He has developed methods for improving morphological characters in evolutionary studies, and has adapted techniques from cognitive psychology to visual learning. Students in his lab have also conducted experimental tests of an organic method for controlling invasive species, and the effects of air pollution on Pines. Projects in plant structure include studies of floral development in the Heliconiaceae (with Dr. Chelsea Specht, UC Berkeley), character recognition and description in California Lupines (with Dr. Ellen Simms, UC Berkeley), and ovary structure in the culinary gingers (Zingiberaceae).

From the Associate Head... Time Flies When You Are Having Fun

In April 1972, I met Dr. Bruce Eberhart at the annual meeting of the American Society for Microbiology in Philadelphia. As a graduate student at the University of Delaware, this was my second ASM meeting, but my first job interview. A week after the meeting, Dr. Eberhart called to invite me to come to UNCG for an on-campus interview in early May. The search committee was Dr. Eberhart, Dr. Jim Wilson, Dr. Bill Bates, and Ms. Sarah Sands. During my interview visit, I met all the faculty, gave a seminar on my dissertation research, and talked with two administrators. I stayed at Dr. Eberhart's home. Bruce was an early person, so we were up at 6am talking about research and UNCG. Thankfully, I was and still am an early person. Two weeks later, Bruce offered me an Assistant Professorship, which I obviously accepted. In August, my wife, Janne, and I moved from Delaware to Greensboro.

For my first fall semester, I taught General Microbiology with Sarah Sands. We divided the lectures in half and each taught a lab section. I wonder today what my early micro lectures sounded like to students (some who were older than I was). In the spring semester of 1973, I taught Microbial Ecology. Janne helped me set up my lab, and I attracted my first graduate student. My academic career had begun.

How time flies. This past fall, I taught General Microbiology for the 41st time in a row. I now teach with Parke Rublee who was hired after Sarah Sands retired (Sarah is 90 years old and lives in Winston-Salem). Parke now teaches Microbial Ecology. Microbiology is a popular class. We had 3 lab sections for a total of 72 students. I'm teaching Immunology this spring along with an Honors course titled "How to Win a Nobel Prize." Immunology is fun because the students are upper level bio majors and graduate students, and the Honors course is fun because all the students except one are non-science majors.

For about the last 10 years I have served as Associate Head of the Department. This administrative assignment along with other service assignments of the past 41 years have been enjoyable in that I have been able to help faculty and students achieve their goals.

However, after 41 years as a full-time faculty member, times and assignments are changing. In August. I will enter UNCG's Phased Retirement Program. In Phased Retirement, a faculty member gives up tenure and works half time for three years, before retiring completely. My plan for the next three fall semesters is to teach General Microbiology lecture and lab, and I will also continue to direct our post-baccalaureate program for students who are interested in pursuing various health careers. In the spring semesters, I'll still be working with postbac students, but I won't be teaching. I'll be exploring retirement, which means doing some volunteering that I haven't had time for because of working full-time. It means learning how to play golf (better), and more opportunities to travel. And, no faculty meetings to attend. It will be the start of a new phase in my life history.

This issue of Symbiosis gives me the opportunity to thank all the students who I have taught. I hope that we prepared you well for life after UNCG. I know that the faculty in the Department of Biology will continue to prepare students well in the future as I phase into retirement. We hope that the newsletter will reconnect you to your college major and to your alma mater.

All the best, Rob Cannon

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Make an impact. Support the Biology department by using our online form and your Visa or MasterCard to make a gift.

http://www.uncg.edu/bio/gifts/

Help UNCG forge new possibilities for students, faculty, programming and research.

What's growing in our Greenhouse?



Amaryllis, *Amaryllis spp.*Family: Orchidaceae



Alice Dupont, Mandevilla amabilis
Family: Apocynaceae



Scouring Rush, Equisetum hymale Family: Equisetaceae

Dr. Gideon Wasserberg

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Faculty Spotlight

Dr. Gideon Wasserberg



Sand Flu (Leishmaniasis)

Humanity is currently facing an epidemiological transition, characterized by the resurgence and emergence of old and novel infectious diseases the majority of which are associated with a wildlife source (zoonoses) and/or arthropod vectors. Human-induced environmental change has been implicated as the predominant driver of this phenomenon via processes such as encroachment into pristine environments, land-use change, pathogen evolution, globalization, and climate change. Understanding and managing emerging zoonotic

and vector-borne diseases, requires an ecological approach applying ecological theory and methodology to address such epidemiological problems. In the Wasserberg lab we use a combination of field and lab experiments as well as modeling studies to address these problems. Currently, research in my lab focuses on four main topics: La Crosse encephalitis (LACE), Cutaneous Leishmaniasis (CL), oviposition behavior of mosquitoes, vector-host coupling theoretic model.



With respect to LACE, we study the effect of anthropogenic modification of the environment on the ecological drivers of virus transmission (Ph.D. student – Marcelo Schwarz, undergraduate student - Joanie Lambert). With respect to CL, we study in the lab the oviposition attractants of the sand fly vector (Undergraduate student - Bahjat Marayati). We also study in the field and in the lab the effect of competition and predation on the oviposition behavior of the Asian Tiger mosquitoes (graduate student - Kim Yeoman). Finally, as part

of the BioMath program (C. Smyth), we developed a simulation model to study the effect of vector-host coupling on the dynamics of vector-borne diseases.

Dr. Wasserberg's credentials include a Ph.D. from Ben-Gurion University of the Negev, Israel; and an MPH from Johns Hopkins University School of Public Health.

Faculty Spotlight Dr. Zhenquan Jia

Dr. Jia's research investigates the environmental toxicant-induced cardiovascular inflammation and neuronal injury with a special interest on determining the underlying signaling mechanisms. In line with this research, his lab is also actively studying the pharmacological agents/novel bioactive compounds that target and reduce toxin-mediated pathogenesis. His approaches include cell- and molecular biology techniques, and different animal models.



The Jia Lab Members (Dr. Jia pictured 4th from left) The research in his laboratory has been supported by the grants from the Harvey Peters Foundation, Jeffress Memorial Trust, the Institute for Critical Technology as well as a current active grant from NIH. Currently, Dr. Jia's research group at UNCG consists of one postdoctoral fellow, one Ph.D. student, four graduate students, two post-baccalaureates, and six undergraduate students.

Dr. Jia received his Ph.D. from Virginia Polytechnic Insitute and State University.

Who's Who Amongst Our Graduate Students Kirsten Trowbridge, Environmental Health Science Ph.D. Candidate

M th ac price are you lill form

UNCG Biology Graduate Student, Kirsten Trowbridge and her daughter, Kaleema

My course of study in Environmental Health Sciences through the UNCG Biology Department has centered on aquatic ecology and environmental toxicology. My research project seeks to understand effects of a commonly used anti-microbial compound on the stream community. Check your ingredient labels: if you use antibacterial soap, you are likely to see triclosan listed as an active ingredient. It is also found in an astounding number of other consumer and medical products. Additionally, there are a growing number of concerns about potential hazards related to triclosan exposure. Since society has been using triclosan for a few decades now, it is a very common contaminant in the environment. My research will evaluate some of its impacts downstream of a wastewater treatment plant in Greensboro. Among the organisms making up the stream community are different types of algae and bacteria, and my studies focus on their responses to triclosan exposure. I endeavor to answer these questions: 1) Are these organisms taking triclosan up and removing it from the stream water? 2) Is triclosan exposure changing the assortment of

organisms that grow on the stream rocks? 3) Are bacteria gaining resistance to triclosan and other antibiotics as a result of long-term exposure? I am especially interested in the third question. Increasing resistance to antimicrobial agents limits the ability of healthcare providers to treat infections. Therefore, acquired resistance to triclosan in environmental populations could pose a human health risk. Resistance mechanisms can be passed between different bacterial populations. Consequently, if resistant populations are being selected for in the environment, it could intensify these problems in clinical settings.

Outside of science, I am a singer, dancer and percussionist with a longer list of creative hobbies mostly kept on the backburner while I work on my PhD and raise my beautiful new daughter. I also love being active, practicing yoga and Pilates (which I used to teach) and engaging in outdoor activities whenever possible. I grew up hiking, camping, swimming and exploring forests, caves, rivers, and streams in the Appalachian Mountains. For as long as I can remember, since before I learned the word, "Ecology," I have been marveling at the ecology of rivers and streams. I am devoted to making a contribution to the restoration of rivers and streams and preservation of these ecosystems. I am pursuing my PhD in Environmental Health Science with the intention of continuing teaching and research in biology with a focus on environmental issues. My first choice for a long-term career is a professorship at a college or university, although I would also find an environmental health research position very fulfilling.

Kirsten was selected to represent the department as the Fall 2013 Excellence in Graduate Studies student and does her research under the tutelage of Dr. Anne Hershey. Dr. Hershey's current research interests concern the ecology of rural and urban NC Piedmont streams, including effects of stream restoration on ecological processes, methane cycling and use of methane-derived carbon in stream food webs, and fate of anthropogenic nitrogen in urban streams.

UNCG Biology Faculty Publications

The publications authored by the faculty in the UNCG Biology Department range in topics from molecular biology to ecology and everything in between.

The biology website keeps a comprehensive list of the current and past publications published by faculty.

web: http://www.uncg.edu/bio/ about/publications.html

Did you know?

In 2012:

Over 20 biologists visited and presented their research at departmental seminars.

Dr. Bob Stavn, was
as an extra in the movie
-- Bullet to the Head, with
Sylvester Stallone. Dr.
Stavn can be seen dancing
in the Cajun dancing
scene.

Former NC Governor, Bev Purdue, visited Dr. Olav Ruppell's lab and spent time learning about bees and his research.

14 new graduate students were accepted into the Biology department to pursue Master and Ph.d. degrees.

There are currently 40 faculty members on staff in the UNCG Biology Department.

Science Olympiad

The UNCG Biology Department has been hosting the North Carolina Science Olympiad Greensboro Regional tournament for over a decade. The 2013 Greensboro Regional Tournament was held on February 23rd and 29 schools (15 middle and 14 high schools) sent a total of 52 teams to participate in the tournament. More than 800 students from 7 different counties in the Greensboro region participated. This year's competition had over 60 faculty and professional event leaders and 75 student volunteers. The North Carolina Science Olympiad is a non-profit organization with the "mission to attract and retain the pool of K-12 students entering science, technology, engineering and mathematics (STEM) degrees and careers in North Carolina." The North Carolina Science Olympiad is funded completely by donations and corporate sponsorship, including Time Warner Cable's 'Connect a Million Minds' program.



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The students participated in over 40 different events and competitions integrating and combining knowledge of many different scientific disciplines including biology, chemistry, physics and many more. Events ranged from traditional exams that tested knowledge to complex set-ups challenging student ingenuity and creativity.

In the Sounds of Music event, middle school students built and designed 2 different instruments based on a 12 note tempered scale; these instruments could be based on real instruments or be a completely novel design. Each instrument had to be played by the student and in this year's tournament they had to play a major scale, a required melody, ('Theme Movement #2 New World Symphony') and an additional melody of their choosing.



Want to receive this Newsletter? Have any noteworthy information to share? Fill out the form below and return to the Biology Department or visit the Symbiosis website: www.uncg.edu/bio/newsletter/

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What is the GK-12 Program?

GK-12 Information:

web: http://gk12.uncg.edu

Contact:Lynn Sametz, Project Director

phone: 336 256-0057 email: I sametz@uncg.edu The GK-12 program at UNCG has been funded by the National Science Foundation to partner graduate student Fellows from three departmental graduate programs (Biology, Chemistry and Biochemistry, and Geography) with teachers and students at three Guilford County Schools: Montlieu (elementary), Welborn Academy of Science and Technology (middle), and Andrews High School. All three schools are located in High Point, NC, and their campuses are in close proximity. Fellows, teachers and students will form discovery teams to scientifically investigate the biological, chemical, physical, health-related, and socioeconomic effects of changing land use patterns in the region.

e a hands-on science day located along GK-12 Resident Scientists. More than a that connects the three schools Green-

Greenway Day 2013 on April 27 from 10 a.m. to 2 p.m. will be a hands-on science day located along High Point's Greenway hosted by the students, teachers, and GK-12 Resident Scientists. More than a dozen science stations will span across the one-mile greenway that connects the three schools. Greenway Day is an opportunity for GK-12 participants to promote science education on the greenway.

Greenway Day is an opportunity for GK-12 participants to promote science education on the greenway. This is done successfully by working with students, teachers, administrative staff, and the community to develop interactive hands-on activities that engage participants in science education. Families and community members can take part in Greenway Day by seeing and participating in the interactive science projects students are doing – ranging from testing water quality, trapping bugs, to wading in the creek, and learning about local frogs, turtles, and salamanders.

The goal is to get participants on the greenway (The High Point Greenway is located between Lexington Ave. and Andrews High School) to showcase GK-12's wonderful science-based educational activities, and to make science education fund and exciting for everyone.

https://www.ncstem.org/node/551