

BIOLOGY

FALL 2013

Faculty and staff are one of the greatest assets of the School of Biology. In this issue, we showcase the research of Dr. Al Merrill, who has developed a distinguished career investigating sphingolipids and their role in health and disease. Undergraduate research also plays a prominent role in the School and students present their results as posters at the end of each semester. In spring, two of our undergrads had the distinction of attracting GT President Bud Peterson to their poster. Take a look at the Pacific Program, where undergraduates have the opportunity to study biology in New Zealand and Australia with Georgia Tech professors. You also may find interesting our summer program for high school juniors and seniors called Bio@Tech. It might be a good way to test whether your highschooler is a budding biologist. Two Biology professors retired this year and became emeritus professors. Sadly, one of our emeritus professors, Nancy Williams-Walls, passed away, and we have included a poignant memorial to her by a colleague. Read why our spirits were lifted recently by an especially moving testimonial by one of our graduates. We have special activities planned for homecoming this year on November 1, so we hope that you can join us! Also, we love to hear from you and read your comments about this newsletter. Please drop us a line at terry.snell@biology.gatech.edu.

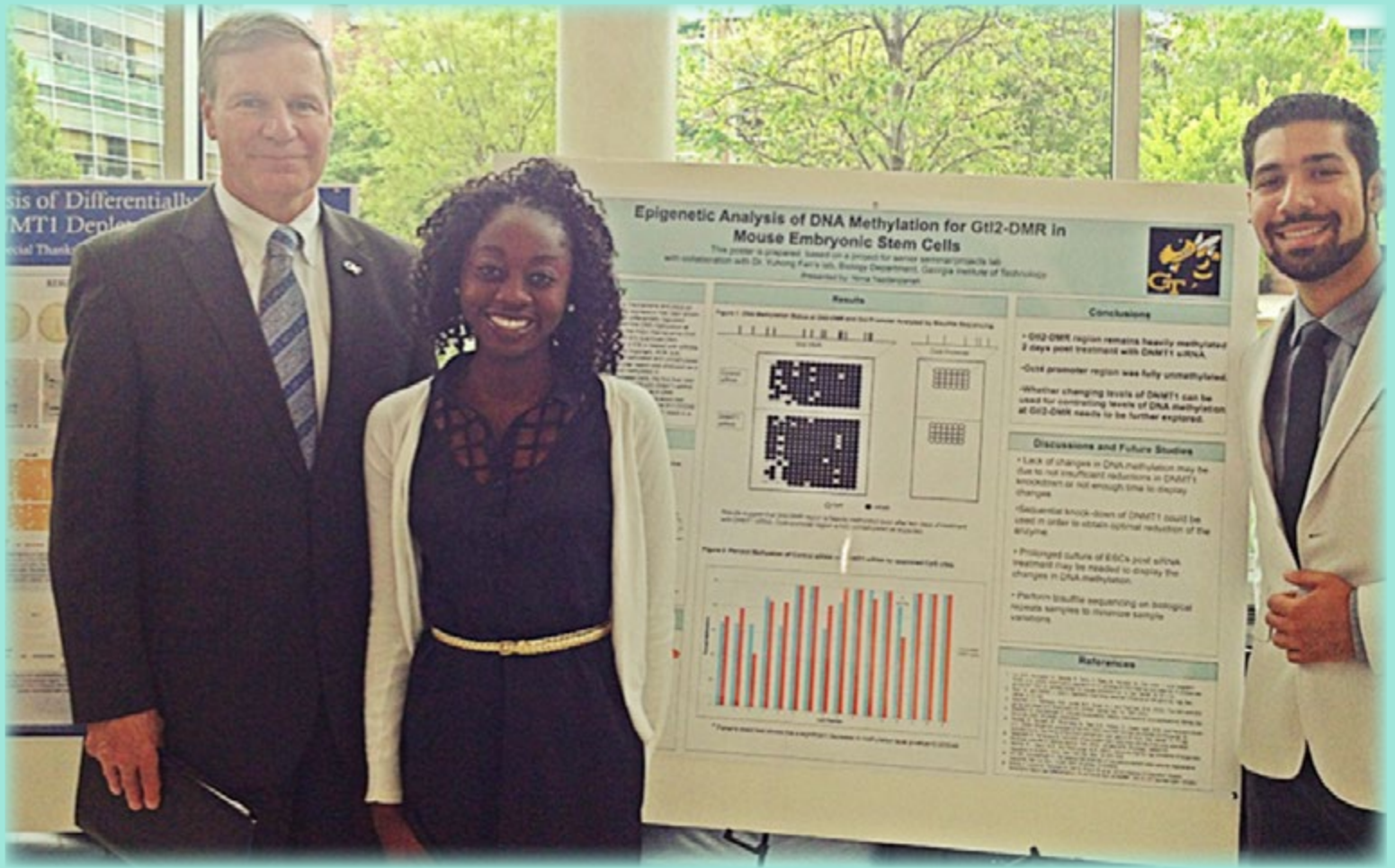
Best wishes,



Professor Terry Snell
Chair
School of Biology



Cindi Bossart '74 and Terry Snell share a laugh inside a football box for the School of Biology during the GT-UNC football game.



Biology senior research experience: Spring 2013 poster session

At the end of each semester, the School of Biology hosts a poster session where Biology majors present the results of their research. An example of a poster can be seen in the photo where results are being presented and discussed with passersby. This past spring, Nima Yazdanpanah and Marteki Codjoe had a surprise visit from GT President Bud Peterson; they are explaining to him their results on the epigenetic analysis of mouse stem cells. Undergraduate research is required of all Biology majors and is the capstone experience of their curriculum. These students participated in a course called Research Project Lab, which was an investigation of a topic by 14-16 students

led by a Biology faculty member. The title of this project lab was Epigenetic Analysis of Developmental Genes, taught by Dr. Yuhong Fan. Other students participating in this poster session conducted research one-on-one with a faculty mentor. These projects were on topics that are part of the ongoing research effort in faculty labs. Our most ambitious students conducted multi-semester research projects with faculty mentors that culminated in honors theses. Some of these were substantial enough that they were published in scientific journals, effectively launching the scientific careers of some of our students.



Group photo, Biology 2100 field trip to Tongariro National Park. Mt. Ruapehu, a snow-capped volcano, is in the background. Students observed the volcanic features of this park, as well as vegetation zonation from temperate rainforest to tundra, during the 12-mile hike.

Studying Biology can take you abroad: The Pacific Program

The Pacific Study Abroad Program travels to New Zealand, Australia and Fiji every spring, offering Georgia Tech students an opportunity to spend a semester down under. During the first six weeks, students are residents at Victoria University in Wellington, New Zealand. The second half of the program includes stops in Brisbane and Sydney, sandwiched around a full week on the Great Barrier Reef at the University of Queensland's Heron Island Research Station. The final two weeks are spent on Viti Levu, the main island of Fiji, and include an opportunity to participate in a coral reef restoration project.

The program is open to students of all majors and includes a selection of courses (students must register for a minimum of 12 hours). Three Biology courses are included in the program: Biology 1520



Biology 1520 students are introduced to a tuatara named Spike. Tuatara are the sole members of the reptile order Rhynchocephalia, found only in New Zealand. This has become an annual tradition in the program, as Spike is a youngster for a tuatara, being only 25 years old.



Lunch break during a field trip in the Blue Gum Forest, Blue Mountains National Park, New South Wales, Australia. This is a well-protected example of Australia's famous eucalyptus forests, with clear-flowing streams and picturesque red sandstone cliffs.

(Introductory Organismal Biology), Biology 2100 (Island Biogeography of New Zealand) and Biology 3100 (Ecology & Evolution: An Australian Perspective). The Biology courses capitalize on the unique features of each country. New Zealand is a remote collection of oceanic islands with the highest level of endemism in the world; Australia is renowned for its marsupial mammals and also offers a remarkable diversity of terrestrial and marine ecosystems; Fiji illustrates the influence and importance of coral reef systems to indigenous populations and serves as an example of the challenges involved in protecting rare or threatened ecosystems. Students in the Biology courses gain experience from multiple field trips and complete independent research projects at spectacular sites.

The Pacific Program has departed for the Antipodes each January for 15 consecutive years, typically with about 45 students plus accompanying faculty and staff. Anyone interested in the Pacific Program is welcome to check out our web site at www.pacific.gatech.edu or contact Dr. David Garton in the School of Biology.

Students cementing live coral "fingers" to a rack, which will be positioned on a protected part of the reef. After each finger grows into a larger colony, the colonies can be transplanted to other areas of the coral reef (Mana Island, Fiji).



A Biology 3100 student enjoys her first encounter with a sea hare at Long Reef Marine Reserve near Sydney.





Bio@Tech - Δ Summer Program for High School Students

Each summer the School of Biology and Center for Education Integrating Science, Math and Computing offers BIO@TECH, an intensive three-week investigative biology experience for high school students with strong interests in the biological sciences. Topics included in each session vary, and include selections from the following:

- Glow Germs - Creating bacterial cells that glow in the dark
- CSI: GT - DNA forensics
- Power of the Plankton - Ecology of oceanic and freshwater plankton
- Daughters of Eve - Mitochondrial DNA ancestry
- Life on the Edge - Microbes found in harsh and extreme environments
- Breaking the Code - DNA sequencing and identification
- Green Genes - Detecting genetically modified foods

Two identical three-week sessions of BIO@TECH are offered each summer, meeting Monday through Friday. Session I begins in late May and runs until mid-June. Session II begins in early July and runs through late July. Students participate in lectures and laboratory experiments from 9:00 a.m. until 4:00 p.m.

each day at Georgia Tech's School of Biology, with short breaks in the morning and afternoon, as well as a lunch break.

BIO@TECH is taught by Georgia Tech faculty and instructors from the School of Biology. Under the direction of these faculty, students explore key breakthroughs and issues in current biology, as well as the challenges they represent to society.

Each session is designed for 25 rising eleventh and twelfth graders with a strong interest in biology, chemistry or biomedical sciences. Students are selected based on a review of their portfolio. Interested students should have completed at least algebra and one year of high school biology. Applications are encouraged particularly from students historically under-represented in the fields of science, mathematics and engineering. Tuition for this program is \$695.

For more information, please see the website at <http://www.biology.gatech.edu/biotech.php>, or contact Benita Black at benita.black@biology.gatech.edu.



Professors Harvey and Pullman retire



In spring 2013, two professors retired from the School of Biology. Professor Steve Harvey has been at Georgia Tech for 10 ½ years, serving as the Georgia Research Alliance Eminent Scholar in

Computational Structural Biology and later as the Nelson and Bennie Abell Professor. After receiving his bachelor's degree from the University of California (Berkeley), he worked as a computer programmer and data analyst and then spent two years as a Peace Corps volunteer in Cali, Colombia, where he was part of a team at the Universidad del Valle that worked with secondary school teachers to introduce modern laboratory-based methods in physics and biology into the high school curriculum. Returning to the US, Dr. Harvey received his PhD in biophysics from Dartmouth College (1971). After two years of postdoctoral work in the laboratory of Herbert Cheung at the University of Alabama in Birmingham, he joined the UAB faculty, where he served for 29 years, including three as Chair of the Department of Biochemistry (1990-93).

Dr. Harvey's research is aimed at understanding and exploiting structure-function relationships in systems of biological macromolecules. For many years, his group has used computational methods, in collaboration with various experimental groups in the US and Europe. As an emeritus professor, he remains fully active in research. His current interests include the evolution of the ribosome,

which is responsible for translating messenger RNA into proteins, in collaboration with several Georgia Tech faculty. Dr. Harvey is also finishing a textbook titled "Computational Structural Biology," based on courses he taught at UAB and Georgia Tech, and he is considering a return to teaching when that book is finished.

Dr. Gerald (Jerry) S. Pullman joined the Georgia Tech School of Biology 10 years ago with Georgia Tech's acquisition of the Institute of Paper Science and Technology. Dr. Pullman's research focused on plant stem cells and seed development, clonal forestry of high-value trees, and development of in vitro conservation methods for endangered plant species. Dr. Pullman taught Introductory Biology, Plant Physiology, Senior Seminar and Project Lab. Dr. Pullman has 11 US patents, three from research at IPST/Georgia Tech. Throughout his career he has published 124



articles and has been awarded approximately \$3.5 million in grant funding as a principal investigator for individual or collaborative research. Dr. Pullman remains active as an emeritus professor, teaching Plant Physiology and continuing part-time research on conifer embryo development and conservation of endangered plant species in partnership with the Atlanta Botanical Garden.



Faculty Spotlight: Al Merrill

From *Georgia Tech Alumni Magazine*, by Rachel Maddux

Al Merrill was 10 years old when he decided to become a scientist. Now a professor of Biology and the Smithgall Institute Chair in Molecular Cell Biology at Georgia Tech, with degrees from Virginia Tech and Cornell, he still has the sense of wonder that first drove him to raise tadpoles and tinker with chemistry sets, and he relishes opportunities to spark a similar awe in young minds.

Whether he's shaping the academic careers of Tech students or leading kids on outdoor adventures with the Sierra Club's Atlanta Inner City Outings, he says, "My goal is to show that there are so many wonderful things in nature. Looking at it and wondering how it works is the first step toward becoming a scientist."

Still a critter-catching kid at heart, Merrill keeps a number of *Kukulcania hibernalis*—more commonly known as Southern house spiders—as office pets. "People will often find these looking very emaciated in corners of the building and bring one to me in a jar ... I'll give it some water. It's kind of touching, actually. You'll see this spider drag itself over to the drop of water and drink it, and over the next few days it'll fill out. I'll bring it some crickets to eat and build itself back up again ... very few spiders are injurious to humans. They're fascinating organisms for how they're able to find their niche."

Merrill's research concerns a family of molecules called sphingolipids. He is particularly proud to have discovered, with a collaborator at the USDA labs in Athens, that sphingolipids are the target of fumonisins (mycotoxins that contaminate corn in many parts of the world and can cause cancer in humans, lung failure in pigs and a particularly gnarly horse



disease called leukoencephalomalacia). In recent years, Merrill's lab has spearheaded the use of mass spectrometry to study other aspects of sphingolipid metabolism and the roles they play in health and disease.

Merrill's shelves are guarded by several sets of Great Sphinx of Giza bookends, and photos of the ancient monument hang on the walls. "The individual who first discovered sphingolipids, J.L.W. Thudichum, named them 'sphingosines' because they're very enigmatic molecules. The enigmatic sphinx has been a symbol of that whole field for decades, and we are pleased to have helped solve some of the mysteries about these important biomolecules."

A sense of wonder has followed Merrill throughout his career; so, too, has a certain houseplant. "When I was an undergraduate student, my research adviser had a Christmas cactus outside his office. As a reminder of what I learned from him, in 1972 I snipped off a piece, and it's grown with my career, from training in Virginia, New York and North Carolina to being a professor at Emory and then Georgia Tech. If I had a bigger pot I think it could grow even larger."



In Remembrance: Professor Nancy Williams-Walls

By Dr. Edward Yeagers, GT Biology Professor Emeritus

Dr. Nancy Williams-Walls, 82, a retired faculty member of the School of Biology, died in March 2013 in Ann Arbor, Michigan. She was one of the first female faculty at Georgia Tech, and her life at the Institute was eventful and memorable. She led the way for women to pursue academic careers at Georgia Tech.

At a time when Tech was a male bastion, she broke into faculty ranks as a microbiologist studying the effects of gamma radiation on *Clostridium botulinum*, the causative bacterium of botulism. At one point she rose to be acting director of the then-named School of Applied Biology, then founded her own consulting company and gradually reduced her participation in Institute affairs. She retired in 1997.

The glass ceiling for female scientists frustrated her all her life. According to one story, at one point in her chairmanship she defied an administrator, believing that she was leading the School in the right direction. The administrator responded by calling a Biology faculty meeting and publicly firing her. She remained stoic in the face of an action that she believed would never happen to a man, but she later said that it colored her thinking from then on.

She took as another manifestation of the double standard the fact that she was never promoted to professor. Her accomplishments during her early career put her on track for promotion and her activities in research and graduate education extended into the second half of her tenure, but during much of the latter period she was on half-time service. Notwithstanding, she remained an effective and respected teacher. The patience and wisdom she exhibited during student conferences was commendable. Most important, she brought real-world experiences into her teaching.

She was an explorer and pacesetter in daring undertakings. Early in her career, she participated in two three-month cruises aboard ship in Antarctic waters to gather samples for later assay. The latter work took place at a time when women were not actually allowed to set foot on the Antarctic continent itself. She spoke of these cruises as just being further steps in her scientific life, showing that a woman could do anything a man could do.

She was a successful businesswoman, starting a company that conducted environmental impact studies.

After establishing a relationship with a large power company, she incorporated her consulting firm and grew it into a multimillion-dollar enterprise. She enjoyed the freedom that having her own company gave her and administered it with strength and grace. In turn, her employees rewarded her with loyalty and hard work.

Early in her life she began several collections that became the envy of high-end auction houses and museums. At various times she collected American Indian blankets, vintage dolls and, most important, museum-quality oil paintings. Her oil paintings were much sought after for display at major exhibitions.

She was an enthusiastic philanthropist and benefactor of the arts and education, contributing generously to scholarships and seminar series at Tech and at the University of Michigan. In particular, she set up a fund to award a yearly prize to an outstanding female graduate at Tech.

Dr. Nancy Williams-Walls' many activities on behalf of science, business, the arts and the affirmation of women in science were important contributions for which she will be remembered.





The Gratitude of Biology Graduates

From time to time we get messages of appreciation from Biology graduates describing how they value the education that they got at Georgia Tech. Below is a particularly poignant one from Meredith Klinect, who earned her biology degree in May 2013. This is the kind of message that all faculty love to get and is a huge motivator for Biology to continue to provide an exceptional undergraduate experience.

Dear Biology Faculty,

I graduated from Georgia Tech with my BS in biology in May 2013, and I started medical school just four days ago. Even four days in, I am absolutely overwhelmed with gratitude to each and every one of you who worked so hard to provide such a high-quality, relevant and thorough education during my time in undergrad. I can see that my undergraduate education has prepared me in ways that are distinct from my peers who attended other universities in Georgia and throughout the Southeast. I have already been able to apply principles and knowledge that I learned in General Biology, Immunology, Genetics, Cell Biology, Developmental Biology, Animal Physiology, Senior Project Lab, Microbial Symbioses, Senior Seminar and so much more. Thank you so much for your commitment to being such effective and knowledgeable educators, as well as teaching me how to use literature and research to educate myself. I owe such a debt of gratitude to each and every one of you.

Thank you again,
Meredith (Klinect) Terry





2013 Homecoming Events for Biology Alumni

Georgia Tech **Biology**
College of Sciences

You are invited to
Biology HOMECOMING
Friday, November 1, 2013

CHEER with your fellow alumni
MEET and listen to current undergraduates
attend a pre-event TOUR
SEE Dean Goldbart entertain
ENJOY the food

Friday, November 1, 2013 • 6-10:00 P.M.
BioSciences Quad 311 Ferst Drive
Atlanta, GA 30332

Event sponsored by Applied Physiology, Biology, Chemistry and Biochemistry, Earth and Atmospheric Sciences, Mathematics, Physics, and Psychology in the College of Sciences

You must **RSVP** to attend this event
<http://rsvp.cos.gatech.edu/2013-homecoming-rsvp>

Friend the School of Biology



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