



DEPARTMENT OF BIOLOGY
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To strengthen and integrate the field, the department partners with numerous campus units, including the Program for Integrated Biological and Genome Sciences, the Curriculum for the Environment and Ecology, and the Lineberger Comprehensive Cancer Center. The National Research Council ranked UNC Biology in the top 10% of its field in a 2010 nationwide evaluation.

Our department's impressive scope, standards of excellence and future growth depend on the generous contributions of alumni, parents, and friends.

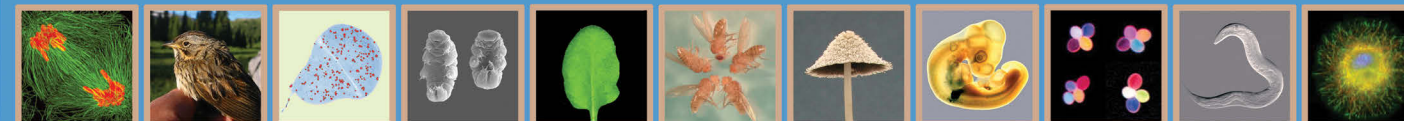
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Thank you for supporting outstanding students, faculty, and innovation in UNC Biology.

Victoria Bautch
Chair, UNC Department of Biology
bautch@unc.edu



BIOLOGY Newsletter

Department of Biology
THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

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Professor Ken Lohmann with a marine iguana in the Galapagos Islands of Ecuador, where UNC students can now study abroad.



For more information,
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A Note from the Chair

*W*elcome to the second issue of the *Department of Biology newsletter*. As I begin my second year as chair of UNC Biology, I'm excited about our accomplishments and am looking forward to new opportunities. Our departmental graduation in May found 621 Biology undergraduates turning their tassels, and we also hooded 17 graduate students – we are so proud of all of them! I am pleased to introduce five faculty who joined the department or moved into new roles this year: Dr. Kelly Hogan and Dr. Blaire Steinwand started positions as STEM (Science, Technology, Engineering and Mathematics) Lecturers to bring the best practices to our teaching mission and help us communicate the wonders of biology to all students; Dr. Daniel Matute (Evolution) and Dr. Daniel McKay (Developmental Genomics) joined as Assistant Professors to contribute to our teaching and research missions. Finally, we are especially pleased to welcome Dr. Carol Folt, the Chancellor of UNC-Chapel Hill and an environmental scientist, to our faculty ranks. We began outward-looking strategic planning with a faculty retreat in January. We've worked to maintain connections with you – our former students and friends of the department, and we continue to seek your insights and support. We embrace teaching and exposing our fantastic undergraduates to cutting-edge research, and to providing our graduate students with outstanding training and competitive stipends. Thank you for your interest and support!



UNC Chancellor Joins Biology Department Faculty

UNC Chancellor Carol Folt has joined the faculty of the Department of Biology. Chancellor Folt, who arrived at UNC in July 2013, was previously the President of Dartmouth College and a Dartmouth Professor of Biological Sciences. Her scientific training includes a bachelor's degree in Aquatic Biology from the University of California at Santa Barbara, a master's degree in Biology from UCSB, and a Ph.D. in Ecology from the University of California at Davis. Chancellor Folt is an environmental scientist who has studied the effects of dietary mercury and arsenic on human and ecosystem health, salmonid fisheries management and restoration, and global climate change.

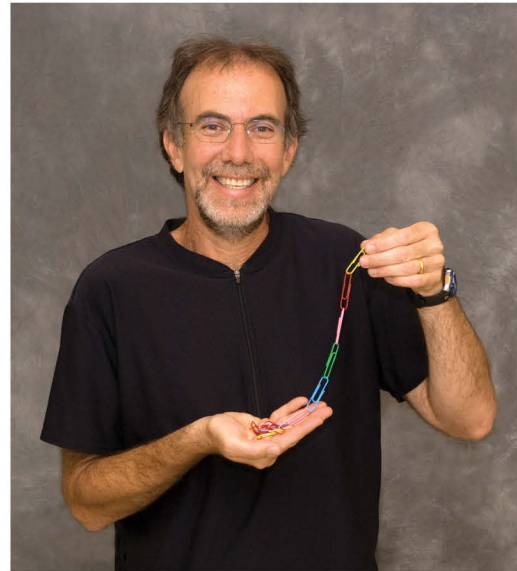
At UNC, it is traditional for chancellors to have a faculty appointment in one or more home departments. Chancellor Folt has chosen to have dual appointments in the Department of Biology in the College of Arts and Sciences and in the Department of Environmental Sciences and Engineering in the UNC Gillings School of Global Public Health.



Faculty: In their own words ...

The post-genome era has heightened public awareness of DNA and raises important questions as to how we deal with the information lying in our genomes. While we can extract information through the sequence, there is still a great deal to learn in terms of how cells extract information and regulate the trillions of genomes in our body. We have been exploring the “physics of DNA”, which is analogous to trying to understand how a bowl of spaghetti is organized. The immensity of DNA (2 meters/cell) and how the molecules wiggle and writhe around the nucleus almost defy comprehension. Using new tools to visualize chromosomes in live cells we have been able to watch this ballet through the microscope. Chromosomes are constantly in motion, and the path taken is largely predicted by simple polymer models taught in freshman physics. Our surprise came while watching mitosis during cell division. The region of the chromosome where microtubules attach, known as the centromere, is so compacted that the DNA turns into a tightly coiled spring. This spring is central to mechanisms required to achieve fidelity in chromosome segregation.

Our laboratory incorporates cell biology, physics, math and computer science toward the goal of understanding how chromosomes work. Most of our papers are co-authored with undergraduates, who serve a vital role in this process by bringing new ideas from these ‘foreign’ disciplines. The advances in computer speed, simulation and super-resolution microscopy allow us to make models with nanometer accuracy in live cells and test predictions from mathematical models. The undergraduates are the conduit, their hidden strength, naïveté. Taking a fresh look at an old process is the goal as we dive deeper into these remarkable structures called chromosomes. 🐛



Paper clips provide a good physical model for DNA.

- **Kerry Bloom**

Thad L. Beyle Distinguished Professor of Biology



Collecting early lycopod tree fossil remains at an outcrop in southwestern Virginia.

I collect rocks. Not just any kind, but those that entomb the remains of ancient plants. Preparation and study of these fossils allows my lab group to reconstruct aspects of the past history of plant life, including changes in biodiversity and how plants altered earth systems. Changes in vegetation often occurred in response to climate changes, evidence of which is recorded in the rocks themselves.

My research focuses on some of the earliest vascular plants (plants with water-conducting tissue), dating to about 400 million years ago (early Devonian period). These plants are small, usually leafless and rootless, and vastly different from all but a small percentage of modern plants. Many of the fossil species we study are unique, even bizarre, compared to modern plants, and most are now extinct. Research from my lab, along with findings of others, clearly demonstrates that a rapid radiation of vascular plants occurred over a relatively short span of Devonian time (tens of millions of years), an event comparable to the Cambrian radiation of animals.

My work involves not only collecting fossils from diverse geographic locations (such as Maine, Canada, Europe, and China), but also using special techniques to extract all possible information about their morphology and internal structure. These approaches enable us to reconstruct growth forms and often to deduce the functions of various structures. Our work has provided insight into how leaves first came into existence. We have also investigated some of the earliest rooting structures and woody tissues. By looking at the environment in which each species is preserved, we often can determine which ones grew together and how they responded to their environment. Only part of plant history has thus far been revealed; we hope to uncover much more in the years ahead. 🐛

- **Pat Gensel**

Professor of Biology

A Message from the Biology Graduate Student Association (BGSA)

Biology graduate students could not wish for a more inspiring and productive environment than our Biology department at UNC. The diversity of research fields and the abundance of resources available allow for extremely interesting and fruitful collaborations. Many of our students and faculty members are also actively involved in partnerships beyond the departmental sphere, reaching out to other departments, universities, research institutions, and companies, inside or outside the Research Triangle Park. The Biology Graduate Student Association (BGSA) supports personal, social, and professional development of graduate students in the department by organizing events, fostering friendship and camaraderie, and advocating for students’ needs within the department. Looking at the vibrant and enthusiastic community that is the Biology department, I am convinced that the relationships we forge with our professors and peers during our time at UNC will last well into our personal and professional lives, and I am looking forward to it.

- *Julia Samson, BGSA President 2014-2015*



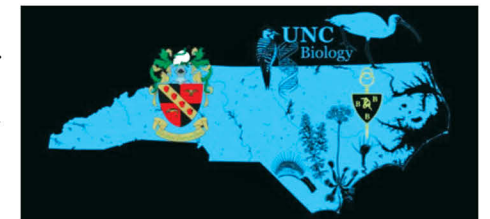
- Kier & Smith Travel on a TransAmerica Trail Bike Tour -

Professor Bill Kier was on sabbatical during the spring, conducting research at Hopkins Marine Station (the marine biology lab of Stanford University) near Monterey, California. After returning in April, he and his spouse, Dr. Kathleen Smith, set off from Kitty Hawk, NC on a “trip of a lifetime” to cross the country on their tandem bicycle - a bicycle built for two. They covered 4318 miles in 73 days of riding, climbing a total of 167,235 feet as they crossed 11 states and four mountain ranges. They finished at the Pacific Ocean in Florence, Oregon (see photo). During the trip they carried all of their gear and stayed in motels, campgrounds, and hostels. They also maintained an online journal, with photographs, which can be viewed at:

<http://www.crazyguyonabike.com/doc/bandktransamtour>

Tri-Beta Biological Honors Society for Undergraduates

The UNC chapter of Beta Beta Beta, the National Biological Honors Society, is thriving as a social, service, and networking group for biology undergraduates. Having added 60 new members this fall, the group has plans for a variety of educational and service projects ranging from the annual science career panel to serving breakfast at the Ronald McDonald House to participating in UNC’s Science Days. The group also hopes to send members to the Tri-Beta regional research symposium and to the Experimental Biology symposium in Boston.



BIOLOGY NEWS

* Four students working in Biology Department labs have been awarded prestigious *National Science Foundation Graduate Fellowships*: **Katrina Kutcho** (*Alain Laederach’s lab*), **Ben Morris** (*Allen Hurlbert’s lab*), **Kristi Schaefer** (*Mark Peifer’s lab*), and **Casey Schmidt** (*Greg Matera’s lab*).

* Professor **Gregory Copenhaver** was an inventor on two U.S. patents involving techniques for genetically modifying plants with engineered chromosomes.

* Senior Lecturer **Kelly Hogan** was featured in a front-page article in *The New York Times*, which highlighted her efforts to improve biology instruction in introductory classes.

* Assistant Professor **Daniel Matute** received the 2014 *Theodosius Dobzhansky Prize*, an award from the *Society for the Study of Evolution* to recognize an outstanding young evolutionary biologist.

* Professor **Peter White** received the 2014 *Star Award* from the *Center for Plant Conservation* in recognition of his contributions to conserving imperiled U.S. flora.

* Three graduate students – **Michael Meers** (*Greg Matera’s lab*), **Joy Meserve** (*Bob Duronio’s lab*), and **Esta Terzo** (*Bob Duronio’s lab*) – have received *Ruth L. Kirchstein National Research Service Award Predoctoral Fellowships*.

* Professor **Ken Lohmann** was elected a Fellow of the *American Association for the Advancement of Science* and was also named the “2013-2014 Tri-Beta Biology Professor of the Year” for excellence in teaching.

* **Laura Miller** (Associate Professor of Biology and Mathematics) was selected to give a Plenary Talk at the 2014 meeting of the *Society for Mathematical Biology* in Osaka, Japan.