



DEPARTMENT OF BIOLOGY
The University of North Carolina at Chapel Hill
CB# 3280, Coker Hall
Chapel Hill, NC 27599-3280

NONPROFIT
US POSTAGE
PAID
UNC-CHAPEL HILL

Support the UNC Department of Biology

UNC Biology is a leader within the university, in the South, and across the nation. Our students, faculty, and alumni define new directions for biology and develop innovative connections with other disciplines.

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 recently ranked UNC Biology in the top 10% of its field. This past year your generous contributions contributed to efforts such as Summer Undergraduate Research opportunities.

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

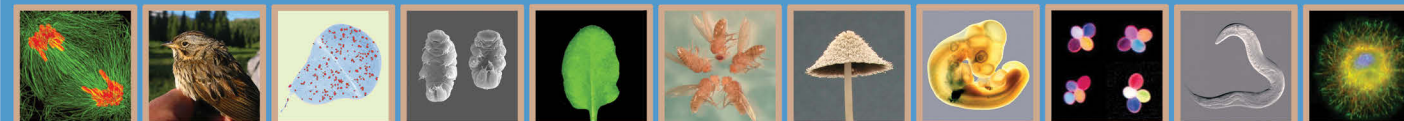
Your continued support will enable us to recruit and retain our best faculty members, to attract the nation's top students, and build on our current world-class research.

Please make your donation by returning the enclosed reply card, or by visiting: <http://bio.unc.edu/donate/>.

To learn more about supporting UNC Biology through estate gifts, professorships, graduate student fellowships, or student research awards, please contact Stephen Keith (919-843-0345 or stephen.keith@unc.edu).

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

Victoria Bautch
Chair, UNC Department of Biology



BIOLOGY Newsletter

Department of Biology
THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

VOLUME 3 ISSUE 1

FALL 2015

IN THIS ISSUE

A Note From the Chair.....	1
Images of UNC Biology.....	1
Amy Shaub Maddox Profile.....	2
Keith Sockman Profile.....	2
BGSA Message.....	3
Tri-Beta Honors Society.....	3
Professor Wins Nobel Prize.....	3
In Memorium-Seth Reice.....	3
Biology News.....	3
Support Biology.....	4

Field Work in Plant Ecology: Students in the spring 2015 Ecology Seminar at Forty Acre Rock, S.C. (Photo by Professor Robert Peet.)



For more information, please visit our website: <http://www.bio.unc.edu/>

The Newsletter is published by:

The Department of Biology
The University of North Carolina at Chapel Hill
CB# 3280, Coker Hall
Chapel Hill, NC 27599-3280
Phone: (919) 962-2077

Department Chair
Victoria Bautch
Department Manager
Marie Fholer
Newsletter Editor
Ken Lohmann
Printing
UNC Student Stores Print Shop
© UNC-CH Department of Biology

UNC IS AN EQUAL OPPORTUNITY/
AFFIRMATIVE ACTION INSTITUTION

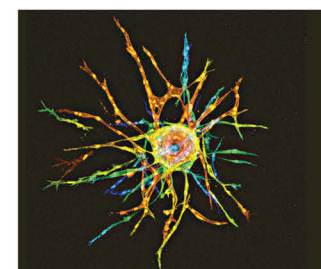


A Note from the Chair

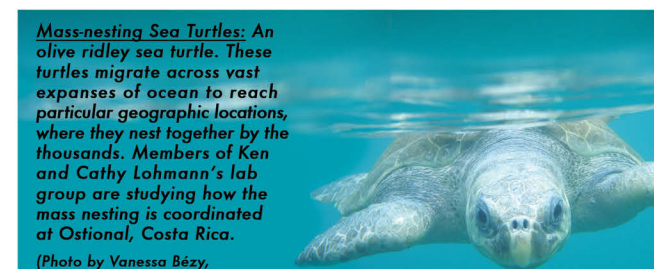
Welcome to the third issue of the *Department of Biology newsletter*. The Department has celebrated numerous accomplishments this past year, and we are looking forward to new opportunities. Our departmental graduation in May was stirring as we wished 513 undergraduates a fantastic future (we had the most graduates of all departments), and we hooded 12 graduate students – we are very proud of all of them! We are also proud of new faculty who joined the department this year: Dr. Mara Evans started a position as Lecturer to help us bring ecology and integrative biology to our students; and Drs. Jill Downen (genomics, joint appointment), Christopher Martin (evolution), and Zach Nimchuk (plant biology) joined as Assistant Professors to contribute to our teaching and research missions. We were thrilled to get permission to plan a major renovation of Wilson Annex, built in 1964 and showing its years. This commitment shows strong support for the research and teaching missions of the department, allowing development of state-of-the-art research/teaching space, and we are interested in involving friends and alums in the process. We continue to set the national bar for best teaching practices, and a recent site visit from the American Association of Universities, who financially assist our efforts, was mutually beneficial. We've also worked to maintain and strengthen strong connections with you – our former students and friends of the department, and we appreciate your insights and support. We are excited to enable our world-renowned faculty, expose our great undergraduates and graduate students to cutting-edge research, and participate in a strong and vibrant teaching mission for our students. Thank you for your interest and support!



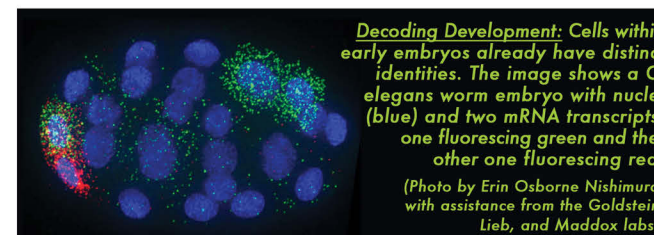
Images of UNC Biology



Building Blood Vessels: Blood vessels sprouting from a bead in 3D. Colors indicate distance from viewer. In humans these tubes carry blood and nutrients to organs. The research provides insight into how blood vessels form during development, and how these processes are altered during diseases such as cancer. (Photo by Lauren Saunders, Vicki Bautch's lab.)

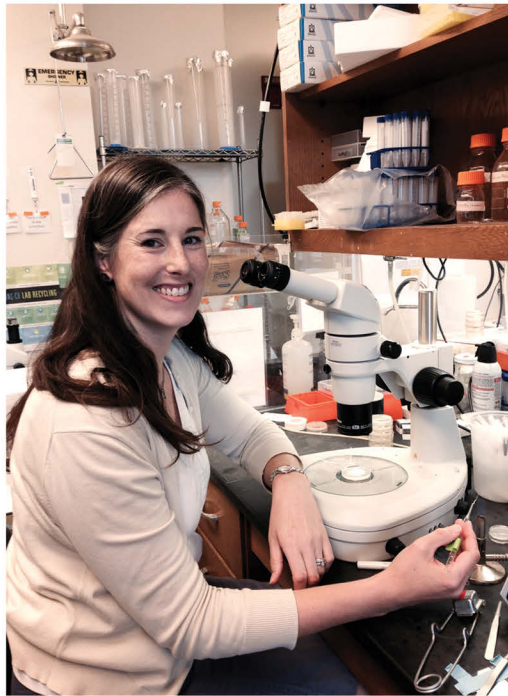


Mass-nesting Sea Turtles: An olive ridley sea turtle. These turtles migrate across vast expanses of ocean to reach particular geographic locations, where they nest together by the thousands. Members of Ken and Cathy Lohmann's lab group are studying how the mass nesting is coordinated at Ostional, Costa Rica. (Photo by Vanessa Bézy, Lohmann Lab.)



Decoding Development: Cells within early embryos already have distinct identities. The image shows a *C. elegans* worm embryo with nuclei (blue) and two mRNA transcripts, one fluorescing green and the other one fluorescing red. (Photo by Erin Osborne Nishimura, with assistance from the Goldstein, Lieb, and Maddox labs.)

Faculty: In their own words ...



Amy Shaub Maddox, conducting research in her laboratory.

Although I didn't realize it at the time, I started down the path of becoming a biologist when I was still a little girl. From an early age, I was fascinated by living things. But I didn't know what I wanted to do with my life until a professor generously took me, as an untrained undergraduate, along for a summer of experimental endocrinology at the Marine Biological Laboratory on Cape Cod. That summer I reveled in the scientific method – the distillation of a hypothesis and a pile of materials into a yes or a no, sometimes by the end of the day. I also got the chance to peer through a microscope and discover the beauty of cells.

Every living thing is made up of cells. For a fertilized egg to become a person, that first single cell must multiply into trillions. Also, for tissues like the skin and digestive tract to be maintained despite constant wear and tear, cells must multiply. Proper cell multiplication is also necessary to avoid disease states including cancer. Therefore, to understand both normal development and illness, we must understand how cells multiply.

During the final step of cell multiplication, a single "mother cell" changes shape dramatically as it pinches into two "daughter cell" copies. My lab is studying this final step of cell separation, known as cytokinesis. Using microscopes, we make pictures and movies of cells pinching in half. Then we carefully measure cell shape. Cell shape is driven by microscopic tracks and motors inside of the cells, so we examine the location and texture of these structures. For one cell to become two, we think that the cell skeleton needs to be lined up just right and gathered tight, so that the forces generated are focused onto a small enough area that they can split the cells. We are gathering experimental evidence, and collaborating with physicists and mathematicians to develop and test this idea. We involve undergraduates in all stages of this work, hoping that the experience will spark a life-long love of science, as a similar research experience once did for me. ☺

- Amy Shaub Maddox
Assistant Professor of Biology

Work in my lab lies at the intersection of behavior, physiology, and ecology. We use wild songbirds as a system for studying the decisions that animals make in order to optimize reproduction in unpredictable environments. For example, when choosing among prospective mates, female songbirds normally prefer courtship signals that involve intricate vocal control of complex songs, presumably because only high-quality suitors are capable of such skilled performances. During some years, however, extreme weather or other conditions reduces the number of males capable of high-quality performance. Our studies have shown that female birds are remarkably flexible under such circumstances. Instead of forgoing mating, they merely adjust the threshold for the song performance that they find acceptable. This flexibility is associated with changes in neurochemicals in the brain.

Our findings have led to new insights into how animals change their behavior as needed to optimize survival and reproduction in an ever-changing environment. Some of our discoveries have been encapsulated in new models showing how feedback on the performance of a behavior, such as the way that female birds respond to the size of an egg, can enable an individual to optimize behavior (in this case, egg size) for the set of conditions that exists at a particular time.

Our laboratory work involves sophisticated techniques such as high pressure liquid chromatography and immunocytochemistry, but it is often simple procedures in the field, coupled with careful observation, that lead to our biggest advances. The research depends on post-docs, graduate students, and dozens of hardy UNC undergraduates, many of whom have endured weeks of difficult field conditions camping in sub-freezing temperatures while collecting data at our high-elevation field site in the Colorado Rocky Mountains. By using an interdisciplinary approach, one that combines field and lab studies -- as well as the tribulations of snow camping with the comfort of UNC -- the research program remains focused on the most interesting questions. ☺

- Keith Sockman
Associate Professor of Biology

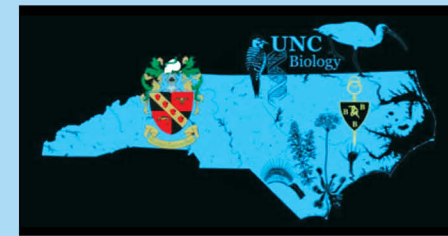


Male Lincoln's sparrow at the Molas Pass, Colorado field site. The color-band combination is specific to the individual and enables identification without the need for recapturing.

A Message from the Biology Graduate Student Association (BGSA)

The Biology Graduate Student Association (BGSA) works to create a welcoming environment for graduate students by organizing events that foster interactions among students, postdocs, and faculty. Each year the BGSA sponsors the Fall Picnic and the Research Symposium for the department, in addition to weekend hikes, camping trips, and happy hours. We have also organized events to promote interactions with other academic units, such as a recent volleyball match with members of the UNC math department and a heated game of laser tag with the Duke biology department. By offering these activities, we hope to create a social environment that enables grad students to enjoy UNC while simultaneously thriving as researchers. Updates on BGSA activities are available online at bgsa.web.unc.edu. Alumni are welcome at all events.

- Audrey Kelly
BGSA President 2015-2016



National Biological Honors Society

The UNC chapter of Beta Beta Beta, the National Biological Honors Society, is thriving as a service, networking, and social group. TriBeta sponsors events that enhance the education, opportunities, and career prospects of undergraduates interested in biology. Activities include monthly Professor Talks, a Career Panel, Science Days, several charity events, and the TriBeta regional research symposium. The group has grown to unprecedented size and now has 120 active members.

UNC Professor wins Nobel Prize

Aziz Sançar, the Sarah Graham Kenan Professor of Biochemistry and Biophysics at UNC, is a recipient of the 2015 Nobel Prize in chemistry. The award recognizes Professor Sançar's pioneering research on cellular mechanisms of DNA repair. The Biology Department joins the rest of the UNC community in congratulating our colleague on this outstanding achievement. Professor Sançar is the second member of the UNC faculty to receive a Nobel Prize in the life sciences during the past decade; UNC Professor Oliver Smithies also received the award in 2007.



- IN MEMORIAM, PROFESSOR SETH ROBERT REICE -



Professor Seth Reice, a longtime member of the biology faculty, died at his home in Carrboro on December 23, 2014. Dr. Reice grew up in New York City, earning his Bachelor of Arts degree at the University of Rochester in 1969 and a doctorate in zoology from Michigan State University in 1973. He served on the faculty of the UNC Biology Department from 1973 until his retirement in 2011. During his 38 years as a professor, he taught over 2,000 students, published numerous articles, and authored a book titled "The Silver Lining", which discussed the important role that environmental disturbances play in ecosystem function. An adventurous traveler, Dr. Reice also taught in the UNC Honors Semester in London, England, in the Semester at Sea program, in a UNC study-abroad program in Brazil, as a visiting professor at Hebrew University in Israel, and at Monash University in Australia. Dr. Reice was a friendly and popular professor who went out of his way to mentor students. He is deeply missed by the UNC biology community.

Biology News

* Professor Emeritus **Haven Wiley's** new book, "Noise Matters: The Evolution of Communication", was recently published by Harvard University Press.

* Professor **Joe Kieber**, an international leader in the study of cell signaling in plants, was named a Kenan Distinguished Professor.

* Professor **Jeff Dangl** received the Danforth Award for Plant Science in recognition of outstanding achievement benefiting agriculture, food nutrition, and human health.

* **Alan Weakley**, Adjunct Associate Professor and Herbarium Director, won the Center for Plant Conservation's 2015 Star Award and also helped create the FloraQuest app, which enables users to rapidly identify plants using a mobile phone.

* Professor **Peter White** received two major awards for his work as director of the North Carolina Botanical Garden: (1) the John Pritzlaff Conservation Award from the Santa Barbara Botanic Garden; and (2) the Edward Kidder Graham Faculty Service Award from UNC.