

Exploration & Discovery

NEWS AND INFORMATION FROM THE DIVISION OF RESEARCH AND GRADUATE STUDIES VOLUME 6, ISSUE 3

From Tobacco to BioFuels: A Region in Transition to a Sustainable Future

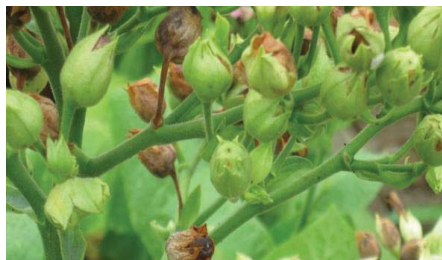
An age-old NC cash crop that has been the focus of public health debate for many years may now help solve the nation's energy crisis.

That's the exciting possibility that ECU faculty researchers are exploring as part of their overall work in biofuel and plant biotechnology development. NC tobacco farms hit hard financially in recent years may soon be able to return to tobacco as a significant revenue source, boosting regional economies as well as aiding in NC's alternative energy mandate calling for 10% of the state's total fuel consumption to be supplied by biofuels by the year 2017.

Scientists now believe using tobacco may, in fact, be even better than some other biofuels in that it would not affect a major U.S. food source, unlike other biofuels made from corn, soybeans, and other crops. According to researcher Vyacheslav Andrianov at Thomas Jefferson University, tobacco is an attractive "energy plant" because it can generate a large amount of oil and sugar more efficiently than other crops. Researchers have discovered ways to genetically modify tobacco to produce as much as 20 times the oil stored in a typical plant.

Loren Limberis (Dept. of Engineering) is collaborating with RTI Interna-

tional and the NC's Northeast Commission on a study evaluating the potential for expansion in biofuel and plant biotechnology development in the region. ECU also works closely with the North Carolina Biotechnology Center in these matters (see separate story below) as well as other partners. For example, the



Biofuels Center of NC is very interested in the results of ECU research into the exploration of tobacco as a viable, scalable and cost-competitive feedstock to create biofuels.

Also in alignment with these efforts, **Baohong Zhang**, PhD (Dept. of Biology) is exploring the use of marginal soils not suitable for row crop production for growth of other promising biofuel crops beyond tobacco, including switchgrass. This initiative will employ a combination of advanced, cutting-edge approaches and methodologies,

including next-generation sequencing, comparative genomics, recombinant DNA technology, and transgenics to improve switchgrass and the biomass and tolerance to environmental stresses of other crops. This work runs in tandem with the Biofuels Center of NC's trials with a range of energy grasses at a larger scale for biofuels use. The goal is to have as much as 100,000 acres of energy grasses in the southeast NC region to support a 160 million gallons of biofuels production a year.

Still more ECU faculty from the Department of Biology as well as the College of Technology and Computer Science are investigating the use of algae for biofuels. This project is in the early stages, but will focus on biodiesel production using non-photosynthetic micro-algae. Rather than absorbing carbon dioxide via sunlight to proliferate, genetically-engineered non-photosynthetic algae can grow in closed batch cultures on sugars without the need for sunlight. ECU is also investigating the potential for taking this process one step further to genetically modify the micro-algae to produce recombinant proteins and other useful industrial enzymes while allowing multiple product yields from a single batch process.

NC Biotechnology Center @ECU: Funding Research, Creating Jobs

"We make the connections that create biotech jobs," is the tagline on the website of the North Carolina Biotechnology Center. Indeed, this private, non-profit corporation has been instrumental in developing NC's enviable position of having the third-largest population of biotechnology companies in the U.S. - with 538 bioscience companies directly employing over 59,000 people, with an average salary over \$75K. The total annual economic impact is \$64.6 billion overall, 1.92 billion for state/local taxes, with a total of 226,800 jobs.

An essential part of the Center's mission is funding research in this ever-growing field. In the past two years alone, the Center has awarded nearly half a million dollars to ECU researchers for activities ranging from the study of nanomaterial toxicity to the development of biotechnol-



ogy processes to increase the yield and quality of cotton. Since being established and supported by the NC General Assembly in 1984, the Center has provided tens of millions of dollars in grants and loans. Its Centers for Innovation program helps accelerate commercialization in areas of particular economic promise.

The Center's eastern regional office, staffed by **Mark Phillips**, executive director, and **Thomasyne Jefferson**, regional coordinator, is housed at ECU, adjacent to RGS offices. This office is responsible for activities in 27 counties and is focused on supporting the region's core strengths in marine science, medical devices, agriculture, biofuels, and biopharmaceutical production and processing, as well as other bio-related opportunities. For more information, go to: www.ncbiotech.com.

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SPOTLIGHT ON ECU GRADUATE STUDENTS

Valerie Robbins

Digging Through History

Sifting through sand to uncover history makes life a beach for graduate student **Valerie Robbins**.

The anthropology major is conducting research on Fort Macon State Park's Eliason House, an 1800's house that was built for the fort's various commanding officers and their families. Burned at the start of the Civil War, the house's remains are now buried.



Using the artifacts found on the site, Robbins will analyze how military officers and their families lived during the Antebellum period. Her thesis will compare this information to a contemporary civilian household in nearby New Bern

in order to provide a better understanding of the similarities and differences between such households during this period. Robbins, who has also done field work in England, will present her research at the Society for Historic Archeology annual meeting in Baltimore in January.

Sorting through the Fort Macon excavation has been a rewarding puzzle to Robbins, who has always been fascinated by history and the everyday lives of people. Says Robbins, "I was drawn to historical archaeology because it is a great way to learn about and connect to the people of the past in a very tangible way."

Kyle Chapman

Canvassing for Opinions

Listening to others' opinions isn't everyone's cup of tea, but it's right up **Kyle Chapman's** alley.

Chapman, an Industrial/Organizational Psychology graduate student, studies public opinion for ECU's Center for Survey Research.

During a recent project, Chapman examined sustainable land use options for rural North Carolina and identified ways of increasing awareness among landowners and public officials. He also made recommendations concerning potential educational programs that would lead to broadening public awareness of various land use options.

Statewide focus groups to determine the stakeholder awareness levels and a survey of NC policymakers were also conducted. The study is important because with unprecedented population growth facing the state, economic development and environmental sustainability are vital to its future.

The "coolest" part for Chapman was meeting with landowners and learning about their experiences. In this case, no second opinion is needed! Says Chapman, "Knowing that our research has the potential to affect policy and protect the natural resources of North Carolina is very rewarding."



MEET THE RGS STAFF

Robin Tutor, interim director of the NC Agromedicine Institute, works with faculty and students as well



community partners across the state and nation to promote the health and safety of farmers, fishers, foresters, their workers, and families. This goal is accomplished through research, prevention/intervention, and education/outreach. In all these efforts, Robin combines her personal experience as a member of an active farming and logging family with her education and community engagement to ensure that services of the Institute are useful to the end-user.

Andrea Strickland has spent 22 years at ECU and specifically in the Willis Building, headquarters for the Office of Engagement, Innovation and Economic Development (OEIED), where she is the business services coordinator and executive assistant to the associate vice chancellor. Andrea's responsibilities also include finance administration and human resource management as well as serving as Willis's facility manager. She is also particularly excited about supporting OEIED's recently established Innovation Design Lab and its forward-leaning programs such as the Middle School Innovators Academy.



ECONOMIC OUTREACH AND COMMUNITY ENGAGEMENT

The Office of Engagement, Innovation, and Economic Development (OEIED) has undertaken three initiatives that help ECU stand out as a national model and broadly define its Community Enhancement and Economic Transformation Initiative (CEETI). CEETI supports distressed eastern NC communities through technical assistance, financial and human resources, economic development products, and the expertise of ECU's faculty, staff, and students, including the Municipal Management and Innovation Initiative, the Talent Enhancement and Demonstration Grant program, and the ECU Outreach Network. The initiatives are overseen by **Kenny Flowers**, director of community and regional development.

The **Municipal Management and Innovation Initiative (MMI)** supports small, low-wealth, limited-resource and limited-capacity municipalities in eastern NC. MMI is a response to eastern communities that lack adequate staff and administrative capacity to effectively respond to the basic fiscal, policy and citizen program needs. MMI provides technical assistance to increase local administrative capacity, management, project management, and program development. Initially piloting the initiative in Aurora, ECU is continuing to add new communities to the MMI network.

ECU and the NC Department of Commerce are collaborating on a Community Development Block Grant via the **Talent Enhancement and Demonstration Grant Program**, designed to strengthen less-prosperous communities in eastern NC. The program focuses on community initiatives such as housing development and community revitalization through \$75,000 awards. Beaufort, Edgecombe, Hyde, Jones, Pamlico and Pitt counties, as well as the town of Aurora, have engaged with ECU, including a training program customized to their needs. The program just received an additional \$700,000 in capacity building grants to assist up to 14 more rural communities.

The **ECU Outreach Network** collaborates with faculty, staff, and graduate student assistants who work directly with units of local government and community organizations to prioritize organizational resource needs, identify resource providers, and prepare grant applications that support increased capacity and sustainable community and economic development. Under the co-direction of **Dr. Bob Thompson** and **Dr. Carmine Scavo**, the Outreach Network currently serves seven eastern NC communities.

Together, these initiatives make up a comprehensive approach to creating competitive environments in small towns and throughout the region. **Dr. Ted Morris**, associate vice chancellor for engagement, innovation and economic development, explains that within ECU's Office of Engagement, Innovation, and Economic Development, many complementary enterprises offer support to eastern NC communities.

Sharing Insights About Higher Education in South Africa

For **David Siegel**, associate professor of higher, adult and counselor education in ECU's College of Education, summer 2011 was a particularly memorable highlight of his research career. As one of the 2011 participants in the Fulbright Specialist Program, Siegel spent six weeks as guest faculty at the University of Johannesburg, holding a series of lectures and workshops drawing on his ongoing research into the role of access, inclusion, and diversity in promoting national and economic development.

His visit was at an especially opportune time. "Visiting post-apartheid South Africa was a particularly exciting prospect because the country is in the midst of major transformation," he says.

Siegel had been in South Africa the year before for a briefer visit, delivering a paper at the University of Stellenbosch, near Cape Town. His presentation was drawn from his book *Organizing for Social Partnership*, which explores "cross-sector approaches to addressing social issues, including diversity." A representative of the University of Johannesburg was in the audience and approached



Siegel about returning to South Africa, possibly on a Fulbright grant. Siegel is one of more than 400 U.S. faculty and professionals who travel abroad through such arrangements through the Fulbright Specialist Program each year.

In addition to sharing his research, Siegel also had time to learn more about South Africa's system of higher education. He is very pleased to bring this knowledge back into ECU's classrooms because "cross-cultural understanding is such a crucially important part of our students' education."

Siegel's research on the dynamics of cross-sector collaboration has appeared in journals such as *Higher Education*, *Innovative Higher Education*, the *Journal of Higher Education Outreach and Engagement*, and the *Journal of Further and Higher Education*. He also served as co-editor of the recent three-volume work *The Business of Higher Education*, which examines how business models affect higher education and includes his essay on academic-corporate partnerships to promote social change. Siegel holds a PhD from the University of Michigan.

Todd Watkins, DDS

Designing an "Uber LMS" to Assess Student Competencies

Academic institutions are under intense scrutiny to prove that their curricula are generating graduates who are capable of performing valuable jobs.

In support of this critical evaluation, **Todd Watkins**, assistant dean for dental education and informatics at ECU's new School of Dental Medicine, has worked for more than 20 years on methods for mapping and analyzing the student outcomes for "competency-based" curricula. Recently, he reached a milestone in this work, having just applied for a patent on a method for gathering, normalizing and analyzing student results from basic questions, clinical skills, and problem-based discussion groups.

The patent is entitled "Normalization and Cumulative Analysis of Cognitive Educational Outcome Elements and Related Interactive Report Summaries." Watkins calls it the "Uber LMS," referring to



learning management systems that help faculty and administrators look at results from student reports and make judgments concerning student performance or curriculum effectiveness. These student data come from several very different systems, ranging from online test environments to electronic patient record software, and feed an analysis grid that can be customized for different curricula. Watkins is working to evaluate and present educational outcomes data so degree programs can look at all of the different ways that students encounter information to better meet their specific and unique educational missions. "There is a tradition of looking at innovative methods for instruction at ECU," says Watkins. "I'm hoping my research will have an impact on the ways that all competency-based curricula are evaluated."

Heather L. Ramsdell, PhD

Listening to Infant Sounds of Science

Currently, most speech and language disorders are not identifiable until children begin to speak, and thus critical periods for learning and treatment are missed in development.

Dr. Heather L. Ramsdell is working to change all that through research at ECU's newly-built Infant Vocal Development Laboratory. Together with enthusiastic and hard-working graduate research assistants and undergraduate students in the Dept. of Communication Sciences and Disorders, Ramsdell is conducting monthly recordings of infants and their families to study normal vocal development.

Says Ramsdell: "We work hard, but it's babies! We have a lot of fun listening to their sounds and tracking their development."

Study of infant vocal development is time-intensive longitudinal work, and Ramsdell seeks to establish an environment of productivity and deep appreciation for the scientific process. "We try to keep things as flexible and comfortable as possible so that families enjoy the experience and continue to come back," she says.

The next phase of Ramsdell's research will expand her study to incorporate infants at risk for developing speech and language disorders. She is also pursuing collaborative efforts within ECU to study orofacial (mouth and face) movement patterns in infant vocal development using kinematic motion analysis (with **Dr. Laura Ball** and **Dr. Blaise Williams**) and vocal development in infants who have siblings with autism (with **Dr. Twyla Perryman**). "All of this work may one day better inform diagnosis and treatment of speech and language disorders, and therefore help to improve human communication," she says.



Compliance Close-Up: Handling Protected Health Information (PHI) in Research



The Health Insurance Portability and Accountability Act (HIPAA) outlines 18 identifiers that must be “de-identified” to protect the privacy of protected health information (PHI). Additionally, there are still more measures to take regarding PHI under the Federal Policy for the Protection of Human Subjects, known as the “Common Rule.”

So how can researchers - who often need to retain some identifiers to meaningfully generate and report findings - work within privacy parameters? E&D asked **Joy Hardee**, administrator-privacy officer, and **Dianne Marshburn**, administrator-research, both from the University Health Systems (UHS) of Eastern Carolina, to provide ECU researchers with some guidance:

It’s important to realize that researchers can use certain identifiers, known as “limited data sets,” defined as PHI that may include any of the following direct identifiers: 1) town, city, state, and zip code; 2) all elements of dates directly related to an individual, including birth date, admission date, discharge date, and date of death, and 3) other numbers, characteristics, or codes not listed as direct identifiers.

However, studies using these must be reviewed by Brody Office of Compliance/Privacy Officer. If limited data sets are permitted, you must then complete a “data use agreement” that outlines the permitted use of the data and prohibits re-identifying or using the information to contact individuals. Indeed, **it is critical to contact the Brody Office of Compliance /Privacy Officer at 744-5200 before you work with any PHI in your research.** Only the ECU Privacy Officer can determine how rules apply. Below are some key issues to consider in preparation for HIPAA review and approval:

Think through the distinctions of “use” and “disclosure” in your research: “Use” is defined as within an entity that maintains such information. If the person is employed by the organization that originated or created the PHI, the PHI is being used by the person. “Disclosure” means the release, transfer, provision of access to, or divulging in any other manner of information outside the entity holding the information. For example, a physician may use the PHI of patients to gather information to determine the feasibility of a research project. Complicating this issue is the “business associate,” or any individual or entity that may help or have access to the PHI. There must be a written agreement with business associates that includes restrictions on how PHI may be used or disclosed, and how PHI will be protected. Generally, research sponsors and outside researchers are NOT business associates (unless a business associate agreement is in place), and neither are study coordinators. Third-party groups assisting with recruitment and/or screening ARE business associates, as are web hosting/data storage companies and billing companies or consultants.

Consider how the notice of privacy practice brochure will be provided to participants: The consent form should show how the PHI will be used and disclosed. The notice of privacy practice brochure may be provided by the organization in which the researcher works. However, if the organization does not provide such a notice, then the researcher will need to develop one.

Be aware that to use or disclose PHI, a researcher will need one of the following: 1) written authorization from participants; 2) a waiver of authorization; 3) preparatory to research; 4) research on decedents; and 5) limited data set/data use agreement. PCMH/UHS and ECU utilize a written form for each of these activities. With the exception of 1) above (authorization), the researcher is required to account for any use or disclosure of PHI, known as the “accounting of disclosures” requirement under HIPAA. There are required elements for this, and the HIMS Department (Medical Records) will provide this document to you when they sign off on your protocol. In all of this, don’t forget you must contact the Privacy Officer. The Office for Human Research Integrity (OHRI) is a resource for guidance as well.

GRADUATE STUDENT RESEARCH DAY, A FIRST IN NC

ECU PhD candidates **Ben T. Danielson**, **Michelle Denise**, and **Taylor Ann Mattox** attended the 1st Annual Graduate Student Research Day held at the North Carolina State Capitol in Raleigh during the summer. The students discussed their research on health-



care challenges faced by North Carolinians with several state representatives. They also met with **Philip Rogers**, ECU’s liaison with the state legislature and chief of staff for ECU Chancellor **Steve Ballard**. Rogers also arranged for the group to meet **Al Delia**, policy director and senior advisor to Gov. Bev Perdue. The students were accompanied by **Drs. Paul Gemperline**, **Thomas J. McConnell**, and **Belinda Patterson** (dean, associate dean, and assistant dean, respec-

tively, of ECU’s Graduate School) together with **Dr. Warren Knudson** (professor, Dept. of Anatomy and Cell Biology, and Danielson’s mentor). Next year, Dr. Gemperline will be the president of the North Carolina Conference of Graduate Schools.

FEDERAL BRIEFINGS & FUNDING DEADLINES

SEE NEW RGS EXTERNAL FUNDING WEBSITE: WWW.ECU.EDU/RGS/FUNDINGOPPS.CFM

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NOV/DEC 2011
VOLUME 6, ISSUE 3

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Printed on recycled paper with nonstate funds.