

Exploration & Discovery

News and Notes from the Division of Research and Graduate Studies

September 2008

Email story ideas to editorxd@ecu.edu

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Research and Graduate Studies News

Biologist's Recent Appearance on the Colbert Report Was Indeed Funny... But to Jason Bond, Spider Science is No Laughing Matter

By now, many readers will have heard that the spider-discovering exploits of Dr. Jason Bond, associate professor in ECU's Department of Biology, landed him a spot on Comedy Central's Colbert Report. Such are the perks of a true discoverer and researcher. For those who have not yet seen Bond's moment in the lights, here is a link to the segment:

<http://www.comedycentral.com/colbertreport/videos.jhtml?episodeld=178462>

While Bond's appearance on the Colbert Report may have lent him some cachet among his students, it did not adequately highlight the strengths and the accomplishments of his research. Bond currently focuses on the evolutionary history of, and diversification among, spiders and millipedes. He is now working on three different projects and has applied for two more grants. He is currently finishing up a project that seeks to answer questions about the phylogeny and classification of mygalomorph spiders, more commonly known as trapdoor spiders and tarantulas. Bond's second and third projects are aimed at developing integrative approaches to examining species limits, employing molecular, ecological, GIS, and morphological analyses to delimit populations and species. His third project, in particular, concerns the formal documenting of biodiversity through taxonomic research describing and classifying new species of spiders and millipedes.

Bond's two pending grant proposals also concern the study of biodiversity. In the first of these projects, he will join forces with two other faculty members in ECU's Dept. of Biology, Drs. Enrique Reyes (assoc. professor) and David Chalcraft (asst. professor), in an attempt to tie ecological modeling, remote sensing data, and spider species diversity studies across the coastal plain of eastern North Carolina. The second pending grant is targeted to the study of North American tarantulas, specifically on questions of species diversity, phylogeny, and taxonomy.

Bond sees biodiversity studies as key to his future lab work. He says, "The scientific field of taxonomy has stalled, in my opinion, and the field really needs to change if we are going to meet increasing demands to document biodiversity. This includes developing rapid genomic approaches to evaluating species limits and integrating these methods across what we already know."

While Jason Bond's research may appear esoteric to the casual observer, people are beginning to understand the overall benefit to the study of biodiversity, and even of spiders.



Jason Bond, PhD, Biology



Stephen Colbert

Photo courtesy of ComedyCentral

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Collaborative Research Initiative

In the spring of 2008, East Carolina University's Division of Research and Graduate Studies initiated a program to foster the development of collaborative research opportunities in the area of science, technology, engineering and math (STEM). The STEM programs within ECU are intellectually diverse, as are their research agendas, so real efforts are needed to keep communication pathways open within ECU's STEM community. One such effort is the on-going construction of a database through which STEM researchers can stay abreast of dispersed projects and identify potential research collaborators.

In April, a survey was distributed among deans, chairs, and directors, asking them to identify the top three research strengths in their departments that offer possibilities for interdisciplinary collaboration in STEM fields. Respondents were also asked to identify potential collaborators within their departments, as well as opportunities known to exist for industrial collaborations. Examples of responses ranged from educational psychology to stem cell biology to lung cancer and environmental geology. The numbers of potential collaborators within departments ranged from one or two faculty members to as many as 17. Potential linkages to industrial collaborations included vaccine development, recreational fishing, local start up companies, and clinical trials.

The program, having completed its initial data-compilation stages, is now focusing on the more narrow characterization of specific research clusters. Surveys will be sent to faculty members in the STEM departments asking two questions: what are the top five categories in which to collaborate, and what are the top five areas in which someone could help you?

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Center for Sustainable Tourism: Research Opportunities

In ECU's recently launched Center for Sustainable Tourism, interesting new research avenues are opening for faculty and graduate students. The Center, according to its director, Dr. Patrick Long, is "the only Center for Sustainable Tourism in the country," and it is "establishing itself as the preeminent leader in research, teaching, and community outreach in this field of inquiry."

The goal of academic study in sustainable tourism is to improve the management and promotion of economic, environmental, and social values affecting tourism—in the parlance of the field, to manage the "Triple Bottom Line." Too often in tourism development, business needs and physical realities lead to the pursuit of short-term economic objectives at the expense of the very treasures which attract tourists to begin with. Sustainable tourism seeks to foster long-term planning with all of its benefits: higher tourism profits, more and better jobs, preserved natural environments, and strengthened destination communities.

The Center is currently soliciting partnerships, particularly from researchers with an interest in any of the following streams of investigation:

Renewable Energy in Tourism Initiative

This project, in partnership with the National Renewable Energy Lab and the University of Colorado at Boulder, focuses on strategies to maximize tourism's viability in an energy-constrained environment. A few industry leaders exist today in this new field, but the Center's initiative is the first comprehensive, academic effort to educate and advise stakeholders in renewable-energy practices. Says Academic Library Services faculty member Bryna Coonin, "Our search of the research literature in sustainable tourism confirms the need for additional substantive applied research." This project would be a natural fit for investigators interested in wind and solar energy, alternative fuels, engineering, business, economics, and "green" building.

Climate, Weather, and Tourism Initiative

Climate and weather, play a major role in determining the kinds of recreation and tourism a region can deliver. Many tourism businesses make daily weather-related decisions and global climate change is bound to produce new winners and losers in the industry. The Center's Climate, Weather, and Tourism Initiative is designed to address the needs of business, to inform government decision-making, and to beneficially modify the personal travel behaviors of tourists. This project would be of interest to researchers in atmospheric science, health and medicine, biology, business, the humanities, geology, and other fields. Scott Curtis, an assistant professor specializing in atmospheric science in ECU's Department of Geography, says that his work with the Center involves "gathering data about weather-related likes and dislikes of beach-goers on the Outer Banks." Curtis adds, "We hope to match tourists' expectations with the reality of today's climate and the projections for its future." Plans are currently under way for a fall workshop featuring speakers from the National Climatic Data Center, the United Nations Committee on Climate and Tourism, and *National Geographic Magazine*.

Community Sense of Place Initiative

A cross-disciplinary concept, "sense of place" puts great emphasis on identifying and analyzing the traits that give each destination its distinctive character: demographic and class dynamics, traditions and histories, second-home impacts, and recreational and leisure opportunities, to name only a few. From a tourism perspective, some of these traits are complementary and some occasionally conflict. Sense-of-place studies can illuminate destination qualities in sometimes-surprising ways, and serve as a reliable foundation for the effective management and marketing of all the traits that a destination presents. Researchers interested in pursuing studies in transportation demographics, recreation, business, planning, economics, and the environmental disciplines could find constructive partnerships in this project. According to Derek Alderman, Associate Professor of geography and a faculty affiliate of the Center, "Sense of place greatly lends itself to analyses which recognize that people—residents and tourists alike—bring multiple and sometimes competing connections to their communities and environments. Understanding and properly managing these connections through an informed, concerted approach can only lead to enhanced tourism policy."

One early indication of the multidisciplinary nature of the Center's work is participation by graduate students and faculty mentors specializing in English, planning, geography, recreation and leisure studies, public administration, and business. Now plans are going forward for a Masters of Science in Sustainable Tourism (potentially the first such degree in the nation) under the auspices of ECU's Colleges of Health and Human Performance, Human Ecology, Business, and the Thomas Harriott College of Arts and Sciences. For more information, visit the Center's web site: <http://www.ecu.edu/sustainabletourism/>

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Please contact us with your
comments and story ideas.

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All of the data acquired will go through a social-network analysis conducted by Dr. Jeff Johnson, where he will help identify groups of faculty and research clusters that align well in terms of existing strengths and future funding opportunities. Finally, a database for STEM researchers will be distributed, organizing the acquired data and allowing for easy input of new information.

It is hoped this initiative will succeed in more assuredly bringing collaborators fully on board ECU's growing research franchise—those who are in-house, external, or perhaps new to the university—and that the Collaborative Research Initiative will ease the path to assembling the most effective research teams possible.

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Research Development Awards 2008

ECU's Division of Research and Graduate Studies has announced 19 new Research Development Awards (RDAs) for 2008-9, totaling nearly \$447,000. Twenty-four ECU faculty members/principal investigators representing seven ECU colleges and schools will receive the RDAs. These are one-year awards (typically about \$20,000 each) providing seed funding for the development of preliminary data in support of future grant applications to federal agencies and other external research sponsors. Preliminary data can significantly increase chances for success in the very competitive arena of external grant programs, giving evidence of the validity and feasibility of the proposed research. The first two years of RDA competition at ECU yielded approximately \$1.1 million in RDA funding and led to about \$4 million in additional, external research grants.

A new feature of the RDA program this year was the establishment of interdisciplinary RDAs with multiple principal investigators. Such awards enable faculty members from different departments to be recognized as PIs on collaborative, interdisciplinary projects, and to apply jointly for a higher level of RDA funding. Four of this year's awards are interdisciplinary.

Later this fall, the Division will announce formal guidelines and submission deadlines for the 2009-10 RDA competition. Inquiries regarding the RDA program may at any time be directed to Dr. Al Schreier at schreiera@ecu.edu.

This year's recipients:

- **Leslie K. Allison**, Asst. Prof., Physical Therapy: "Sources of abnormal sensory reweighting in fall-prone older adults."
- **Kori Brewer**, Asst. Prof., Emergency Medicine and Physiology — "Chronic pesticide exposure alters the endocannabinoid system & leads to insulin resistance."
- **Sloane C. Burke**, Asst. Prof., Health Education and Promotion — "Stress and depression coping behaviors among migrant and seasonal farmworkers in eastern North Carolina."
- **Moahad Dar**, Asst. Prof., Internal Medicine — "Gastric bypass surgery cures diabetes through improved insulin secretion: A search for possible mechanisms."
- **Kathryn L. Davis**, Assoc. Prof., Exercise and Sport Science,
Patricia Hodson, Clinical Assoc. Prof., Physical Therapy,
Guili Zhang, Asst. Prof., Curriculum and Instruction — "Motivate, adapt, and play (MAP): An engagement model of physical activity for students with intellectual disabilities."
- **Paul DeVita**, Professor, Exercise and Sport Science — "Positive and negative muscle work in young and old adults."
- **Brett Keiper**, Asst. Prof., Biochemistry and Molecular Biology — "Translational control of growth and apoptosis in the *C. elegans* ovary."
- **Barbara Kellam**, Assoc. Prof., Nursing — "Reduced high frequency sound among hospitalized preterm infants: Effect on improved growth."
- **Yong-qing Li**, Assoc. Prof., Physics — "Study of the mechanism of germination of bacillus spores via analysis of the dipicolinic acid (DPA) release from single spores using laser tweezers Raman spectroscopy."
- **Kwang Hun Lim**, Asst. Prof., Chemistry — "The NMR characterization of residual structure in amyloidogenic unfolded states of proteins."
- **Loren Limberis**, Asst. Prof., Engineering — "Development of a biohybrid DNA separation device featuring fast and linear separation with single base pair resolution."
- **Amy G. McMillan**, Asst. Prof., Physical Therapy — "Effects of residential camp plus year-long-centered followup on movement characteristics, activity, and participation in overweight adolescents."
- **Jeffrey Popke**, Assoc. Prof., Geography,
Rebecca Powers, Assoc. Prof., Sociology — "Employers and Hispanic/Latino workers in eastern North Carolina."
- **Evelio Rodriguez**, Asst. Prof., surgery, pediatrics — "Mitochondrial dysfunction in cardiac muscle of patients with mitral regurgitation and/or atrial fibrillation, and impact of surgical intervention on exercise capacity and mitochondrial function in skeletal muscle."
- **Nicholas Murray**, Assoc. Prof., Exercise and Sport Medicine
Carmen Russoniello, Assoc. Prof., Recreation and Leisure Studies — "A randomized, controlled study of biofeedback training and video games in reducing stress and improving mood in patients with Sickle Cell Disease."
- **Nancy Stephenson**, Assoc. Prof., Nursing — "Partner-delivered reflexology: Duration and effects on cancer pain and anxiety."
- **Gregory A Gagnon**, Assoc. Prof., Pathology and Laboratory Medicine,
John E. Wiley, Professor, Pediatrics-Genetics — "Optimization and elucidation of immune responses against leukemo/lymphogenic fusion proteins derived from chromosomal rearrangements via labeling with the alpha Gal tumor rejection antigen."
- **Lester A. Zeager**, Professor, Economics — "Tracking the Impact of Hurricanes on the Incomes and Labor Earnings of Poor and Near-Poor Households: Evidence from Longitudinal CPS Data."
- **Xiaoming Zeng**, Asst. Prof., Health Services and Information Management — "The Determination of Reasons and Solutions for Low Quality ICD-9-CM Coding in Cardiovascular Cases: A Quantitative Approach."

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Checking in on TechMath

Almost two years ago, the "TechMath: Real-World Math, Technology, and Business Connections" program was introduced as a three-year initiative to link businesses and higher education with underserved high school students and teachers across rural eastern North Carolina. Now, two years later, and with the encouragement and support of the National Science Foundation, this program is seeking to extend its time frame for one more year, totaling four years of work with these students instead of three.

The focus of the program has been to bring practical, real-world mathematics and science examples to the classroom, allowing students to become more engaged with and aware of science, technology, engineering, and mathematics careers. Local businesses pair up with teacher and student participants, both in and out of the classroom, to build teaching modules designed to provide other students with a better understanding of how science, and the math behind the science, is applied in local business. For example, teachers and students visiting Halifax Electric were shown how mathematics and business decisions work hand-in-hand to provide just the right amount of coal ensuring a smooth flow of energy and a reasonable profit margin. Teachers and students observed how ordering too much or too little coal could create an imbalance, resulting in a decline of energy output, affecting local customers and risking a loss of profitability and of jobs. Real-world examples such as this have allowed participating students to observe first-hand that basic knowledge of math and science is an essential skill in the real world and that this knowledge is directly linked to their potential working lives—whether they acquire those skills through a technical career, community college, or university education. That recognition in itself represents a success.

Any university employee interested in nominating a local teacher for participation in this program should contact Ernest Marshburn, Office of the Vice Chancellor for Research and Graduate Studies, at (252) 328-9014, or at marshburne@ecu.edu. Application review for Cohort 3 of the TechMath program began on September 12 and will continue until all seats are filled.

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For one thing, despite the fear that many people feel towards spiders, these creatures are actually quite important to human health and quality of life. Spiders consume anywhere from 40 to 250 kg of insect biomass per hectare per year. Without them, we might be overrun by insects. Beyond that, Bond cites the example of the colony collapse disorder in honey bees as a more accessible approach to explaining the importance of guarding biodiversity. While the cause of the colony collapse disorder is not yet fully understood, our agricultural system may hang in the balance owing to the increasing scarcity of pollinators. Research in biodiversity might offer solutions to this growing concern, and to a host of problems not yet imagined. Jason Bond won't mind if you find his study subjects creepy, or his TV appearances funny, if he can discover something useful to humanity along the way.

Grant Opportunities from the North Carolina Biotechnology Center

Listed below are some of the grant opportunities now available through the North Carolina Biotechnology Center. Note that some of the programs feature hard deadlines, while others have rolling deadlines. For assistance or further information, contact John Chaffee at the Center: John_Chaffee@ncbiotech.org.

Programs with Hard Deadlines

Biotechnology Research Grants — pre-proposal deadline: Wednesday, 1 October 2008, noon
http://www.ncbiotech.org/services_and_programs/grants_and_loans/biotech_research.html

These grants support individual investigators at universities and non-profit institutions. Note that pre-proposals are required.

Programs with Rolling Deadlines

Biotechnology Event Sponsorship — http://www.ncbiotech.org/services_and_programs/grants_and_loans/biotechnology_event_sponsorship/index.html

This popular program, which awards up to \$3,000, promotes and supports events advancing the understanding or application of biotechnology to benefit North Carolina.

Biotechnology Meeting Grants — http://www.ncbiotech.org/services_and_programs/grants_and_loans/BiotechnologyMeetingGrant.html

This grant promotes and supports national and international meetings which advance the understanding or application of biotechnology and focus national and international attention on the North Carolina scientific community. Events must promote information sharing and personal interaction focused on biotechnology-related research, education, or business.

Oliver Smithies Faculty Recruitment Grants — http://www.ncbiotech.org/services_and_programs/grants_and_loans/faculty_recruitment/index.html

These grants are intended to assist with the recruitment of top scientific talent to regional universities. Applicants must hold positions of associate professor or higher.

Business Loans — http://www.ncbiotech.org/services_and_programs/grants_and_loans/business_loans.html

All NCBC Business Loans are available on a rolling basis; see the web site for further information.