

Environmental News

The Department of Environmental Sciences

Volume 2, Issue 1

Fall 2008



Pictured: Hui Liu



Pictured: Isabel Gray

DES Water Resources Program Expands and Obropta Receives Tenure

Since joining DES in 2002, Dr. Christopher Obropta has built the nine-member Water Resources Team of scientists, engineers, and educators into a major force that is working to protect NJ's water ways. The team has developed regional stormwater management plans and cutting-edge computer watershed models. They have designed, tested, and implemented stormwater Best Management Practices (BMPs), and worked with municipalities and non-governmental organizations (NGOs) on watershed protection and restoration planning. Dr. Obropta has joined with local officials to establish "Research Watersheds," whose function is to integrate research, education, and extension outreach activities. The synergistic effect of integrating these three components within a watershed has the potential to make a real difference in the quality of life for residents of the watershed.

The Water Resources Group works very hard to provide hands-on educational experiences. Participants in their programs include local high school students, as well as Rutgers undergraduate and graduate students. Since joining DES, Dr. Obropta's lab has trained six Masters and three PhD candidates. He has also completed a USEPA-funded water quality trading program and secured funding from the State of NJ to support five new Environmental County Agents, a pilot program that will commence in fall 2008. As a result of his innovative programs, successful fund raising, research and scholarship, in April 2008 Dr. Obropta was awarded tenure in DES.



Pictured: Dr. Chris Obropta building a Rain Garden

Dr. Robert Tate New DES Chair; Dr. Lily Young Dean of International

Dr. Lily Young has been appointed the first SEBS Dean of International Programs & Research, and so steps down as Chair of DES, a position she has held for the last seven years. During this time, DES has added faculty, strengthened the curriculum, increased student enrollment, and expanded research. Dr. Young's new responsibilities will focus on organizing the many international collaborations that already exist in SEBS, and developing programs for undergraduate and graduate students to incorporate study abroad. Research and education opportunities already exist, and can be enhanced in many parts of the world, including China, South America, Africa, Eastern Europe, and southeast Asia.

Dr. Robert Tate assumed the DES Chairmanship on September 1. This is Bob's second term as Chairman of DES. He notes that DES has experienced exceptional growth, and is a very strong department with new positions to fill, an influence of young faculty, and strong external support. Our three unique programs (meteorology, bioengineering, and environmental science) serve not only majors and non-majors at SEBS, and also introduce these disciplines to the general RU audience. Bob has worked with Lily as the DES Associate Chair for the last seven years. He says his door is always open for both students and alumni. Bob will retain his editorship of Soil Science and has pledged to continue to his ballroom dancing competitions with Mrs. Tate.

Research Excellence Award

Dr. Gedi Mainelis (pictured right with Dr. Mark Robson) was honored at the Annual SEBS/ NJAES Dinner, where he received the Research Excellence Award. Gedi's area of expertise is biological aerosols. His Federally-funded research is developing new tools, and validating existing methods, to measure and monitor airborne biological pollutants. Dr. Mainelis' work is critically important in an age of bioterrorism, and his analytical methods will facilitate rapid response to bioterrorism attacks. Gedi's research group has been developing a sampler (inspired by a Lotus flower) that can collect airborne bioagents and concentrate them into tiny droplets that can then analyzed by a "laboratory-on-a-chip." Working in the exciting realm of micro scales, Dr. Mainelis is collaborating with lung cancer researchers in the Rutgers School of Pharmacy to develop a system to deliver airborne nanoparticle pharmaceuticals directly into the lungs of cancer patients. He is also researching the effects on consumers of the ubiquitous nanoparticles that are now appearing in consumer products ranging from clothing to sprays to cosmetic powders.

Airborne contaminants such as the bacteria and fungi can plague allergy sufferers and contribute to serious health problems such as asthma. To improve the monitoring of youngsters' response to airborne pollutants, Dr. Mainelis and colleagues at UMDNJ are creating robotic technology (a prototype was based on LEGOs) that mimics the active movements of children. Using robotic technology, the researchers showed that commonly employed stationary monitoring techniques were understating the exposure of actively mobile children by almost 50 percent. Robotic technology seems to be a more accurate method to measure human exposure to pollutants, and the researchers are now building an advanced robot that will expand the scope of this work.

Climate Research – "Jersey Roots, Global Reach"

The Rutgers Climate and Environmental Change Initiative (CECI) is co-led by DES faculty member Dr. Anthony Broccoli. Tony believes that dealing with climate change involves more than developing alternative energy sources – we must also plan to cope with the climate changes that will inevitably occur as a result of the CO₂ that has already been released into the global ecosystem. Dr. Broccoli believes CECI plays a critical role in providing information and research that will also accurately anticipate local and regional climate changes. He emphasizes the need for the U.S. to be the leader in developing strategies for reducing carbon footprints and coping with the adverse effect of climate change. Tony is confident that DES graduates are sophisticated enough to understand these questions and challenges, and that they will participate in finding solutions to these global problems.

Mark Miller Joins DES

Dr. Mark Miller (pictured middle right) became a member of the DES faculty in October 2007. Trained as a physicist, during his research as a graduate student Dr. Miller became interested in the impact of clouds on the climate system and their role in climate change. His 15-year research effort is focused on improved understanding of the complex feedback loops that exist between clouds and the climate system, and the accurate representation of these processes in Global Climate Models. Mark is working with the Department of Energy to obtain data from stationary and mobile sensors placed at multiple global locations. He focuses on regions of the globe that are most susceptible to climate changes associated with changes in the cloud structure, and regions that are relatively under-sampled, and therefore, not well understood. He is passionate when describing the changes that are now being documented in these susceptible ecosystems.

Dr. Miller is deeply concerned about recent observed changes in the global climate system that are a consequence of greenhouse gas accumulation and the uncertainties



in our ability to project the consequences of further accumulation. He believes that deeper understanding of the climate system is the key to formulating a responsible global energy policy, but that time is of the essence. We are facing not only academic questions, but practical concerns about the worldwide socio-economic consequences of climate change. Mark is committed to training the next generation of atmospheric physicists capable of resolving the many cloud physics questions that still remain.

DES Pioneers Microbial Source Tracking (MST)

Coliform bacterial contamination threatens human health through pollution of food and water supplies. Current methods of water testing require time to allow bacterial colonies to grow, and once the bacteria are cultured, the contamination source is still unknown.

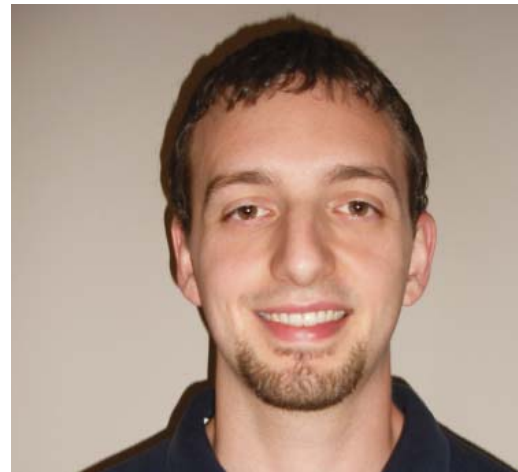
DES microbiologist Dr. Craig Phelps is working with Dr. Chris Obropta's Water Resources Team to develop molecular tools that will identify and track the source of coliform bacteria contributing to water pollution. The basic premise of this research is that animals harbor bacteria in their digestive systems that help to break down their food. Some of these bacteria, such as *Escherichia coli* (E. Coli) are found in other animals. However, the associated bacterial groups in humans differ genetically from associated bacteria found in other animals. Using DNA primers, which react to the various bacterial species, a sample can be analyzed molecularly, and this genetic analysis can indicate the animal species where the bacteria originated.

Dr. Phelps is working with "human-," "cow-," and "bird-only" microbial groups to identify the bacterial sources in Dr. Obropta's water samples. Craig is also working to identify a "horse-only" bacterial group. Based on the successful outcome of this research, water quality impairments can be corrected by targeting the specific contamination source(s), and lessen the human health risks due to E. coli contamination. This DES team is in the forefront of bringing 21st century molecular analytical methods into use throughout NJ to improve and protect the State's drinking water supplies.

To view a You Tube video of Dr. Phelps's environmental microbiology students studying methane gas production in Passion Puddle see:
youtube.com/watch?v=e2gzh35hce.

Alumni News - Kevin Finneran, DES (1996)

Dr. Kevin Finneran (pictured left) credits experiences at Cook College, and the faculty who advised and supported him here, with starting him on a career path that has now lead to a faculty appointment in the Department of Civil and Environmental Engineering at the University of Illinois. Kevin first became interested in bioremediation when he was placed at USEPA in Edison, NJ for his Cook College intern Co-Op experience. Upon graduation from Cook (1996) Kevin began graduate work in the lab of Dr. Derek Lovley at U Mass, Amherst. After earning his PhD (2001), Kevin took a position in the Boston office of GeoSyntec Consultants. Three years later, he decided to return to academia, and applied for a position in the microbiology department at Illinois University. Kevin thinks it was pure luck that his CV was sent over to the Department of Engineering, where he was hired, and where he now works on bioremediation and bioenergy research. The highly diverse and interdisciplinary Illinois engineering department reminds Kevin of the diversity he experienced while at DES. Kevin says it was only after he left NJ that he realized what a wonderful place it was to grow up, and what a great undergraduate education he received at Rutgers. We hope the next time Kevin is back in NJ visiting friends and family, he will come to Rutgers and talk about his microbial remediation research.

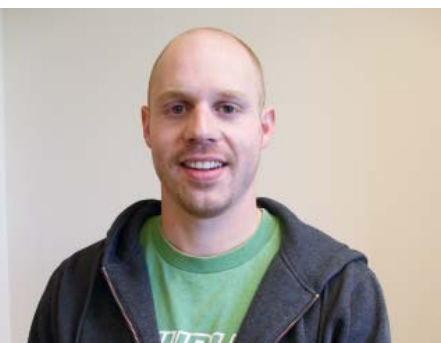


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Pictured: Rob Eklund, Melvin Finstein Awardee.



Pictured: David Babson (Bioengineering Graduate Student) and Daniel Stanton (Class of 2008).



Pictured: Yevgen Nazarenko, Fulbright Scholarship Graduate Student

DES Program #6 in the County - Students Win Awards

The Chronicle of Higher Education has ranked Rutgers DES Environmental Sciences Program #6 in the US, and the DES Atmospheric Science Program #5 in Faculty Scholarly Productivity. Our graduate students are also winning awards for their research.

Yevgen Nazarenko, working with Gedi Mainelis, is the first Fulbright Scholarship awardee from the Ukraine. When awarded his Fulbright, Yevgen picked Rutgers because it had the best Environmental Sciences Program. Yevgen has been studying environmental science since he mastered environmental chemistry in high school. He also received the Air & Waste Management Association grant (APERG) for his study of the effect of nanoaerosoles on airborne microorganisms.

Working in Chris Obropta's lab, PhD candidate Steven Yergeau (pictured bottom of page 3) was awarded the NJ Water Environmental Association (NJWEA) for his ecosystem-scale research. Steve modeled surface and ground water movements within a 350-acre freshwater wetland before and after restoration activities.

Undergraduate DES 2008 awards were presented to Rob Eklund and Erin Mayfield (Melvin S. Finstein Award), Taylor Hays and Mary Moore (Meteorology Award), and Chris Thiel and Kathleen Kang (Bioengineering Award) (pictured page 3). Rob plans to attend graduate school after working for a year. He spent the summer constructing 1200' high antenna towers. Chris received an environmental science degree (Class of 2005), and after working as an environmental consultant, returned to earn his environmental engineering degree. Chris also met his wife at Rutgers (Megan Fisher, Class of 2003). He is now beginning his job search.

Kathleen Kang (pictured page 3 top) always knew she would come to Rutgers for bioengineering; she will begin the graduate mechanical engineering program at Stanford this fall. In addition to her coursework, Kathleen was Captain of the Technique Dance team that performs at student shows and hip hop competitions. We wish all our Class of 2008 Graduates good luck in the next phase of their careers.

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