THE UNIVERSITY OF MICHIGAN
DEPARTMENT OF ECOLOGY AND EVOLUTIONARY BIOLOGY

NATURAL SELECTIONS

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ECSS 2010: experimental evolution

The Early Career Scientists Symposium featured seven outstanding young scientists who are working on this year's topic of experimental evolution. Dr. Richard E. Lenski of Michigan State University was the plenary speaker. The symposium, which began in 2004, was created as an outlet for scientists just beginning their careers – from students completing their doctoral degrees to budding assistant professors, to highlight their work in an international forum.

Experimental evolution is a growing discipline that involves the direct observation of evolving populations in order to study fundamental evolutionary mechanisms. This approach is undergoing a renaissance due to recent and rapid advances in computing and DNA sequencing. Thus a window has opened to observe the precise mutations and phenotypes that are relevant in the adaptation of captive populations. The fundamental utility of the experimental evolution approach is a full time series of population snapshots.

Using replication, frozen ancestors or digital organisms, we can truly replay the tape of life to study the mode, tempo, and contingency of allele substitutions as well as more complex phenomenon such as communication, learning, and species interactions. This year's speakers

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From diversity springs creativity, excellence

"Whenever you're trying to create excellence as an organization, a more diverse pool of participants makes it more likely that you're going to create an excellent situation," said Professor John Vandermeer. He explained that there is abundant literature supporting this notion and that partly as a result of these findings, universities around the country are trying to achieve greater balance, especially in regard to attracting more females to participate in the sciences.

The same idea of excellence deriving from diversity can be considered in terms of people's ethnic and racial backgrounds. "We see that in the field of ecology and evolutionary biology, we are lily white with far too few African Americans in the field, some more Hispanics but not that many, and very few Native Americans," said Vandermeer. EEB has several initiatives that seek to increase diversity: a new Research Experience for Undergraduates Program, a Bridging Program, and the Frontiers Master's Program.

The metaphor of a "leaky pipeline" applies well to the underrepresentation of women in EEB, although less so to underrepresentation by race and ethnicity. Whereas many females tend to "leak" out of the field after receiving their Ph.D.s, many minorities and

Mark Hunter and Mairin Balisi

other underrepresented populations, especially from poor urban areas, don't even enter the pipeline toward an EEB program. The EEB Diversity Committee developed an idea for a different kind of Research Experience for Undergraduates (REU) program to see if it could help to funnel a greater diversity of students into the EEB pipeline. REUs are

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LECTURERS: EEB's strong foundation

Lecturers are an essential part of the teaching mission in the Department of Ecology and Evolutionary Biology at the University of Michigan. "We have a superb set of individuals who are completely dedicated to undergraduate education and who also have experience and expertise in the science of how to teach and how to help students learn more effectively," said Professor and Chair Deborah Goldberg. In addition to their own classroom teaching,

EEB's lecturers help tenured track faculty teach more effectively and assess how well students are learning in other classes. Lecturers play important roles in coordinating large courses, running discussion and lab sections, and in concentration advising.

Now, brace yourself for a lightning round of introductions to our four outstanding lecturers.

see lecturers, page 4

chair's notes

Deborah E. Goldberg
Elzada U. Clover Collegiate Professor and Chair, Ecology and Evolutionary Biology

Dear Friends,

We have had a very exciting winter and spring as we finalized preparations and then hosted a joint external review of EEB, the Museum of Zoology, and the Herbarium. The most recent review was in 2000 and resulted in the recommendation that the Department of Biology split into what became EEB and the Department of Molecular, Cellular, and Developmental Biology. We were therefore well aware that external reviews could produce momentous changes! Consequently, the faculty and staff of the department and museums invested substantial effort over the past year gathering data about our current status and in intensive discussions about our future priorities. We prepared a (voluminous!) self-study and new five-year plans to provide background for both the LSA Dean's Office and a very distinguished external review committee of faculty from our peer institutions. In March, that committee spent a packed two days visiting the department and museum units, including meetings with undergraduates, graduate students, postdocs, faculty, and administrators, and then sent a written report to the Dean's Office with their evaluation and recommendations.

We were pleased to see a very positive report by the external review committee overall, with strong praise for our academic programs (although they did point out that we are badly in need of new facilities: the Kraus Natural Science Building is beautiful, but nearly 100-year old buildings are not ideal for modern biology!) The review also challenged us to further integrate the exciting individual research across the department and the museum units to develop a more comprehensive program in evolutionary biology that would take fuller advantage of the world-class research collections in the Museum of Zoology and Herbarium. The faculty is eager to move forward to meet this challenge and we will have much to tell you about new initiatives over the next year.

In the meantime, we use this newsletter to highlight two important aspects of the department that don't always receive the attention they deserve. First, we profile each of our wonderful lecturers: Drs. Marc Ammerlaan, Lynn Carpenter, Laura Eidietis, and Jo Kurdziel. Drs. Ammerlaan and Kurdziel have been an important part of the department for years, while Drs. Eidietis and Carpenter have recently joined the faculty. Collectively, these dedicated and talented teachers play crucial roles in the biology and EEB curriculum. Not only do they teach their own classes in their areas of expertise, but they are heavily involved in developing the lectures, laboratories, and discussions for the introductory biology sequence, are responsible for training and mentoring Graduate Student Instructors, and help with concentration advising. Drs. Eidietis and Kurdziel also conduct research in science pedagogy and are using this expertise to assess how well students meet the learning goals in EEB courses and to develop ways to improve learning. I hope you enjoy learning more about each of them.

Second, the cover story of this issue describes some departmental programs aimed at increasing the human diversity of the disciplines of ecology and evolutionary biology; we will be highlighting other efforts in future issues. Biologists know full well the importance of diversity and variation for ecological function and evolution and social science research has made it clear that diversity of perspectives, background, and knowledge also increase creativity in joint problem solving. Yet we have a long way to go before our disciplines are truly representative of the U.S. population. The ED-QUEST REU program, the Bridging Program for recruiting, and the Frontiers Master's Program will help move us toward this goal.

Finally, some bittersweet news: Professor Beverly Rathcke is retiring after being on the faculty for over 30 years. Beverly has been particularly important to generations of graduate students in the department for her amazing combination of intellectually rigorous mentorship and warmly encouraging support. The bad news is that we will miss her, but the good news is that she is enjoying her retirement immensely, including catching up with students and colleagues, as well as traveling the globe.

My warmest regards to all of you and I hope to see you in Ann Arbor,

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diversity feature

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programs funded by the National Science Foundation to support undergraduate research during the summer.

"All of us tend to get entrenched in our habits, and get blinkered in our views of life, and the greater diversity of people who are attacking the problem, the greater diversity of ideas you will get to solve that problem," said Professor Mark Hunter, director of the Frontiers Master's Program, which seeks to increase the number of underrepresented minorities in EEB's master's program.

Professor Scott Page, director for the Center for the Study of Complex Systems, who has researched how diversity in groups leads to better decision making and greater creativity, said, "Variation is crucial to success in organizations as well as species. The logic doesn't align perfectly – what's good for salamanders isn't necessarily good for General Motors – but it's close."

The Diversity Committee (Vandermeer, Professor Patricia Wittkopp, Dr. Josepha Kurdziel, and graduate students Jasmine Crumsey and Senay Yitbarek) believes that students interested in the sciences are diverted into medical school early, so they never even consider EEB when they apply to college. The program will concentrate on recruiting from historically black colleges, Hispanic and Native American colleges in the U.S., as well as underprivileged white students.

"Variation is crucial to success in organizations as well as species. The logic doesn't align perfectly – what's good for salamanders isn't necessarily good for General Motors – but it's close."

The REU will target first and second year undergraduate students, particularly students who have an interest in biology, to show them that there's more than one way to pursue their interest.

The committee received funding of $265,000 for two years from the National Science Foundation to develop the REU program. EEB's goal is to have its first cohort of 10 students by winter 2011. The students, who will likely be from colleges and universities scattered around the country, will initially connect with each other and their faculty or graduate student mentors through cyberspace using social media.

Students will spend two weeks in Ann Arbor in early summer to attend a series of workshops and develop an action plan for their research with their mentors. Depending on the project, they could spend their summer working as nearby as a lab at U-M to as far as field sites in Mexico or Panama. Upon project completion, students return to Ann Arbor for a week in August to write about their results and present their findings at a symposium.

Another EEB diversity initiative is the Bridging Program for recruiting new graduate students, originally funded by the National Center for Institutional Diversity at U-M. The Bridging Program partners with Howard University, Morehouse University, Spelman College, and the University of Puerto Rico to bring two to three students from each school to visit the department annually. They spend time in labs and attend the Field Ecology course, which is taught on the weekends by Vandermeer and School of Natural Resources and Environment Professor Ivette Perfecto. This year, two of the students admitted to EEB's Frontiers Master's Program came from the Bridging Program.

Senay Yitbarek and John Vandermeer

The Frontiers Master's Program was developed three years ago because, like other programs in EEB, the master's program had not been successful in recruiting minority students. "Underrepresented minorities are missing at all levels from master's to Ph.D., in academia, and in the workforce as well," said Hunter.

Frontiers is a two-year, fully funded program. "I think that's really helped us attract students we might not have otherwise."

Current funding for the program requires that students work as graduate student instructors to help pay tuition. Hunter's ideal would be that each student would have an endowed fellowship for two years. This would reduce the stress on new students who are learning about graduate school and research for the first time.

Students spend their first summer at the U-M Biological Station working with a mentor on

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lecturer profiles

Jo Kurdziel

lecturer/assistant research scientist

Jo Kurdziel

back when - "I was always one of those kids fascinated with the outdoors, plants and frogs. I was interested in biology but I wasn't sure what I was going to do with it. When I was really young, I liked figuring out what caused certain organisms to die. I find life interesting, so I think that what causes it to end is also interesting."

As Kurdziel became increasingly interested in ecology, she decided to focus on understanding the interactions between species.

pre-U-M - NSF postdoctoral fellowship in science education at University of Arizona, Tucson; Ph.D. in ecology and evolutionary biology, State University of New York at Stony Brook.

passions - "I like my interactions with students. It's really fun when they come to office hours and you can tell something they just heard sparked their curiosity. Or sometimes they come back years later to talk about something they learned in the course. With 600 to 700 students, they don't all come to office hours, or to talk after class, but sometimes I hear from them years later and it's great to find out what really excited them about the class."

Kurdziel is interested in invertebrates. Many students think they're more interested in humans than other species, Kurdziel said, but she challenges them to open their minds about the processes that cause different species to exist, and why other species have gone extinct.

Marc Ammerlaan

"I think every kid at some point is a scientist, asking why or how or what, and the job of teachers in general should be to encourage enthusiasm in students."

new grant - U-M's IDEA Institute is funding Kurdziel's project "Injecting assessment in the introductory biology curriculum to improve student learning and teaching." The IDEA Institute is a collaboration between LSA's natural science departments and the U-M School of Education. Its mandate is to improve science education at all levels, including teacher training and collecting data on student learning. Kurdziel has been awarded a $100,000 grant for three years to develop a collaborative team to assess the new introductory biology sequence. The team will have preliminary results by the end of winter term 2011.

Marc Ammerlaan

lecturer

on learning - "I think every kid at some point is a scientist, asking why or how or what, and the job of teachers in general should be to encourage enthusiasm in students. It's an indictment if we're turning kids off or forcing them to jump through hoops. It should be exciting or different. There shouldn't be too many rules in learning in general, never mind in science. We have to keep things safe, but if kids want to try something we should run and get the equipment and turn them loose on it."

pre-U-M - Lecturer at University of Texas at Austin; Ph.D. in microbiology, University of Texas, Austin.

passions - "There is nothing better than seeing a student light up with understanding about something. If you can explain something and then all of a sudden they say 'I see,' and even more so, they can see why it was important enough for you to lecture on, that's good.

"I have a nine-year-old son, Blake, who keeps me busy. I'm really beginning to believe this genetics thing. I'm not going to tell you my quirks and bad habits but somehow he has the same ones.

"I liked biology because it seemed to me that there were big broad questions that weren't answered yet. I pestered my poor high school teacher: 'Why does this work?' Or 'what does that mean?' I couldn't get answers to those questions and I took classes till I got answers. Biology was at that exciting point of exploding in its ability to ask and answer ever more questions."

new fellowship - Awarded the Teagle Fellowship for the 2009-10 academic year to examine the way students learn, funded by a grant through the U-M Center for Research and Learning on Teaching. Fellowship recipients include five instructors from the sciences, and five from humanities and social sciences. They meet to read papers, comment, hear speakers and trade perspectives, with a particular focus this year on multiculturalism and diversity. He finds it invigorating and rejuvenating to connect with faculty from across campus to share ideas, especially about how to reach students and learn new ways to present challenging, stimulating material to them.

lecturer profiles

Lynn Carpenter

lecturer/advisor

sparks - "I was a zoology major as an undergrad. I went to grad school and took an evolutionary biology course and from then on I knew exactly what type of science I wanted to work in. It was the first thing that I really loved."

During a physics exam as an undergraduate at Eastern Illinois University, Carpenter's professor noticed her struggling. She was amazed that her professor took the time to turn the question around in her head to help her through it. "I thought, 'Wow, she cares more about what I understand than just the grade.' That's when I realized I wanted to be a teacher."

serendipity - Carpenter had reached a point in her thesis work at the University of Illinois where she was burned out and about ready to quit. "For some weird reason, I walked into a coffee shop that I never used to visit." She sat there trying to work on her thesis, when her former physics professor walked in. "In a completely different town, in a completely different time, she came into that coffee shop and I just about fell over!" Their talk gave her a whole new perspective and the motivation to complete her thesis.

turnabout - Carpenter used to be a waterfowl research biologist. "I chased ducks for a living. I would come home tired and kind of grumpy." She liked her job but it wasn't what she loved. To supplement her income, she got a job tutoring. After a long day at work, she'd teach for three hours and come home in the best mood. One day she realized that she could reverse the balance and spend most of her time teaching, with a little research on the side.

pre-U-M - Postdoctoral research associate, biological sciences, University of Notre Dame; Ph.D. in EEB, University of Illinois.

passions - "I get the most satisfaction helping students who are not sure what to do with their lives. I was really lost at that stage and so when I see students come in, I can often recognize that."

new grant - Carpenter received a 2009 Teaching with Technology Institute grant of $2,500 from the U-M Center for Research on Learning and Teaching. Her students are developing podcasts about the displays at the Exhibit Museum of Natural History. The podcasts will be on the museum website (for virtual visits) and with on-site digital players.

Laura Eidietis

lecturer

background - assistant professor, Hunter College, City University of New York; assistant professor, Eastern Michigan University; Ph.D. in biology, University of Michigan.

alumna - When looking into graduate schools, Professor Paul Webb's work on biomechanics and physiological ecology caught Eidietis' eye. "He sent me back a two-page personalized letter, as opposed to most grad schools that sent me a one-page standard letter with a little note at the end.

"I ended up here, working really hard on learning how fish swim. My dissertation was on functional morphology and biomechanics of tadpoles."

teaching about teaching - After graduate school, Eidietis taught biology for elementary teachers and biology pedagogy for secondary teachers at Eastern Michigan University. She moved out east and worked in science education at Hunter College, CUNY.

behind the scenes - Beginning in fall 2009, Eidietis had traveled full-circle back to U-M. The lecturer spends most of her time coordinating Introductory Biology: Ecology and Evolution. She handles registration, develops and standardizes discussion sections, organizes and helps the graduate student instructors, and coordinates graduate student mentors for the Program in Biology.

Eidietis secures multiple rooms for the tests and ensures the right numbers of tests are in the right place at the right time. "It's kind of like throwing a big party for a bunch of people who don't want to go," she joked. "When you have 750 students, you name the different conflicts and illnesses and you'll have it."

She is developing an integrated math and biology summer course for a new NSF grant-funded Biology Academy to help incoming students who may need some extra academic support in order to succeed.

passions - "I'm really happy to be teaching biology." Eidietis teaches two Honors discussion sections. She enjoys these challenging and fun interactions with the students.

On the home front, Eidietis and her husband, Andrew, are newly minted parents to Callie Rose, born February 4, 2010.

Lynn Carpenter

Laura Eidietis

alumnus profile

Tilman wins prizes for biology and environmental science

"A recent event caused me to think back to my days at Michigan (1967-1976), and to how great an impact the many people of EEB (then Zoology) have had on my life and career," wrote G. David Tilman, Ph.D., Zoology, University of Michigan, 1976. "I owe great thanks and a deep debt to John Vandermeer, Steve Hubbell, Nelson Hairston, Bill Dawson, Julian Adams and, of course, Peter and Susan Kilham as well as many, many others. The event was a ceremony in Japan in which the Emperor honored me with receipt of the International Prize for Biology."

Tilman receiving International Prize for Biology

His acceptance speech included the following: "When I started my studies at the University of Michigan, I studied physics, imagining it to be the only branch of science in which I could combine my interests in experimentation and mathematics. Then two new faculty members, Drs. Stephen Hubbell and John Vandermeer, introduced me to their vision of ecology becoming a mechanistic and predictive science. I had found the profession to which I have dedicated my life."

Since his days as a graduate student, he said, "I have been fortunate to collaborate with many other faculty, graduate students and postdoctoral researchers. This award honors all of these individuals."

Tilman, Regents Professor of the University of Minnesota, Department of Ecology, Evolution, and Behavior, McKnight Presidential Chair in Ecology, and Director of the University's Cedar Creek Ecosystem Science Reserve, won the 24th International Prize for Biology in 2008. Awarded annually to an individual who has made an outstanding contribution to the advancement of basic research in a field of biology, the recipient receives a medal and 10 million yen (equivalent to over $108,000 US dollars), and an imperial gift from Emperor Akihito of Japan. This fall, Tilman will receive the international Heineken Prize for Environmental Sciences from The Royal Netherlands Academy of Arts and Sciences. This highly acclaimed honor carries a $150,000 prize.

Tilman's singularly outstanding work at the University of Minnesota has been a major influence in ecology and related fields, both in terms of theory and in long-term field experiments, on the causes, consequences and conservation of Earth's biodiversity, and on how managed and natural ecosystems can sustainably meet human needs for food, energy and ecosystem services.

In a recent series of papers founded on ecological theory and his own research, Tilman has offered many thought-provoking insights into sustainable agriculture and biofuel production. With humanity facing an ever-deepening environmental crisis, Tilman's research achievements have contributed greatly to the renewal and development of ecology and related disciplines.

Tilman has dedicated much of his career to communicating with the public, politicians and the managers of Earth's ecosystems so that they might be better informed about environmental science and its relevance to society and to sustaining, for the long-term, the quality of human life on Earth.

E-news coming to an inbox near you this fall!

Beginning with the fall issue, you will receive an electronic version of Natural Selections if U-M has your email address or by subscribing at the page link below. You'll be helping to save precious natural resources and postage and your e-newsletter will contain links to further information and full color photos!

Don't fret if you don't have an email account, we will continue to mail your paper version of Natural Selections for now. You can unsubscribe at any time. See you in your inbox (or mailbox) soon!

www.lsa.umich.edu/eeb/alumni/directory.html

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encompassed a wide range of topics, tackling age-old questions in evolution with the latest technology, such as programming robots and next-generation DNA sequencing.

A record 177 people registered for the event from different universities around the globe and various fields of study.

ECSS organizing committee

(*committee italicized,* **speakers bold**):

(back row, left to right): *Timothy James*, **Levi Morran**, **Sijmen Schoustra, William Harcombe**

(middle row): Alex Kondrashov, **Jenna Gallie, Bjørn Østman, Sara Mitri**

(front row): Amanda Izzo, **Aimee Dunlap, Richard Lenski**

Not pictured: *Zhi Wang*

faculty profile

Professor Emerita Rathcke

After a remarkable 32 years at the University of Michigan, Professor Beverly J. Rathcke retired May 31, 2010.

Rathcke was the first woman hired in ecology in the U-M's College of Literature, Science, and the Arts in 1978, when hiring a woman was not very common. She came to the University of Michigan as an assistant professor.

Rathcke did research in community ecology and plant-animal interactions. Her early research challenged prevailing competition theory, and she was among the first to use random (null) models to test competition hypotheses. She also made major contributions to our understanding of how environmental changes (habitat fragmentation, introduced species, hurricanes) affect pollinators and plant pollination and reproduction. Recently, she determined that some, but not all, populations of white mangrove exhibit androdioecy, an extremely rare mating system where populations have male plants and hermaphroditic plants. She is studying how pollinator behavior and life history may determine the persistence and frequency of males in populations in the Bahamas, Florida and Mexico.

Rathcke was especially dedicated to graduate education, serving as the major professor for 29 Ph.D. students and on more than 50 dissertation committees. In 2008, she was awarded the Rackham Distinguished Graduate Mentoring Award and she was part of the team that won the U-M Distinguished Diversity Leaders Award for her work on the Frontiers Master's Program. She started a seminar on women in science in 1985. Rathcke taught undergraduate ecology courses and a graduate seminar on plant/animal interactions, one of the most popular departmental graduate seminars for years.

Beverly J. Rathcke

She served on more than her share of departmental committees, including numerous years as chair of the graduate affairs and graduate admissions committees, and as the inaugural associate chair for graduate studies in EEB. Rathcke is a role model for women in science, and a champion for the development of individuals interested in careers in science.

"Beverly's commitment to rigor in research and graduate student training is legendary, as is her wonderful collegiality and willingness to help make things happen in the department," said Professor and EEB Chair Deborah Goldberg. "We will miss her terribly!"

diversity, from page 3

a research project before beginning classes. "It's great fun, building an identity for the cohort, and providing an introduction to field-based science," Hunter said. He runs a career development workshop, which introduces students to designing research projects, analyzing data, presenting results, and how to succeed in graduate school.

"As a result of the program, we've greatly increased our recruitment of African American, Hispanic, and Pacific Island students into our EEB program," he said. "We've been remarkably successful in recruiting and retaining students."

The Frontiers Master's Program has won the University of Michigan's Diversity Leaders Team Award and Hunter and Vandermeer have both received the Imes and Moore award, which recognizes exceptional contributions toward recruiting and mentoring graduate students to the sciences from disadvantaged and non-traditional backgrounds.

EEB's funding priorities

Frontiers Master's Program
Developed in 2007 to increase the diversity of graduate students, and ultimately the diversity of the workforce, in ecology and evolutionary biology.
• Cost: $120,000 to support eight students in the program per year.

EEB graduate student support
For fellowships and research support (especially travel). • $59 will sponsor a student at the U-M BioStation retreat • $350 sponsors a student's annual travel and research stipend • $500 sponsors an annual Outstanding Graduate Student Paper Award.

New: Wedgewood Scholarship Fund
Generously established by a 1961 zoology alumnus to help undergraduates who wouldn't otherwise have the opportunity to gain invaluable research and study experiences abroad. Donations of all sizes are welcome.

President's Challenge for The Student Global Experience
Provides a 1:2 match for endowments of $25,000 - $500,000 for students studying abroad, available until Dec. 31, 2010 or until matching funds are depleted.

Full descriptions of these and other giving opportunities can be viewed on our website: ***http://www.lsa.umich.edu/eeb/alumni/giving.html***

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Prized photographs: EEB Photo Contest winners

First place: David Marvin, "CO2 chambers at night," U-M Biological Station, Pellston, Michigan.

Nearly 80 incredible images from around the block and around the world were submitted. The annual contest winner receives the honorary title for the year of Photographer at Large in memory of David J. Bay.

Tied for second place: Paul Dunlap, "Tridacna," Ishigaki-shima, Okinawa, Japan.

Tied for second place: Susanna Messinger, "Sunset tent," Simpson Springs, Utah.