ECOGEN
ECOLOGICAL GENOMICS INSTITUTE
Kansas State University

EGI Newsletter

Winter 2015

IN THIS ISSUE

Graduate Student to attend Lindau Nobel Laureate Meeting

by K-State Today

Courtney Passow, a biology doctoral student and an EGI student, from Round Rock, Texas, will attend the 65th Lindau Nobel Laureate Meeting in Lindau, Germany. She is one of 672 young scientists selected worldwide to attend the meeting.

The Council for the Lindau Nobel Laureate Meetings invited Passow to attend the meeting, which occurs June 28 to July 3. Mars Inc. is sponsoring Passow and covering her travel expenses.

While attending the meeting, Passow will interact with Nobel laureates, graduate students and postdoctoral researchers – all in areas of physics, physiology, medicine and chemistry.

"These are some of the top researchers around the world and it's a great opportunity to not only make contact with them but to also look for potential collaborations," Passow said. "While physics and chemistry are not my primary areas of research, getting to meet with researchers in these fields and discuss ideas for developing my own project further is indispensable."

Passow is studying the underlying physiological and genetic mechanisms of adaptation to natural stressors. She focuses on *Poecilia mexicana*, a small live-bearing fish that lives in the presence and absence of hydrogen sulfide, a natural toxicant.

Courtney has been conducting research with Michael Tobler, assistant professor in the Division of Biology. Tobler nominated Passow for the prestigious designation of attending the Lindau Nobel Laureate Meeting.

"Courtney is an exemplary graduate student with an impeccable work ethic and an accordingly long list of accomplishments," Tobler said. "Nominating her for an opportunity to interact with leaders in her field seemed timely, considering that she is about to transition into the next state of her career. Science can be a tedious endeavor with virtually no instant gratification, and I hope the trip to Europe and the exchange with Nobel laureates will remind Courtney that all those long hours in the lab are bearing fruit after all."

Herman to Chair Gordon Conference

From Genomes to Biomes: Using Biodiversity to Explore Biocomplexitiy. July 12-17, 2015.

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Bernatchez to Visit K-State

Dr. Louis Bernatchez will be delivering a seminar on April 10 at 4:00 pm in Ackert Hall, room 120.

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Gordon Research Conference on Ecological and Evolutionary Genomics

From genomes to biomes, from microbes to plants and animals, the 2015 Gordon Research Conference on Ecological and Evolutionary Genomics will highlight how genome-enabled approaches are helping rapidly advance our understanding of the complicated relationship between genotype, phenotype and the environment. Topic areas such as genome evolution, microbiomes and symbiosis, speciation and adaptation, phylogenomics and organismal responses to climate change, will highlight how diversity can be used to illuminate complex biological relationships and inform ecological and evolutionary processes and molecular mechanisms of adaptation to changing environments. The conference will also feature emerging approaches and technologies to aid further exploration of the genomes from organisms that span the tree of life.

Co-chairs, Jack Werren (University of Rochester) and Mike Herman along with Vice-chairs Felicity Jones (Max Planck Institute, Tubingen) and Michael Pfrender (University of Notre Dame) invite you to attend on the ocean-side campus of the University of New England in Biddeford, Maine for a diverse group of established and early career investigators to discuss their latest work. View the conference agenda at http://www.grc.org/programs.aspx?id=13135. Applications for attendance will be accepted on a first-come-first-serve basis until the meeting is full. Please plan on attending!!

12th Annual Symposium Held

EGI hosted its 12th annual symposium October 31- November 2, in Kansas City, Missouri. Organized by a committee and led by co-directors Loretta Johnson and Michael Herman, the symposium highlighted 9 speakers from the United States, Canada and Germany. Attendees represented 28 universities, 20 states and four countries. Speakers at the symposium were:

- Zac Cheviron, University of Illinois
- Cassandra Extravour, Harvard
- Felicity Jones, Max Planck Institute
- Ari Jumpponen, Kansas State University
- Catherine Linnen, University of Kentucky
- Sean Place, Sonoma Place University
- Jesse Poland, Kansas State University
- John Stinchcombe, University of Toronto
- Alex Wilson, University of Miami

In addition to the 9 speakers, four poster abstract submissions were chosen for presentation. Fifty-one posters were on display throughout the symposium, as well as, highlighted during two poster sessions.

Due to funding received from the AGA and the journal, *Genome*, we were able to award 20 travel fellowships to students and postdocs. Additionally, five K-State undergraduates were awarded travel fellowships. Funding for these undergraduates was supported by NSF URM.

13th Annual Symposium Scheduled

The 13th Annual Ecological Genomics Institute symposium is scheduled for November 6-8, 2015. This year's symposium will be held in Manhattan at the Hilton Garden Inn. More details available soon!!

Galliart Double Award Winner

Matthew Galliart, a biology graduate student, recently became a dual award winner. First, Matt received notification from the Provost office that he is the 2015 recipient of the Presidential Award for Distinguished Undergraduate Student in Research. He will receive the award at a May 6 ceremony.

Less than 24 hours later, Matt received notification that he received a 2015 National Science Foundation Graduate Research Fellowship Program Fellowship. His selection was based on his demonstrated potential to contribute to strengthening the vitality of the US science and engineering enterprise.

Matt received his undergraduate degree in December 2014 and began his master's studies in January. He has been working in Dr. Loretta Johnson's lab since May 2012. For his graduate research, he will focus on the experimental field selection of big bluestem ecotypes across the Great Plains: A novel test for the strength of local adaptation.

Loretta Johnson, professor in the Division of Biology and EGI co-director, nominated Matt for the honors, stating, "Matt has an incredible work ethic, as well as a level of intellect and maturity rarely observed in undergraduate students."

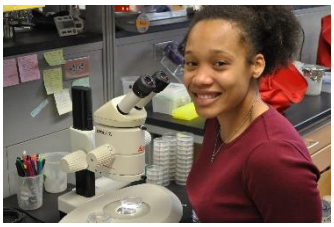
Greenway receives NSF recognition

Graduate student Ryan Greenway has been awarded an Honorable Mention from the National Science Foundation Graduate Research Fellowship Program. Considering the volume of applications received by the program, this is a fantastic accomplishment. The program recognizes and supports outstanding graduate student NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based masters and doctoral degrees. Ryan is currently studying mechanisms of speciation in fish inhabiting toxic sulfide springs in the lab of Michael Tobler, assistant professor and EGI faculty in the Division of Biology.

Alsdurf receives KAS grant

Jake Alsdurf, a Biology graduate student, was awarded a Kansas Academy of Science (KAS) Research Grant. Jake's research investigating tall grass prairies in an "ecological genomics" context offers unique perspective to address two important questions; how will predicted climate change affect Great Plains grassland? How are plants adapted to drought at the genetic and ecological levels? His main research goal is to characterize how genetically adapted populations of big bluestem might respond differently to predicted climate change. Jake is working in the lab of Loretta Johnson, professor and EGI co-director in

White gives award-winning presentation



Corin White, a Ph.D. student in the lab of Michael Herman, professor and EGI co-director in the Division of Biology, participated in the Kansas State Research Forum on March 31. The Forum was sponsored by the KSU Graduate Student Council, the Graduate School, the Offices of the President and Provost and Sigma Xi. Corin was awarded first prize for her presentation in the Interdisciplinary Research and Oral session. She received $500 and a plaque with her name will be on display in the Division of Biology office.

Bernatchez to Visit K-State

The department of Biology and the Ecological Genomics Institute would like to welcome Louis Bernatchez to the Kansas State campus. He is Canada's preeminent specialist in the genetic management of freshwater fish and holds the Canadian Research Chair in genomics and conversation of aquatic resources. His work is highly multidisciplinary with both fundamental and applied aspects. His group uses population and quantitative genetics, genetic mapping, functional genomics, behavioral ecology, and physiology to address fundamental questions in ecology and evolutionary biology. His group focuses on lacustrine fish populations (whitefish, genus *Coregonus*, Salmonidae) that have recently diverged and vary with respect to their level of reproductive isolation in relation to their levels of specialization towards distinct ecological niches. His work addresses both basic, fundamental questions as well as applied aspects regarding improvement of management and conservation practices of natural populations.

Dr. Bernatchez is a prolific writer, publishing 2 books and authoring or co-authoring over 300 articles. He is also the editor-in-chief of *Evolutionary Applications* and the review editor of *Molecular Ecology*. Dr. Bernatchez is an elected fellow to the American Association for the Advancement of Science, an elected member of the Royal Society of Canada, and the 2012 recipient of the Prix de Quebec, Marie-Victorin.

Dr. Bernatchez will be delivering a seminar, entitled **Investigating Ecological Speciation by Means of an Integrative Biology Framework**, on Friday, April 10, at 4:00 pm, in Ackert Hall, room 120.

New Faces

Michael Tobler

Michael (Michi) Tobler became an assistant professor of Biology and institute member when he moved to K-State last summer. His lab focuses on the ecological and evolutionary effects of environmental variation on populations. Specifically, he is interested in understanding how ecological and evolutionary processes in complex environments drive adaptation and speciation. His lab website can be found at http://www.sulfide-life.info/mtobler/

Gregory Ragland

Gregory (Greg) Ragland joined K-State and EGI when he became an assistant professor in the Department of Entomology in May 2014. Greg's research goal is to understand both the selective factors giving rise to diversity and the physiological and genetic underpinnings of adaptations to variable environments. Many of the questions he addresses center on insect diapause. His lab website can be found at http://www3.nd.edu/~gragland/.

Jennifer Rhodes

Jennifer Rhodes joined EGI in August 2014, as program coordinator. Prior to working at K-State, Jennifer worked as a teacher's aide at St. George Elementary School in St. George, Kansas. Before her family's move to Kansas, she was an IT training specialist with the Arizona Supreme Court.

Edwina Dowle

Edwina (Eddy) Dowle is a new postdoctoral research associate in the lab of Dr. Greg Ragland, Entomology. She has a background largely in population genetics. Her previous research has focused primarily on genetic and phenotypic adaptation across environments. She has primarily worked on invertebrates, insects and snails, utilizing a range of genetic and morphometric techniques. She has also spent some time working on deeper phylogenetic questions relating to dispersal and vicariance events in New Zealand taxa. Additionally she has recently been involved in helping develop molecular tools for biomonitoring (freshwater/marine). While at K-State, she will primarily be working on Pine beetle and Rhagoletis projects.

Researchers Develop Wheat Genetic Global Map

by K-State Today

K-State scientists have released findings of a two-year study of the genomic diversity of wheat species. Their work has produced the first haplotype map of wheat that provides detailed description of genetic differences in a worldwide sample of wheat lines. "All of these new, genomic-based strategies of breeding promise to significantly accelerate breeding cycles and shorten release time of future wheat varieties," said Eduard Akhunov, associate professor of plant pathology, the project's leader, and EGI member.

Akhunov's research associates, Katherine Jordan and Shichen Wang, are lead authors of the study, "A haplotype map of allohexaploid wheat reveals distinct patterns of selection on homoeologous genomes," which will be published in an upcoming issue of the journal Genome Biology. The project was coordinated through the International Wheat Genome Sequencing Consortium, and included groups in Canada, Australia, the U.K. and the U.S. Much of the work took place in Kansas State University's Integrated Genomics Facility.

The study included 62 wheat lines from around the world that were either modern cultivars or varieties not previously improved through formal breeding techniques, called landraces.

To reduce the complexity of the wheat genome, the research team developed a tool called "exome capture assay" to perform targeted sequencing of only functional parts of the larger wheat genome. This technique bypasses those parts of the genome that are repetitive, according to Akhunov.

The scientists found 1.6 million locations — called single nucleotide polymorphisms — in the genome where the wheat lines differed from one other. The research team used this information to describe the impact of these differences on the function of tens of thousands of wheat genes.

"Once genes controlling agronomic traits are identified, they can be used for improving wheat using not only traditional breeding approaches, but also new strategies that are based on biotechnology and molecular biology," Akhunov said.

"In the future, we will expand the set of wheat lines characterized using our sequencing strategy by including not only more genetically and geographically diverse wheat lines, but also by including close and distant relatives of wheat," he said. "These wheat relatives are known for being a reservoir of valuable genes for agriculture that can improve abiotic and biotic stress tolerance or other quality traits, and increase yield."

Akhunov said that genomics-based approaches are now being introduced into every wheat breeding program worldwide. "I am sure that we will see the impact of diversity resources developed at Kansas State University on wheat breeding within three to five years," he said.

In addition to Jordan and Wang, the Kansas State University research team included Alina Akhunova and Yanni Lun, who coordinated work in the Integrated Genomics Facility; and plant pathology faculty member and EGI member Christopher Toomajian.

"This study would be impossible without the computational and genomic infrastructure developed by K-State Research and Extension, the College of Agriculture and Kansas State University over the last five to seven years," Akhunov said.

Funding for the study was provided by the U.S. Department of Agriculture's National Institute of Food and Agriculture through the National Research Initiative.

New EGI Website Launched

The Ecological Genomics Institute is happy to announce the launch of its new, updated website. The website is still located at the same address -- http://ecogen.k-state.edu/. The website will receive on-going updates. If you would like to see anything added, please contact Jennifer Rhodes at jenniferrhodes@ksu.edu.