INDIANA UNIVERSITY College of Arts + Sciences

BioNews

Keeping you updated on what's happening in the **Department of Biology**

Fall 2016

MAKERS.com

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Indiana University

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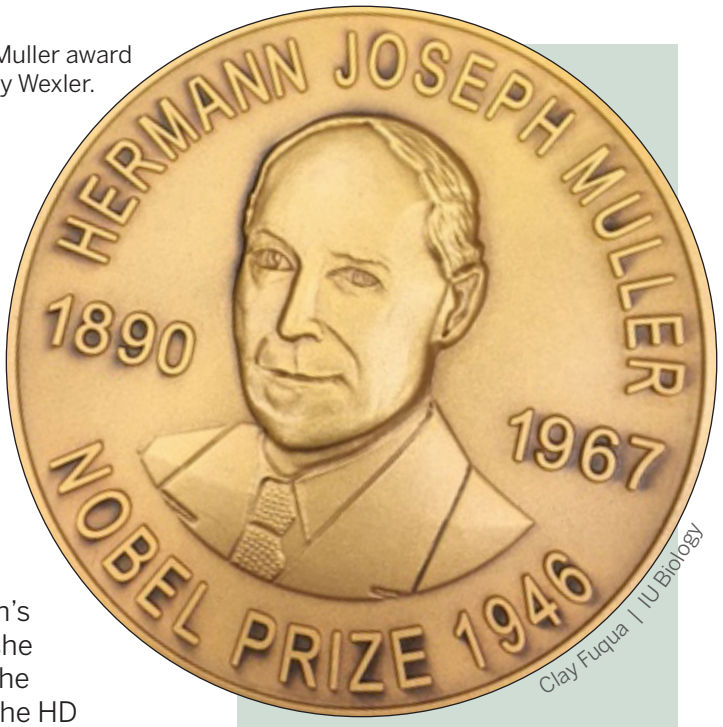


Clay Fuqua | IU Biology

Medallion presented to Muller award recipient Dr. Nancy Wexler.

Hermann J. Muller Award for Contributions to Our Understanding of Genes and Society

Huntington's disease pioneer Nancy Wexler delivers inaugural Muller award lecture

Professor **Nancy S. Wexler** from Columbia University and the Hereditary Disease Foundation, accepted her award and presented a lecture, "Mendel, Muller, Morgan, Mom, and me: an ever expanding voyage of discovery" during a ceremony on April 25, 2016.

Wexler, whose mother was a biologist and died of Huntington's disease, became known as a gene hunter. Starting in 1979, she led research teams to Lake Maracaibo, Venezuela, home to the world's largest family with Huntington's disease, to identify the HD genetic marker. In 1983 they found a DNA marker associated with the neighborhood of the HD gene. An international collaboration of more than 100 scientists began a search to find the HD gene itself, and a decade later, it was found. Wexler is now a self-proclaimed cure hunter on a quest to find treatments and cures for Huntington's disease and related neurological disorders.

The annual Hermann J. Muller Award for Contributions to Our Understanding of Genes and Society was established in 2016 to honor Muller and to recognize luminary international geneticists whose discoveries, like Muller's, have or are making a significant impact on the field of genetics and society. "Nancy Wexler's work is a perfect example of high caliber genetic research that has an enormous impact on human lives," noted Clay Fuqua, IU Biology chair.

Terri Greene | IU Biology

Dr. Helen Muller (left, daughter of Hermann Muller), Dr. Nancy Wexler (center), and Dr. Mike Lynch (Distinguished Professor of Biology) share a laugh after the ceremony and lecture. Muller assisted IU Provost Lauren Robel in presenting the award to Wexler.

Watch the award ceremony and Wexler's presentation at https://broadcast.iu.edu./events/muller-lecture-wexler.html

Hermann Muller is probably best known as the founder of radiation genetics. His discovery of X-ray mutagenesis earned him the Nobel Prize in 1946. Equally important is his groundbreaking work on the nature of mutations and many other seminal findings using the fruit fly, *Drosophila melanogaster*, a powerful genetic model that continues as a focus of research at IU Bloomington.

As a graduate student, Muller was an integral collaborator in "the fly room," run by Morgan at Columbia University, where he and colleagues used *D. melanogaster* to discover the basic laws governing heritability and the passing of traits. Their work led to an American domination of the then-new field of genetics.

His outspoken political beliefs often led to conflict professionally and socially for Muller. He decried abuses of genetics and advocated for radiation safety.

Muller joined the IU faculty in 1945 and retired in 1964. During his career, he published more than 300 professional articles on genetics.

Dr. Elof Axel Carlson, Muller's student and biographer, shares a brief bio and list of Muller's major accomplishments in genomics at www.bio.indiana.edu/events/lectures/muller_bio.shtml.

Faculty Research, Grants, and Awards

The Newton Lab apiary is located at the IU Research & Teaching Preserve. The hive boxes are painted different colors for identification purposes. For example, lab members can note that they sampled the "yellow" colony.

Graduate student Freddy Lee (inset) pulls a frame from a honey bee hive at the Newton Lab apiary, looking for "brood." "Brood" refers to embryos (eggs), larvae, and pupae. Finding "brood" is a sign of an active and healthy queen.

Courtesy photos

Microbiota and genetic diversity may provide answers to decline in honey bees

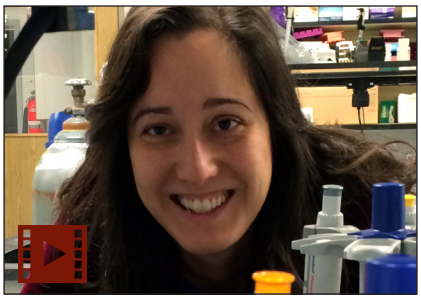
Irene Garcia Newton is seeking answers to the dramatic decline in the honey bee (*Apis mellifera*) population by looking at their gut bacteria (microbiome). She and her lab also explore how host genetics, behavior, and development interact to form the microbiome.

The bee gut houses diverse bacterial species. Newton's lab explores the functional meaning of this diversity with regards to metabolism, ecological interactions between community members, and—ultimately—host health.

> "A better understanding of how microbes contribute to the health of the bee will help us understand how to make a healthier bee—not just in terms of probiotics, but in terms of management." *I. Newton*

Work from Newton's lab to create the first metatranscriptome of the honey bee gut has shed new light on how organisms work together and apart from one another to carry out the dominant function of the gut microbiome—carbohydrate metabolism. Results from another study suggest a model in which the honey bee queen gut microbiome is colonized by bacteria from workers' glands—rather than from maternal inoculation as in other animal microbiomes.

Irene Garcia Newton is an assistant professor in the Microbiology Program within the IU Department of Biology.



Courtesy photo

Irene Newton discusses her work on the honey bee: https://www.youtube.com/watch?v=11NMK5EnSiQ&feature=youtu.be

Indiana University

George Hegeman, professor emeritus of biology and local bee expert, talks about problems facing honey bees: https://www.youtube.com/watch?v=DxHReGyJDag

Faculty Research, Grants, and Awards

The continued productivity of our faculty is sampled through the following highlights.

More info: bio.indiana.edu/alumni/newsletters/16Fall/faculty.shtml.

Research

Roger Innes and lab members have modified a plant gene that normally fights bacterial infection to confer resistance to a virus (in *Science*).

Patricia Foster is PI on a study finding that a "gap in the armor" of DNA may allow an enzyme to trigger cancer-causing mutations (in *PNAS*).

Jake McKinlay and lab members describe an efficient bacterial process for ethanol production that uses nitrogen gas instead of industrial fertilizers (in *PNAS*).

Grants

Mike Lynch, **Patricia Foster**, **Jake McKinlay**, and **Jay Lennon**—$6.2 million to study bacterial evolution in single species and in communities using high-power sequencing approaches.

Armin Moczek to co-lead an $8.7 million grant on evolutionary development: Moczek, **Mike Wade**, and IU colleagues will receive $1.25 million to lead three of 22 projects that span nearly 50 scientists at eight institutions in the U.S., Great Britain, and Sweden.

Yves Brun, **Daniel Kearns**, **Sidney Shaw**, **Malcolm Winkler**, and colleagues—$3.4 million collaborative NIH grant to develop new reagents and methods to study the bacterial cell wall, the main target for the design of new antibiotics.

Erik Ragsdale—NSF funding to identify the genetic mechanism that makes up a "switch" allowing some genetically identical species to develop strikingly different physical characteristics based on their environment—a phenomenon known as "polyphenism."

Jay T. Lennon, **Ken Locey**, and collaborator—$1.9 million NSF biodiversity grant to better understand the role of dormancy in maintaining microbial diversity.

Awards

Jeff Palmer—2015 McClintock Prize for Plant Genetics and Genome Studies.

Armin Moczek—2015 Fellow of the American Association for the Advancement of Science.

Craig Pikaard—2015 Martin Gibbs Medal from the American Society of Plant Biologists.

Elizabeth Raff and **Rudolf Raff**—2015 Geological Society of America Distinguished Career Award.

Ellen Ketterson—2014 Cooper Ornithological Society's Loye and Alden Miller Award for Lifetime Achievement.

Ellen Ketterson—2014 Fellow of the American Academy of Arts and Sciences.

Steve Bell (2015), **David Kehoe** (2015), and **Clay Fuqua** (2014)—Fellow of the American Academy of Microbiology.

Greg Demas—2015 Fellow of the Animal Behavior Society.

Roger Hangarter (2016) and **Craig Pikaard** (2015)—Distinguished Professor, highest academic rank within IU.

Amy Berndtson—IU's 2016 James P. Holland Award for Exemplary Teaching and Service to Students.

Gift to foster virology research

A gift of over $4.46 million to the College of Arts & Sciences from alumnus Dr. **Larry Blatt** (a pioneering virologist and founder of Alios BioPharma Inc.) will fund an array of new and ongoing endowments, including $2 million to endow the Lawrence M. Blatt Chair in Virology in the Department of Biology and $500,000 for the Milton Taylor Fellowship for graduate students in virology, initially created by Blatt in 2000 in honor of his mentor, Professor Emeritus Milton Taylor. This gift also funds the Blatt Biotechnology Internship Program that will provide private sector experience for Biology students.

Steve Weir | Indiana University

Larry Blatt and Milton Taylor in 2001.

"Viral infections continue to be a significant public health concern throughout the world and, in many cases, treatment options are either suboptimal or nonexistent," said Blatt. "Training of the next generation of virologists is key to the continued fight against emerging and existing viral infections."

Student Accomplishments

Terri Greene | IU Biology

Lekeah Durden investigates host-microbe interactions in plants in Distinguished Professor Keith Clay's lab.

Meet Lekeah Durden

The National Science Foundation featured Ph.D. student and NSF research fellow **Lekeah Durden** on its website in February in celebration of Black History Month and contributions made by African American researchers.

> "What makes me proudest in my scientific career is participating in initiatives that support women and underrepresented minorities to pursue interests in science." *Lekeah Durden*

And, participate she does. For two years, Durden has instructed high school students through Foundations in Science and Math, a summer program organized by IU graduate students. She has volunteered at IU Science Fest and the state science olympiad. She also assists with science outreach at local elementary schools.

Durden encourages students to find ways to explore even the slightest interest in science. "You never know what you'll find if you don't take the time to search," she advises.

Lekeah Durden is pursuing her Ph.D. in biology through the Evolution, Ecology & Behavior Program. She received the 2014-15 James P. Holland Fellowship.

2016-17 Goldwater Scholar

Sophomore **Hannah Busey** has been named a 2016-17 Goldwater Scholar, a highly competitive national award recognizing outstanding college sophomores and juniors who have shown great promise in math, science, or engineering.

Busey is pursuing a Bachelor of Science degree in biology. Using horned beetles as a study system, she researches the evolution of head development in insects in Professor Armin Moczek's lab. Busey plans to earn a doctorate in biology and to conduct research in the field of evolutionary biology.

Indiana University

Hannah Busey

Graduating seniors

Of the 289 seniors who graduated in May and August 2016 . . .

- 10 graduated with a B.A. degree with double majors
- 34 graduated with dual degrees (i.e., multiple B.S. degrees)
- 4 graduated with triple majors

This means over 10% of our undergraduates earned degrees in addition to their Biology degrees.

Student awards

Thanks to our generous donors, Biology was able to grant scholarships, fellowships, and other awards to 28 graduate students and 29 undergraduates in 2016. New gifts to Biology during the last three years have allowed us to make multiple additional awards available to our students.

Graduate student recipients of national honors

Kinsey Institute Student Research Grant: Kristyn Sylvia

NSF Doctoral Dissertation Improvement Grant: Mikus Abolins-Abols, Natalie Christian, Jamie Kostyun

NSF Graduate Research Fellowship: Elizabeth George, Lucas Henry

Smithsonian Institution Predoctoral Student Fellowship: Natalie Christian

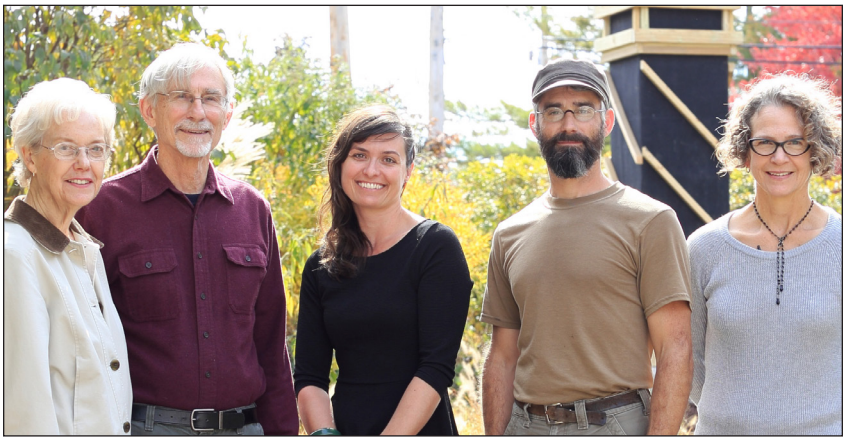
Student research highlight

Graduate student Nikki Rendon (Demas lab)—lead author of an article in *Proceedings of the Royal Academy B*—discusses a hormonal mechanism in hamsters that connects short winter days with increased aggression in females.

Student Accomplishments

Ph.D. student coordinates "Swifts in the City" community outreach project

Doctoral student **Jessica Hite** has teamed with local Sassafras Audubon Society (SAS) and IU colleagues to provide breeding habitat for Chimney Swifts (*Chaetura pelagica*), small gray birds whose playful-appearing flight patterns have earned them the nickname "dolphins of the sky." "Swifts in the City" also engages multiple groups in environmental education and will contribute to long-term local and national monitoring programs.



Eric Rudd | Indiana University

Left to right: Joan and Rob Hongen (Sassafras Audubon Society), Jessica Hite, Rusty Peterson (artisan who built the tower), and Karen Jepson-Innes (Associate Executive Director, WonderLab) pose in front of the newly erected swift tower at WonderLab museum in Bloomington, Indiana, October 2015.

Swift tower construction is an effort to reverse the species' population decline. Many towers are needed because only one pair of birds breeds at each site—despite the fact that hundreds of swifts may share the same space for resting at night. This behavior, combined with the decrease in "swift-friendly" chimneys, is one of many threats facing the species.

Each of the 12-foot "Swifts in the City" towers can provide a home for about 250 swifts and a nesting site for one pair.

The project has brought together volunteers from SAS and Stone Belt (organization supporting individuals with developmental disabilities) as well as local craftspeople, schools, teachers, businesses, the Bloomington Department of Parks and Recreation, and scouting groups. SAS has funded three towers.

Support for the "Swifts in the City" project is funded in part by an Elinor Ostrom Program Grant awarded to Hite. Distinguished Professor Ellen Ketterson, an avian biologist, serves as faculty sponsor of the project.

Jessica Hite defended her dissertation "Feedbacks between host stage structure and parasites: two case studies of disease in amphibians and plankton" in May 2016. She received her Ph.D. in Evolution, Ecology & Behavior. Professor Spencer Hall served as her graduate advisor.

Roger Hangarter | IU Biology

Chimney Swifts enter a chimney at dusk where they will roost for the evening.

As their natural habitat of hollow trees became scarce, swifts adapted by roosting and nesting in smokestacks and brick-and-mortar chimneys. The 1960s saw a rapid decline in the swift population, possibly due in part to increased popularity in chimney caps.

Terri Greene /Jessica Hite | IU Biology

The swift tower (left) at Harmony School in Bloomington was constructed near and decorated to match the playhouse in the school yard. A local Eagle Scout orchestrated the project. Note the metal baffle near the top of the tower used to deter predators.

The completed tower (right) at WonderLab rises above the vegetation of the museum's nature garden. Videos (including local clips) of swifts' amazing acrobatics while zooming in and out of large chimneys can be seen at a kiosk in the museum.

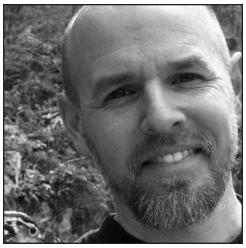
Gary Ritchison | Eastern Kentucky Univ.

Chimney Swift nestlings.

See: http://swiftsinthecity.indiana.edu

Biology Remembers . . .

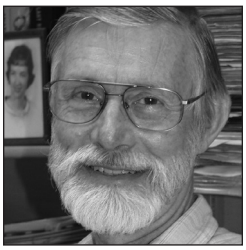
Within the past two years, we have lost five cherished faculty members. They had a tremendous impact on science and on our students. They were each unique and valued colleagues, and we miss their contributions and their character.



Courtesy photo

James L. Goodson, Professor
Nov. 11, 1965–Aug. 14, 2014

. . . was a prominent behavioral neuroendocrinologist known for his work on estrildid finches and his passion for field research in Africa. One of his many accomplishments while at IU was to develop new testing paradigms for evaluating sociality (preference for being with a flock) in zebra finches. Jim was an avid birder and environmentalist. He loved traveling and had a great fondness for Volkswagen buses. Jim's students remember him as an impeccable scientist and as a warm, generous mentor who lived a very large and full life during his 48 years.



IU Biology

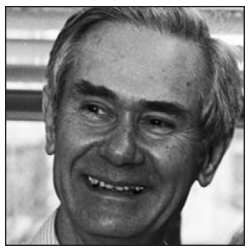
Albert Ruesink, Professor Emeritus
Apr. 16, 1940–Aug. 17, 2014

. . . was a plant biologist who developed novel methods for studying the cells of plants. Undergraduate teaching was his greatest love, and he shared this passion as the director of Biology's Masters of the Arts for Teaching Program and the annual training sessions for associate instructors. Al was a tireless advocate for the Department of Biology. In 2013, he and his wife, Kathy, created an award to recognize those associate instructors who excelled at teaching. Al was active in Earth Care, which brings faith communities together on the topic of environmental ethics and climate change.

IU Biology

George A. Hudock, Associate Professor Emeritus
Mar. 28, 1937–Jan. 24, 2015

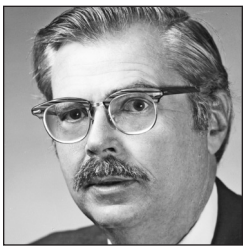
. . . researched the genetic analysis of phototaxis in a type of green algae. George was a gifted teacher, and his students quickly learned that he cared deeply about them, despite a rough exterior. In gratitude for his inspiration and guidance, one of his students created a graduate student fellowship in his honor. George's educational zeal extended beyond IU; he participated in many outreach activities for the public. George felt a strong, spiritual connection to the American West, finding great peace in its wilderness areas.



IU Archives

John R. Preer Jr., Distinguished Professor Emeritus
Apr. 4, 1918–Apr. 22, 2016

. . . performed innovative research elucidating how microorganisms live, compete, and reproduce. With his wife (the late Dr. Louise "Bertie" Preer) working with him, John developed techniques that broke new ground in the study of paramecia during his seven-decade career. He was a pioneering geneticist and a teacher who educated an impressive lineage of students who are now leaders in the field. John built two large telescopes, creating legions of amateur astronomers in his neighborhood. He learned to sail and helped Bertie grow hundreds of orchids at their home.



IU Archives

Arthur L. Koch, Professor Emeritus
Oct. 25, 1925–May 10, 2016

. . . has been described as "one of the true Renaissance scientists of the past several decades." He published on diverse topics from metabolic rates and cell growth to bacterial shape to even problems faced by migrating sea turtles! His surface stress theory, among his most prominent achievements, describes how surface-tensionlike forces determine bacterial shape. Arthur Koch was a one-of-a-kind gentleman—quirky, intelligent, and interested in many topics, including not only science but also music, plays, the outdoors, and his family and friends.

BioNews is published by the Indiana University Department of Biology—with support from the College of Arts and Sciences—for alumni and friends to encourage their interest in and support for Indiana University, the College of Arts and Sciences, and our department.

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Bleakley lab | Courtesy photo

Diverse undergraduates gain research experience in alum's lab

Courtesy photo

Bronwyn Heather Bleakley

IU Biology alumna Dr. **Heather Bleakley** is a researcher fascinated by interacting phenotypes. She uses two systems—guppy antipredator behavior and cannibalism in isopods—to explore how interacting phenotypes may evolve.

Bleakley is also a teacher. Corroborating this are her string of teaching awards from Outstanding Associate Instructor while completing her Ph.D. at IU to her recent Louise F. Hegarty Award for Excellence in Teaching at Stonehill College.

She works exclusively with undergraduates at a teaching intensive institution. Bleakley employs a rolling mentor-apprentice lab organization to provide substantive research experiences to diverse, often at-risk, undergraduates. These students both contribute to the lab research agenda and conduct independent research before going on to STEM (Science, Technology, Engineering, Math) and health careers. Such research experiences greatly support retention of at-risk students and help to diversify the STEM pipeline.

Heather Bleakley visited Indiana University Bloomington in March to give the 2016 Joan Wood Lecture, a forum for undergraduates to interact with women in science careers.

Heather Bleakley received her Ph.D. in Biology (Evolution, Ecology & Behavior) from Indiana University in 2007 with Armin Moczek. She also received a minor in College Pedagogy and an area certificate in Animal Behavior. She is currently an associate professor of biology at Stonehill College in Easton, Massachusetts.

What's happening?

Visit bio.indiana.edu/alumni/newsletters to read IU Biology alumni/ae news.

We'd like to hear from you! Email bionews@indiana.edu to share what's been happening in your life.

Update your record with the IU Alumni Association at alumni.indiana.edu/together/directory.

Wyss honored with IU Staff Merit Award

Kathy Wyss was selected as a 2015 IU Staff Merit Award recipient.

Wyss came to Biology in 1983 and has served as development officer since 1986. Her helpful attitude and attentiveness are well known to students, alumni, and donors alike.

Jeremy Bennett | IU Biology

Wyss (right) and IU Provost Robel at the award ceremony last December.

"Kathy has made a huge impact on the Department of Biology through her long and careful stewardship of our donors and her management of departmental scholarships. She embodies all of the traits listed in the Staff Merit Award criteria: performance above and beyond the position, extreme dedication, impressive work ethics, supportive, pleasant and helpful, takes on additional tasks to help the department, dedication to excellent service. She is most deserving of this award." *Roger Innes, professor and former Biology chair*