

DEPARTMENT OF

Integrative Biology

MSU

College of Natural Science | Newsletter for Alumni and Friends

From the Department Chair...

Happy new era! After much planning, hard work and anticipation, the new Department of Integrative Biology made its official debut on July 1.

In the final newsletter from the Department of Zoology last fall, I explained the rationale for this change. To an increasing number of people, zoologists are khaki-clad characters who study the charismatic megafauna that live in zoos—lions and tigers and bears, oh my! Our name is just catching up with our true identity. As I said in 2014: “If you look at our faculty and graduate student profiles or follow the news stories on our website, you will see that we have already become a department of integrative biology—working across sub-disciplines and taxonomic groups to address 21st-century challenges. We can better serve our many constituencies if everyone understands who we are and what we do.”

In 2014, we engaged in a long, intense self-examination as part of our regular Academic Program Review (APR) process. In our APR document, we set our course to develop an integrative understanding in our research and teaching that emphasizes three areas of biological complexity: 1) how higher level biological complexity emerges from lower level processes, 2) how lower level mechanisms are shaped by higher level ecological and evolutionary processes, and 3) how biological systems at all levels respond to perturbations and changing conditions. We will continue to offer a B.S. in zoology while we grow our new department and develop our new B.S. in integrative biology.

Many faculty and staff have contributed to this effort. I want to highlight the

efforts of Katie Licht, our remarkable communications manager. Katie has taken the lead on developing our new website. Working with college IT and communications staff, Katie has created a brand new site with improved graphic design, content, accessibility and

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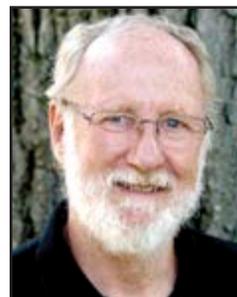
functionality across a range of platforms, including mobile devices. You can visit the site at <https://integrativebiology.natsci.msu.edu>. You’ll find many interesting stories and exciting news highlights. Send us your stories to share. We are proud of our community of alumni and we want the world to know it. We’re still ironing the wrinkles out of the new website, so if you notice anything that we’ve overlooked, please let us know.

But, before you rush off to our new media, please take the time to savor what we have to offer in this very informative and well-crafted artifact of the “old media”—the first newsletter from the Department

of Integrative Biology. Inside you will learn that we have lost a pioneering former faculty member, Evelyn Rivera. Will Kopachik, a prolific and popular teacher, is retiring. New faculty member Gideon Bradburd will be joining us in 2016. We are recruiting several other great new faculty members that we will tell you about in the next newsletter (and don’t forget to watch our new website!). There are fascinating stories about the accomplishments of our faculty, graduate and undergraduate students and alumni.

We don’t have a feature on our staff in this newsletter other than my shout-out to Katie Licht above, so I just want to take this opportunity to tell you that our office and advising staff are doing terrific work. I opened this message with a reference to all the work that went into planning for our name change. It is the staff who will finish the job, answering questions and dealing with all the virtual paperwork, including changing all the ZOL acronyms to IBIO. It is easy to take a highly competent support staff for granted—easy, but unwise. Thanks!

I hope that you find this year’s newsletter informative and enjoyable. And thank you, as always, for your continued support of our programs and students. 🍷



Thomas Getty, Ph.D.
Chair
Department of
Integrative Biology



1960s

James Trosko, M.S., zoology, '62; Ph.D., zoology, '63, retired from MSU in 2014 but remains active in academics and research. Recent activities include a research trip to Barcelona, Spain, and giving keynote talks on the Mediterranean diet in Palermo, Sicily, and Milan, Italy. Future activities this year include speaking engagements at a European Food Safety Meeting in Milan, Italy, and the "One Health" symposium in Nagasaki, Japan, and publishing several papers in scientific journals.

Floyd Ostrom, D.O., zoology, '66, is happily retired after 40 years of practice, mostly in primary care pediatrics in an inner city clinic in Dallas. He concluded his last six years in developmental/behavioral pediatrics in Fort Worth.

Pamela (Walsworth) McAllister, Ph.D., biological science, '67; M.S., zoology, '70; Ph.D., zoology, '73, was selected to be part of the National Cancer Institute's Gastrointestinal Steering Committee, which reviews and approves clinical trials of new treatments for gastrointestinal cancers.

John Rowell, D.V.M., zoology, '69; D.V.M., '73, was in small animal companion practice until 2007 in Boca Raton, Fla.

1970s

Dana Panknin, M.D., zoology, '70, is winding down as a full-time family practitioner in Michigan and transitioning to part-time.

Thomas Hartkop, D.O., zoology, '71; M.S., anatomy, '76; D.O., '80, is currently working as a family practice physician in southern Oregon. He also has an audio recording studio and plans to travel more as he nears retirement.

Clint Kilts, Ph.D., zoology, '73; Ph.D., pharmacology, '79, is a professor and associate director for research at the Psychiatric Research Institute and founding director of the Brain Imaging Research Center at the University of Arkansas for Medical Sciences in Little Rock. Kilts was awarded the Wilbur Mills Chair in Alcohol and Drug Abuse Prevention in December 2014.

David Williams D.D.S., zoology, '71, was recently elected president-North Suburban Branch, of the Chicago Dental Society for 2015-16, and will also be inducted as a fellow of the American College of Dentists in conjunction with the upcoming

American Dental Association Annual Session this November.

J. Douglas Huggett, D.O., zoology, '79, has worked in the Niles/St Joseph, Mich., area for more than 20 years, treating people with cardiac conditions.

1980s

Cindy (Smith) Krol, zoology, '83, is director of the "Time Out, Protect Your Skin" educational outreach program on behalf of the Women's Dermatologic Society for grade-school children in Encinitas, Calif. Krol was an invited speaker at the Blade and Light International Skin Cancer Symposium in Curitiba, Brazil, and is co-author of "Processing High Adipose Tissue Samples: A Comparative Study of Effectiveness of Pre-treatment with Flash Freezing Spray or Liquid Nitrogen," which she presented at the American Society of Mohs Surgery Annual Meeting in San Antonio, Texas.

1990s

Joel Vanderbush, zoology, '95, is celebrating his 20th year as a zoologist and his 10th year as the executive director of Animalia, Inc.,





a nonprofit public charity dedicated to connecting people to animals and nature each year. He is also serving his fifth year as an advisory board member for the Department of Animal Sciences at Purdue University in West Lafayette, Ind.

Joshua Nixon, Ph.D., zoology, '97; Ph.D., zoology, and ecology, evolutionary biology, and behavior, '05, accepted a position as deputy associate chief of staff, Research Service, Minneapolis VA Health Care System in Minnesota.

Donna (Molnar) Malaski, microbiology and zoology, '98; student affairs administration, '00, recently started a new job as manager of academic advising for Kellogg Community College in Battle Creek, Mich.

Tim Murphy-Stevens, Ph.D., '99, got married to his longtime partner, Kelly Stevens, in 2014 and started a new job as head of microscopy and image analysis at RSIP Vision, a computer vision/computer learning and image analysis custom algorithm development company based in Israel. Tim and his wife live in Seattle, Wash., with two Wirehaired Fox Terrier rescue dogs.

2000s

Ryan Holem, zoology, '00, is employed at GEI Consultants and

works on water quality-related issues, especially those pertaining to contaminants in fish and wildlife.

Shannon Soltysiak, zoology, '02; M.S., forensic science, '07, is assistant technical leader at the New York City Office of Chief Medical Examiner, Department of Forensic Biology Laboratory. She and her husband are welcoming their first child in July.

Shanelle Wilson, zoology, '07, became the technical sales and marketing coordinator for the Louisiana Steam Equipment Company in October 2014 following seven years in the United States Air Force as an air battle manager. She was also recently admitted to Tulane University's Master of Management in Energy program through the Freeman School of Business. Wilson lives 30 minutes outside of New Orleans.

2010s

Cassandra Bunker, zoology, '10, received an accelerated B.S.N. degree and is now a certified pediatric nurse at the Detroit Medical Center.

Kellie Salliotte, environmental biology/zoology, '12, has accepted a position at a large laboratory

for pharmaceutical research in Michigan. She was recently certified as an assistant laboratory animal technician and a laboratory animal technician by the American Association for Laboratory Animal Science.

Kimberly Roth, zoology, '14, has recently accepted an animal keeper position in the North Savanna section at Dallas Zoo Management, Inc. in Texas. She will mainly work with Grant's zebras, ostriches, guinea fowl and impalas.

Contact Us

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Photographs courtesy of: Department of Integrative Biology, Max Lambert (page 4), Michael MacDonald (page 5), MSU Communications and Brand Strategy, Harley J. Seecley and Dominic Wright (page 10).

New Faculty



Bradburd

Gideon Bradburd will join the Department of Integrative Biology as an assistant professor in fall 2016. Bradburd's research is focused on understanding the causes and consequences of genetic variation. His study includes fieldwork, sequence data generation and developing statistical methods to understand spatial patterns of genetic differentiation in a variety of empirical systems. Bradburd

will be graduating in summer 2015 with a Ph.D. from the Department of Ecology and Evolutionary Biology at the University of California – Davis. He will then complete his postdoctoral training joining MSU next fall.

Faculty Honors

Stephen Hamilton, professor and associate director of the W. K. Kellogg Biological Station, is the recipient of the 2015 Environmental Stewardship Award from the Society of Freshwater Science. Hamilton was honored by the society in May for his work as an academic researcher and environmental steward of local, regional and global watersheds.

University Distinguished Professor Kay Holekamp, one of the world's leading behavioral ecologists, has been elected to the American Academy of Arts and Sciences. Holekamp's long-running hyena study, covering nearly 10 generations of spotted hyenas, focuses on animal behavior and behavioral endocrinology, as well as the evolution of sexual dimorphism with a focus on spotted hyenas in the wild. An induction ceremony will be held in Boston in October.

Professor Gary Mittelbach has been named a 2015 fellow of the Ecological Society of America (ESA). Mittelbach is one of 24 fellows of the society being recognized for distinguished contributions to ecology. His research focuses on the evolution and maintenance of biodiversity, and, in particular, what determines species diversity at different spatial scales.

In Memoriam

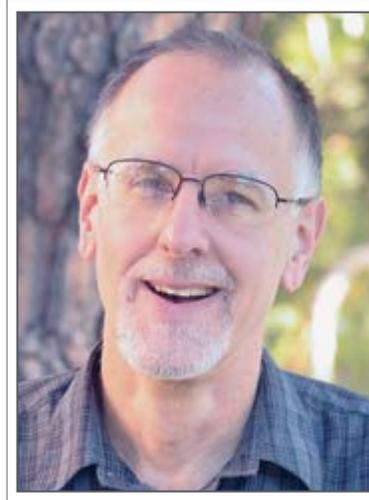


Rivera

Evelyn M. Rivera, emeritus professor of zoology, died January 27, 2015, after a long illness. She received her Ph.D. in 1963 from the University of California, Berkeley, and came to MSU in 1965. Rivera was a pioneer in the development of mammary organ culture for experimental systems. During sabbatical leaves, she studied

immunology with Nobel Laureate Sir Peter Medawar in London and later learned cell cloning techniques at the Salk Institute in La Jolla, Calif., with Renato Dulbecco. Rivera served on the zoology faculty for 34 years, retiring in August 1999. She was active in diversity-based projects and retired faculty affairs and was an accomplished pianist, linguist and gourmand.

Retirements



Kopachik

Will Kopachik, associate professor, is retiring after 29 years on the integrative biology faculty. He received his Ph.D. in biology from Princeton University in 1981, was a visiting fellow at the Imperial Cancer Research Fund in London and did further post-doctoral research at the University of Wisconsin-Madison before joining the MSU faculty in 1986. Kopachik's main research interest is developmental biology using *Dictyostelium*

as a model organism to study the control of gene expression and pattern formation. He collaborated for many years with Professor R. Neal Band on the molecular basis of pathogenesis from the protozoan *Naegleria fowleri*. In retirement, Kopachik plans to complete writing a textbook on the biology of development and increase his education outreach duties at local schools to promote careers in science, technology and academia.

Gary Mittelbach, integrative biology professor, and his colleague, Hannah Distinguished Professor of plant biology, Doug Schemske, received a two-year, \$189,000 grant from the National Science Foundation's "OPUS" Program. This award supports a synthesis of past and ongoing research into the processes that determine community assembly and the maintenance of biodiversity at different geographical scales. Current models for the assembly of ecological communities are incomplete. The researchers hope their work will lead to a better understanding of the processes that generate and maintain biodiversity, and will help guide efforts to restore ecological communities of conservation concern in the face of species introductions and the invasion of exotic species. See related article on page 6.

Jason Gallant, integrative biology assistant professor, received a three-year, \$699,000 grant from the National Science Foundation to identify the genes that regulate specific electric signals made by African weakly electric fish, which generate electric fields for the purposes of communication and navigation through their environments. The grant will fund the use of cutting-edge genomics by postdoctoral scholars, graduate students and undergraduates, as well as trips to Gabon, Africa, to collect weakly electric fish. Identifying the genes responsible for behavioral differences within species will ultimately help biologists understand how changes in behavior can facilitate, or perhaps cause, one species to become multiple species. In connection with the work, Gallant's laboratory will bring a new educational outreach program, focusing on "forms of energy," to middle school students in Olivet, Mich.

Research grant addresses bird damage to fruit crops

Catherine Lindell, integrative biology associate professor, along with collaborators in New York, Colorado and the Pacific Northwest, are using a \$2,044,335 grant from the U.S. Department of Agriculture Specialty Crop Research Initiative to integrate economic, biological and consumer information to address the issue of bird damage to fruit crops, in particular cherries, grapes, blueberries and apples. The transdisciplinary, multi-state team maximizes efficiency in use of research dollars by cooperating in the design of research protocols and data sharing as it quantifies bird behavior in fruit crops and assesses contributions of different bird species to fruit loss. The long-term goal is to provide fruit producers with cost-effective and environmentally sustainable bird management strategies.

"We are investigating this problem from several perspectives," explained Lindell, who combines theoretical and applied research in studying the ecology and behavior of birds, and the roles of birds in ecological functions and ecosystem processes. "For this project we are looking at how we can combine local-scale and landscape-scale management and at what consumers think about various management techniques. As



Birds flock around a vineyard on Old Mission Peninsula near Traverse City, Mich. A transdisciplinary team hopes to give producers strategies to avoid bird damage.

an interesting twist, some bird species are helpful to fruit growers because they eat pest species. How do we discourage the fruit-eating birds and encourage the beneficial birds?

"Our project estimates that birds cost producers tens of millions of dollars

through fruit loss and management efforts," Lindell added. "Despite these costs, affordable management options have been limited. This multi-state project will increase the options by providing individual producers with region-specific information to guide their bird management efforts."

MSU research expands thinking on questions in ecology

What do you get when you combine a professor who literally wrote the book on community ecology and another who has more than 40 years' experience as a leader in the field of evolutionary biology? You get a new way to look at how organisms interact and evolve to form ecological communities.

Recent research of Gary Mittelbach, integrative biology professor, and Hannah Distinguished Professor of plant biology, Doug Schemske, suggests that a stronger focus should be placed on how species that evolved in isolation eventually move across the landscape and can coexist in the same region, and on the feedback between local and regional processes.

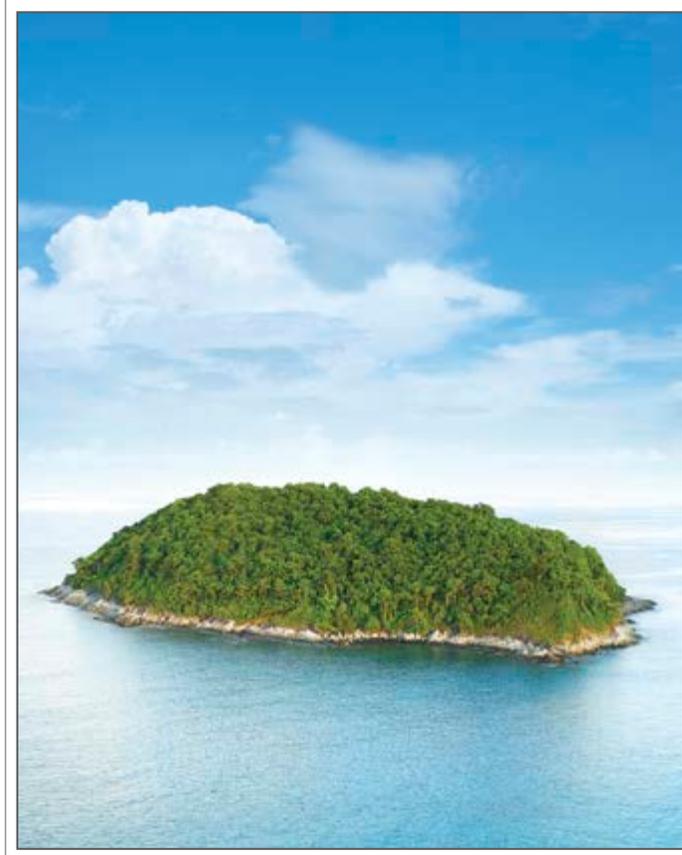
"We are attempting to expand the thinking on this long-standing question in ecology," said Mittelbach, author of the textbook *Community Ecology*.

"Community is a term that every ecologist uses to describe species found together in space and time, but everyone visualizes how these species got there, and how they persist, in different ways."

Mittelbach and Schemske decided to step back, reflect on their combined 80 years of scientific experience, and expand the study of community assembly to include regional—rather than local—influences and stretch the shorter time spans traditionally used by ecologists.

"When we talk speciation, we're talking hundreds of thousands, sometimes millions, of years," Schemske said. "Existing theories of ecology, however, may be trying to explain things on vastly different, shorter time scales."

For example, one explanation for how plants and animals live and thrive in a



MSU's Gary Mittelbach and Douglas Schemske offer new perspectives on how ecological communities are assembled.

fauna and flora gives scientists a model to understand the assembly of communities.

A classic example is the volcanic island of Krakatoa in the Pacific, which exploded in 1883 and was wiped clean of life. As the island cooled and was recolonized with organisms from the mainland, scientists were able to observe firsthand how communities of plants and animals reassembled. On Krakatoa, there has been essentially no evolution of new species. However, in other island systems, new species have evolved in place to become part of the community, such as Darwin's finches on the Galapagos or cichlids fishes in Lake Victoria in Africa.

"The study of islands has shown how communities may assemble through a combination of colonization, natural selection and evolution," Mittelbach said.

"But, how good is this model

for the assembly of communities on continental scales and across millions of years? We're looking at these processes through the combined lenses of ecology and evolution to see if we can untangle what it all means."

Their ideas have implications for other long-standing questions, such as why tropical regions have higher biodiversity than temperate and polar regions. For example, there are approximately 640 species of trees in North America. However, there are more than 700 varieties of fig trees alone, growing in equatorial regions.

"How is it possible that there are more varieties of fig trees than all the trees in North America?" Schemske asked.

"We're not claiming that we can solve this, but that's one of the big questions we're hoping to answer or inspire other scientists to undertake and answer." 🌱

"We're looking at these processes through the combined lenses of ecology and evolution to see if we can untangle what it all means."

specific place is based on the theory of island biogeography. Since most islands or island-like systems are geologically young and isolated, observing their colonization and the development of their



Husband & wife team has big impact on study of little animals

For a combined 105 years, Richard Snider, a professor of integrative biology, and Renate Snider, an assistant professor in the College of Natural Science, have been at MSU studying “little animals.”

He came to Michigan State from Plymouth, Mich., as an undergraduate student in fall 1957. She arrived at MSU from Vienna, Austria, in December 1968 on a Fulbright travel grant.

“We met just around the corner,” Richard said, pointing down the hall from where their current offices are located in the basement of the Natural Science Building. “I helped her buy a car and taught her how to drive.” They married in August 1969.

“The secret to building a good source of funding for the departments is getting the faculty to get behind it.”

Richard’s first job on campus was in the entomology museum, pinning insects and spreading butterflies. She first worked as a lab technician, “rearing little animals,” specifically, Collembola (or springtails). He earned three degrees in entomology from MSU, including his Ph.D. in 1972. She continued to work as a research technician in the entomology and zoology departments until completing her Ph.D. in zoology in 1980.

The couple had the opportunity to team up to do research on the ELF communications systems ecological monitoring project in Michigan’s Upper Peninsula that ran from 1982 until 1994.

Although she enjoyed her time as a researcher, Renate now devotes all her time

to her true passion—teaching. She has taught a variety of courses over the years.

“This is what I love doing,” she said.

In 2000, she developed and began teaching NSC 840 – Writing in the Sciences, a graduate course for students in natural science, engineering, and agriculture and natural resources.

“This is not a grammar course. I teach them how to think,” Renate pointed out.

Students are able to enroll in the class up to three times.

“I may get a student writing a research proposal at the beginning of their program, and then two years later, he or she will enroll again when writing a dissertation,” she said. “These students say to me, ‘Dr. Snider, I’m coming back for more punishment!’ Or, ‘I like your tough love; I’ll be back next semester!’”

She also teaches the capstone course for human biology majors.

In the early 1990s, Richard developed the curriculum in zoo and aquarium science and initiated and helped build the department’s powerful internship program.

“This department puts more interns out there than most departments in the College of Natural Science,” Richard said. “We now send students all over the world—to Australia, Spain, England, Germany, Mexico. And it’s paying off. Our students get jobs.”

Richard continues to teach the introductory course in zoo and aquarium science. He also curates Collembola (and other apterygotes), isopods, spiders and related arachnids in the A.J. Cook Arthropod Research Collection.

“These little animals that people take for granted break down organic matter, and are so important in the ecosystem,” Richard said.



Richard and Renate Snider

To ensure that their work and the work of other researchers in this field will endure long after they are gone, the Sniders have made a \$1 million planned gift to the Drs. Richard J. and Renate M. Snider Endowment for the A.J. Cook Arthropod Research Collection.

“A great university always has great museums,” Richard said. “This collection is an important resource for Michigan State University.”

“Without this money, it could deteriorate in no time at all,” Renate added.

The collection at MSU contains specimens from the Northwest Territory, as well as specimens donated by the long-defunct Detroit Naturalist Society. The museum also houses the Snider-Christiansen Collembola Collection.

When asked about the importance of faculty giving, Richard said: “The secret to building a good source of funding for the departments is getting the faculty to get behind it. And that’s what we should be asking here: ‘Are faculty behind this?’”

Bonding with friends of friends a good instinct

Bonding with a friend of a friend is something most humans gravitate toward naturally—or at least Facebook likes to think so every time it suggests friends for you to “friend.”

But a certain four-legged predator, the spotted hyena, seems to know the benefits of this type of social bonding instinctively, according to a recent study from the National Institute for Mathematical and Biological Synthesis.

A team of researchers, including Kay Holekamp, Michigan State University Distinguished Professor of integrative biology, found that cohesive clustering of the kind where an individual bonds with friends of friends, something scientists call “triadic closure,” was the most consistent factor influencing the long-term dynamics of the social structure of spotted hyenas.

In their study, the researchers used a new type of mathematical modeling typically found in sociology. This more dynamic approach allowed the researchers to evaluate the simultaneous effects of multiple factors—environmental, individual, genetic and structural—on network dynamics.

Hyenas, which can live up to 22 years, typically live in large, stable groups known as clans comprising more than 100 individuals. They can discriminate maternal and paternal kin from unrelated



Spotted hyenas instinctively seem to know the benefits of “triadic clustering,” where an individual bonds with friends of friends.

hyenas and are selective in their social choices, tending to not form bonds with every hyena in the clan, rather preferring the friends of their friends, the study found. And males follow rigid rules in forming bonds, whereas females tend to change their preferences over time.

“In spotted hyenas, females are the dominant sex, so they can be quite flexible in their social preferences,” Holekamp said. “In contrast, males disperse to new

clans after reaching puberty, and after they disperse they have virtually no social control because they are the lowest ranking individuals in the new clan. So we can speculate that perhaps this is why they are obliged to follow stricter social rules.”

Knowing why and how these animals form lasting relationships can help scientists better understand cooperation patterns and the consequences of sociality in other species. 🐾

Howling for crowdfunding

Wolves, coyotes, dogs and hyenas howl and whoop to communicate across vast distances.

Taking a cue from the mammals she is studying, Kenna Lehmann, a zoology graduate student who works with Kay Holekamp, MSU hyena expert, called out on the Internet to seek funds to help move her field forward.

For more than a year, Lehmann has been working with the Cooperative Predator Vocalization Consortium, a group studying the evolution of communication, cooperation and

cognition in social carnivores. Her colleagues have been meeting via Skype, but they realized to better tackle this topic and connect with fellow researchers, they needed to meet in-person at the Behaviour 2015 conference to be held in Australia in August.

“Spotted hyenas are such a strange mammalian outlier, so it is important to incorporate what we know about them into the scientific framework that our consortium plans to build at this conference,” Lehmann said.

In order to raise enough money to

send Lehmann and two others to the conference, the consortium set up a crowd-sourcing initiative earlier this year, and they were able to reach their goal of \$7,000—ahead of their deadline.

“This crowdfunding effort is supporting the advancement of the field of cooperation, communication and cognitive science,” Lehmann said. “Helping bring three scientists to this conference, who would otherwise be unable to participate, ensures that their work, knowledge and experience are incorporated into the projects and collaborations that help advance our field.”



Something to crow about

In the past 50 years, approximately 225 new birds have been discovered, more than half of these from South America.

Of these discoveries, Pamela Rasmussen, assistant professor of integrative biology, is tied for the third-highest total in the world with 10—and is ranked first for birds discovered in Asia. Only 48 valid new bird species have been described from Asia since 1965. And, since Rasmussen published her first new species in 1998, 96 valid new bird species have been described worldwide, 33 of them from Asia.

Being modest, Rasmussen is quick to point out that in most cases she worked with coauthors, some of whom originally made the discoveries, and her part was to provide the necessary museum data, sound recordings and other scientific data to document the finds. However, when she learned of her high ranking, she was a bit astonished.

“I was glad to see that all of the new species that I’ve been involved with are recognized as valid by all the major checklist authorities,” said Rasmussen, who’s also an assistant curator at the MSU Museum. “To my considerable surprise, I had no idea that I was tied with the top three.”

All of the other scientists who have described as many or more birds than Rasmussen work almost exclusively with South American birds.

The numbers through 2013 can be found in the *Howard and Moore Complete Checklist of the Birds of the World*, which shows how many new species have been described in the last half-century. To tally the birds described from 2013 to the present, the International Ornithological Congress



Pam Rasmussen, integrative biologist and assistant curator at the MSU Museum, is tied for the third-highest total of bird discoveries in the world in the past 50 years with 10—and is ranked first for birds discovered in Asia.

“Each new bird species description is the product of hard work by an entire team ...”

(IOC) World Bird List (worldbirdnames.org) was used as the authority for whether the new birds were still accepted at the species level.

The two birds most recently discovered by Rasmussen are the Chinese bush-warbler (*Locustella chengi*) (2015) and

the Sulawesi streaked flycatcher (*Muscicapa sodhii*) (2014). For the complete list of birds discovered by Rasmussen, read the story at <https://natsci.msu.edu/news-events/news/2015-something-to-crow-about-rasmussen/>.

Rasmussen, the lead author of *Birds of South Asia: The Ripley Guide*, coordinator of MSU’s global bird sounds website AVoCet and recent editor for the AVES journal *Zootaxa*, continues to look for more Asian birds. She travels widely to museums and to the field to obtain the necessary data for this research. In some cases specimens of the new species have actually been sitting in museum trays for many decades, unrecognized and unnamed.

“Describing new bird species to science is a prerequisite to understanding the levels of avian diversity, and this is essential information that allows conservationists to set priorities,” Rasmussen said.

Museum collections hold irreplaceable resources that enable the studies of comparative material and study of scientific name-bearing type specimens that are required for each and every new species description, she added.

“Each new bird species description is the product of hard work by an entire team, whether they are scientists, bird tour leaders, museum collection managers or long-dead bird collectors,” Rasmussen said. “I’ve been fortunate enough to collaborate with many accomplished, dedicated people on each of these projects. It can’t happen without them or without the museums that preserve examples of our biodiversity.”

How did the chicken cross the sea?

It may sound like the makings of a joke, but answering the question of how chickens crossed the sea may soon provide more than just a punch line.

Eben Gering, integrative biology postdoctoral research associate, is working with Professor Tom Getty and an international team of collaborators on a study of the mysterious ancestry of the feral chicken population that has overrun the Hawaiian island of Kauai. Their results may aid efforts to curtail the damage of invasive species in the future, and help improve the biosecurity of domestic chicken breeds.

Domesticated chickens, humanity's leading source of animal protein, are fighting rapidly evolving pathogens and fertility issues likely caused by inbreeding. The Red Junglefowl, the chicken's closest living relative, is believed to have been introduced to Hawaii by ancient Polynesians, and is threatened by habitat loss and the contamination of gene pools from hybridization in its native Asian range.

In Kauai, a feral hybrid of the Red Junglefowl and the domesticated chicken has presented the researchers with an opportunity to study the potential practical application of invasive genetics.

"It is crucial that we identify and conserve the genetic variation that still remains in the Red Junglefowl," Gering said. "This variation could soon be essential for the improvement or evolutionary rescue of commercial chicken breeds."

Through investigating the murky genetic origins of the chickens, the team sought to gain insights into the ongoing evolution of the population.

"We are eager to learn which combinations of genes and traits are emerging from this 'evolutionary experiment,' and to see whether our findings can translate to gains in the sustainability or efficacy of egg and poultry production," Gering said.

Gering and his team found that some chickens were a perfect match for genetic data from ancient Kauai cave bones that predate Captain Cook's 1778 discovery of Hawaii. Others, however, had genotypes that are found in chicken breeds developed



Eben Gering, integrative biology postdoctoral research associate, and his team are studying a feral chicken population on Kauai to see how their findings might help build hardier breeds of domestic chickens.

"We are eager ... to see whether our findings can translate to gains in the sustainability or efficacy of egg and poultry production."

recently in Europe and farmed worldwide.

The team also found evidence for a population increase in the chickens in Kauai that coincided with storms that locals believe released chickens and caused feralization over the last few decades. Taken together, the data suggest

that the population may have hybrid origins, resulting from interbreeding between the ancient Red Junglefowl and their domestic counterparts.

Additional clues were found in the appearance and behavior of the chickens, which display physical traits and coloration ranging from those of ancient jungle birds to more recent domesticated breeds. Acoustic properties of rooster crows likewise ranged from those typical of the Red Junglefowl to the familiar sound heard on a domestic farm.

But why do these variations matter? Studying the evolutionary forces at play among the feral chicken population may lead to the ability to create hardier breeds of domestic chickens.

"Darwin drew heavily from his studies of domesticated species to develop his theory of evolution," Gering said. "This can provide important insights into evolution in action within human altered landscapes, and may even someday help build a better chicken." 🐔



MSU scholarships, fellowships and mentorship vital to Ph.D. career path

Recent graduate Levi Storks has always had a fascination with animals. The strong support and mentoring he received at MSU—combined with funding from scholarships and fellowships—has been vital in his pursuit of a career that aligns with his passion.

Initially attracted to Michigan State by the zoology program, Storks began his studies at MSU on the pre-veterinary track.

“It wasn’t until I started working in labs around campus that I realized I wanted to pursue a career in research instead,” said Storks, who received his B.S. in zoology in fall 2014 and is currently working within two MSU labs before leaving for graduate school this fall.

He was first exposed to research as a freshman, in spring 2012, in the lab of Juli Wade, a professor of integrative biology with a joint appointment in the Department of Psychology.

“This is where I first saw what research was like,” Storks said. “I was involved in studying the neurobiology of zebra finches.”

In summer 2012, Storks received scholarships that helped fund his study abroad trip to the Galapagos Islands and Ecuador.

“I felt very lucky to be accepted into such an amazing program coming out of my freshman year,” Storks said. “This experience helped set me on the path to where I am today.”

Desiring more field research experience, he secured a position in the lab of Tom Getty,



Levi Storks poses in front of a poster describing research he participated in on antipredator responses of the gray tree frog.

professor and chair of the Department of Integrative Biology, at MSU’s Kellogg Biological Station during the summer of 2013. There, under the mentorship of Michael Kuczynski, a Ph.D. candidate in the lab, Storks developed a project looking at antipredator behavior in gray tree frogs. He later presented a poster on this at the 2014 Conference of the Animal Behavior Society, for which he received best undergraduate poster.

During his time at MSU, Storks received several other scholarships and awards, including the Marvin Hensley Endowed Scholarship (2014); the MLK Jr.

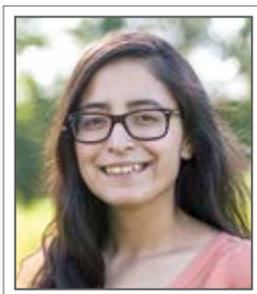
Advancing Inclusion through Research Award (2014); and the Lyman Briggs NSF S-STEM Scholarship (2014). He was also recognized with an MSU Board of Trustees Award last fall.

This fall, Storks will begin his Ph.D. work at the University of Missouri.

“When I begin my Ph.D. in the fall, I will be the first in my family to do so,” he said. “Without the mentoring and guidance of those I have connected with at MSU, none of this would have been possible. I don’t know how successful I would be finding this anywhere else but MSU.”

Ph.D. student receives Ford Foundation Fellowship

Connie Rojas, recipient of a prestigious 2015 Ford Foundation Fellowship, begins her Ph.D. studies in the MSU Department of Integrative Biology in September. Rojas will join Professor Kay Holekamp’s lab and will



Rojas

visit Holekamp’s hyena field site in Kenya before coming to MSU. She will also be part of the interdisciplinary Ecology, Evolutionary Biology & Behavior Program at MSU.

Rojas graduated *cum laude* from Wellesley College in 2014 with a bachelor’s degree in biological sciences and psychology. She hopes to pursue her passion for mammalian field biology by studying the mediation of complex behavioral phenotypes both in the field and in the lab. Ultimately, Rojas would like to become a university professor.

Born in the United States, Rojas grew up in Oaxaca, Mexico, and then returned to the United States when she was nine years old. She is the first person in her family to attend college. Rojas also received a University Enrichment Fellowship from MSU, which recognizes academic achievement, research goals, contribution to a diverse educational community and a record of overcoming obstacles.

Ford Foundation Fellowships are awarded in a national competition; only 116 scholars were selected for 2015 fellowships.

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A single evolutionary road may lead to Rome

Ernst Mayr, a well-known biologist, once theorized that when it comes to two distantly related organisms evolving a similar trait, many roads could lead to Rome. New research by integrative biologist Jason Gallant and collaborators suggests that when it comes to evolving some traits, especially simple ones, there may be a shared gene—one road—that's the source.

The research focused on butterfly wings, which have evolved in some butterflies to warn predators that they are toxic. Other nontoxic butterflies have evolved similar color patterns to mimic toxic butterflies and avoid being eaten. The research team was able to pinpoint a single gene responsible for two different families of butterflies' flashy markings.

"This result represents the culmination of a decade's worth of effort, but we identified the genetic mechanism responsible for the dark patches on butterfly wings," Gallant said.



Jason Gallant, MSU integrative biologist, studied butterflies to illustrate his metaphorical roadmap on evolutionary traits.

The project involved genome sequencing of North American white admiral butterflies and red-spotted purple butterflies, as well as several species of South American butterflies. These two North and South American groups last shared a common ancestor 65 million years

ago. Out of the 30,000 genes examined, the researchers discovered that variation in the gene *Wnt* causes the differences in wing patterns. In the North American group, the variation is caused by a retrotransposon—a DNA virus of sorts.

"It's the same type of DNA 'virus' that causes random-colored kernels in Indian corn," Gallant explained. "In the South American species, the cause is a chromosomal abnormality in the same position of the genome.

"The jury is still out on the evolution of complicated traits," he added, "but when it comes to simple traits, there may be fewer roads leading to Rome than we once thought." 🍀