

# BIOVERSE

FALL 2017 / Alumni Newsletter



**Oregon State**  
University

# BIOVERSE

## Fall 2017

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2



4



10



18



20

## Contents



6 Feature

2

### Outreach

Standing up for science

4

### Students

Adventures in science

6

### Feature

A genomic revolution

9

### In Memoriam

Their lives, their legacies

10

### Travels

Out of East Africa

12

### Research

From the lab to the field

15

### Student Success

Building skills for 21st  
century science

16

### Awards

Garnering honors at home  
and abroad

18

### Alumni

Taking science OUT THERE

20

### Illustration

When science meets art



Oregon State University  
College of Science



Virginia Weis  
Department Head

# FROM THE HEAD

Welcome to our second annual alumni newsletter! As a new academic year begins, Integrative Biology continues to make student success a top priority. We developed a course on career development for all incoming students and launched a new introductory course in marine biology to add to the campus-wide Marine Studies Initiative. Our faculty are leaders in the nation in pedagogical innovation. The active learning techniques they have incorporated into the classroom over the last several years are paying off, as evidenced by more students successfully completing our introductory biology course series.

Our nationally ranked graduate program continues to thrive. Thanks to graduate teaching assistantships, most students receive extensive training in the latest teaching innovations. Three students are working on OSU's Graduate Certificate in College and University Teaching, a program started in our department that is now offered university-wide. Excellence in research training is also prevalent, as evidenced by 13 of our 65 students receiving highly competitive research fellowships, including 11 from the National Science Foundation.

Our faculty continue to excel in research. Last year they published 122 journal articles and received \$5.7 million in extramural grant funding. Bob Mason received the F. A. Gilfillan Memorial Award for Distinguished Scholarship, the College of Science's highest honor. Jane Lubchenco received numerous awards, including the Oregon History Makers Medal from the Oregon Historical Society and the National Academy of Sciences Public Welfare Medal. Congratulations to Dee Denver and Doug Warrick who were promoted to full professor. Our faculty had a strong year of team building and fostering shared governance. At a spring retreat, we discussed our graduate program, our hiring plan and issues of equity, justice and inclusion.

We continue to strengthen our impact throughout Oregon and beyond. Our graduate students organized a second annual Open House for the 2017 Spring Family Weekend that attracted 250 visitors! The event included tours through our research and teaching labs, hand-on activities and mini-presentations of our research. Undergraduate and graduate students also participated in OSU's Discovery Days, a semi-annual event that brings hundreds of K-12 students, many from underserved areas of Oregon, to campus to learn about science.

Finally, I would like to thank our alumni and donors, who have so generously contributed to our faculty and students. I am proud to share their success stories with you and the tremendous impact they have made through gifts supporting scholarships, research and teaching.



## Wanted: Biology & Zoology alumni

Have you moved? Stayed in the same place for 30 years? Gotten married or welcomed new family members? Taken up a new hobby or traveled to Timbuktu?

Nothing new but you just want to say hi? We'd LOVE to hear from you!

Take a few minutes and let us know how you're doing. Your fellow Beavers are eager to hear!

Email [ib-alumni@oregonstate.edu](mailto:ib-alumni@oregonstate.edu) or fill out this quick form online at: [ib.oregonstate.edu/alumni](http://ib.oregonstate.edu/alumni)

# OUTREACH



Ocean acidification has huge implications for Oregon's oyster industry

## Making science more accessible and trustworthy

By: Jane Lubchenco

Make no mistake: a quiet revolution is underway. Scientists – faculty and students alike – are motivated to go beyond their historical roles of discovering new knowledge through research and sharing it with scientific colleagues. They are also now increasingly stepping out of the ivory tower to engage with citizens and decision-makers directly. This broader engagement with society is increasingly important to both science and society, especially in our ‘post-truth’ world where assertion and belief often trump evidence and where most Americans cannot name a living scientist<sup>1</sup>.

Integrative Biology students have long been immersed in the exciting discovery side of science through research projects. But in a time of rapid societal and environmental changes, simply publishing new findings in the peer-reviewed scientific literature and trusting that this knowledge will make it into the hands of citizens, elected officials and business leaders is no longer sufficient. Decision-makers need the most up-to-date knowledge, and

they need to understand its limitations and implications, ideally through exchanges with someone who can respond knowledgeably to questions.

Likewise, non-scientists often have valuable information or stimulating questions that can enhance scientific discoveries. If citizens have helped collect data, and understand the concepts and methods behind a research project, they are more likely to trust the results. If done well, everyone benefits from this broader engagement of scientists.

Integrative Biology is on the cutting-edge of this greater engagement with society. Through workshops and courses, our scientists are discovering how to talk about their science in ways that are more accessible to non-scientists. I call it learning to be ‘bilingual’ – being able to speak the language of science but also communicate effectively with non-scientists. For example, social scientists tell us that stories are ‘sticky’ – people remember them.

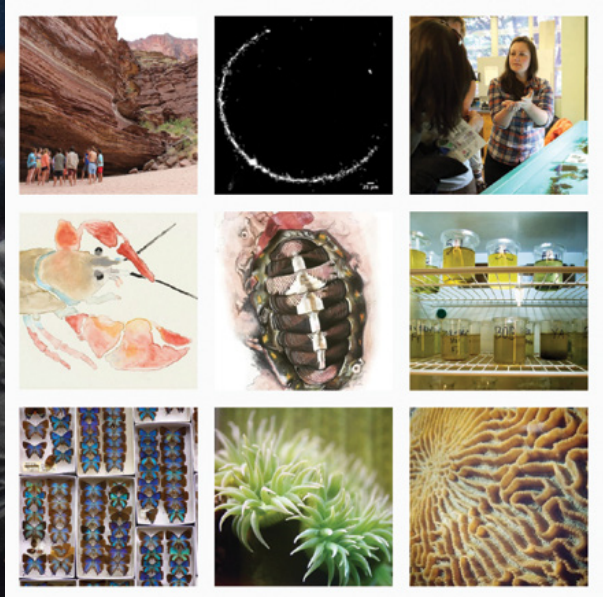
Stories also make a scientist seem more accessible, more human, less intimidating, and more trustworthy. So,

scientists are learning how to tell stories about their research. Initially, it’s an uncomfortable way of communicating. It doesn’t seem “science,” but they quickly discover it works.

Our scientists are also finding new ways to enable citizens to participate in research efforts and policy makers and industry to act on those findings. For example, Integrative Biology researchers are leading efforts to engage citizens along the Oregon coast in measuring local changes in ocean chemistry. The ocean is becoming corrosive because it absorbs extra carbon dioxide people have put into the atmosphere. This ‘ocean acidification’ has huge implications for the oyster industry in Oregon. The shellfish industry is engaged. Elected officials are paying attention. In July 2017, the Oregon legislature passed a bill to initiate new state efforts to monitor and address ocean acidification off our shores. All because our scientists are engaged with them and their constituents.

These and other efforts are building strong bridges between our scientists who conduct fundamental research with those who are interested in and can use

Marine ecologist Francis Chan (L) and population biologist Ben Dalziel (R) at last spring's Science Worth Spreading event



this knowledge as well as contribute to it. "The times, they are a' changin'!"

1. *Frontiers in Ecology and Evolution* 15(1):3. [doi.org/10.1002/fee.1454](https://doi.org/10.1002/fee.1454)

## Our champion for science

A shining example of the kind of science advocacy she extols (see opposite page), **Jane Lubchenco** has stepped up more than once in the last year to champion science. Her influential editorial published last February in the journal *Frontiers in Ecology and the Environment* urged scientists to step out of the lab and "engage more vigorously with society" in a "post-truth world" where climate change denial persists amid mounting evidence of its devastating impact.

Lubchenco also spoke at the annual meeting of the American Association for the Advancement of Science on incentive-based solutions to remediate and sustain our oceans instead of polluting, overfishing and acidifying them. As the main source of protein production for three billion people, our oceans are responsible for the employment of more than 200 million people and contribute \$270 billion to

the planet's gross domestic product. Smart planning is critical not only for the oceans' health but for our own.

## Biology shines at Science Worth Spreading event

**Jane Lubchenco**, marine ecologist **Francis Chan** and population biologist **Ben Dalziel** starred at last spring's Science Worth Spreading event on campus, a morning of powerful, stimulating 7-minute talks by OSU scientists designed to engage and enlighten the public about the scientific research going on in their own backyard. Lubchenco kicked off the event via video, issuing a clarion call for the public value of science in these changing times.

Dalziel gave a talk entitled "Ecology in the Age of Cities" while Chan spoke on "Science in our Changing Oceans." Other OSU speakers included policy expert Brent Steel, chemist Sandra Loesgen and mathematician Vrushali Bokil and Oregon Angel Fund investor Eric Rosenfeld.

[Check out the video of the event](#) on the College of Science YouTube channel: [science.oregonstate.edu/youtube](https://science.oregonstate.edu/youtube).

## Biology is social

The department increased its online presence. Check out our Twitter page to read about our exciting new research, discoveries and upcoming events. Follow us @OSUIB and the College of Science @OSUScience!

We also launched an Instagram page (sneak peek above) to visually showcase the beauty of biology and all that we do.

We are making steady progress attracting followers and have a good bunch of folks from beyond OSU! Watch for cool pictures and science on our Instagram this year!

## Integrative Biology

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“There are so many research experiences in the College of Science.”

— Milan Sengthep, who traveled to Australia, including Orpheus Island (inset).

# STUDENTS

Half a world away in Australia, **Milan Sengthep** is studying with world-renowned marine scientists at James Cook University. Milan is exuberant about studying integrative biology at Oregon State. She decided on a career in marine science after a middle-school field trip to the Oregon Coast Aquarium, highlighting the powerful impact of early exposure to science.

“My advisors and every graduate student/professor/staff in the department are the coolest, most amazing people I've ever met. My advisors helped me navigate stress, planned my career here and challenged me to be a better student,” said Milan. “They're always an email away whenever I need advice!”

A junior biology major with a chemistry minor, Milan was born in Boise, ID, where her parents immigrated from Thailand. They worked hard to establish a new life, always encouraging Milan and her brother to pursue education. Her mother earned a bachelor's degree

in Thailand but her father left before finishing high school. Despite best efforts, he was unable to complete his diploma here due to the need to provide for his family and language difficulties.

Milan is a recipient of a Wei Family Foundation Scholarship, which supports undergraduate and graduate science students with a 3.5 GPA or above, especially those of Chinese ancestry or who have lived in China. Totalling \$100,000 per year with awards of \$6-8,000/student, the scholarship honors the legacy of OSU alumna Chung Kwai Lui, who emigrated from China, was one of the first students to enroll in the new physics graduate program in 1936 and was OSU's first female Ph.D. in physics.

Half-Chinese and half-Thai, Milan's spirit of adventure and love of travel and new cultures mirrors that of Chung Kwai Lui. After graduation, Milan plans to combine a master's degree with her love of travel, applying to programs on the East Coast, Hawaii and Australia.

## Revelations in Mexico

**Elaina Galaviz** was not content to stay in her Oregon “bubble.” Inspired by her father, who serves as a physician for rural communities in Argentina, Guatemala and Nicaragua, Elaina decided to intern at medical clinics in Mexico. She wants to continue working abroad, and the experience also shifted her career ambitions from being a nurse practitioner to a midwife. “Being a part of the birth experience made me look at myself, who I am and the skills I have,” she says. “Going abroad made me see there are no limitations on what I can do.”





## A packed house

[The Integrative Biology Graduate Student Association \(IBGSA\)](#) did an incredible job hosting and organizing our second annual Integrative Biology Open House during OSU Spring Family Weekend last May. The event was a tremendous success: bigger and better than ever!

IBGSA coordinated impressive outreach events in 15 teaching and research labs, showcasing frogs, corals, anemones, fish, fruit flies, human lungs, sheep brains, sea stars, beetles, crayfish, owl pellets, and numerous other specimens. Students and families enjoyed a variety of activities and attended scientific talks to learn about our research. IBGSA also hosted a silent auction with items donated by graduate students and faculty from the department.

**Mark your calendars:** Next year's Open House will be May 6, 2018. Hope to see you there!

## Undergraduate Clubs

**Integrative Biology Club (IBC)** offers students opportunities to experience science outside of OSU through participation in weekend field trips, lab tours and day excursions. Members share their passion for science through

Discovery Days outreach events, helping thousands of K-12 students experience the fascinating world of science. Committed to service, IBC continues a long tradition of collaboration with local non-profit groups such as Green Belt Land Trust and Chintimini Wildlife Center, connecting students to meaningful experiential learning opportunities. Follow IBC on Facebook ([OSU Integrative Biology Club](#)) and Instagram ([integrativebioclub](#)).

Zoology major **Lacy Haig** is one of the founders of an exciting new interdisciplinary student association, the OSU Natural History & Collections Club (NHCC). The goal of the club is to foster student engagement with natural collections across three colleges at OSU, the College of Science, the College of Agricultural Sciences and the College of Earth, Ocean, and Atmospheric Sciences. Working with IB's Jennifer Olarra and Christopher Marshall as club advisors along with the curators of the Herbarium and the Fish, Bird and Mammal collections, the club has already provided curatorial assistance and conducted outreach activities to teach about the science and operations that take place in these research units.

As the club membership grows, the NHCC intends to establish ties with the other Natural History Collections on campus. Stay connected to the club on Facebook: [facebook.com/NHCCOSU](https://facebook.com/NHCCOSU).



## Taking funding into her own hands

Graduate student **Katie Dzedzic** is following an increasing trend nationwide among scientists to turn to crowdfunding for her research. She successfully funded her project, "Can corals acclimate and adapt to a warming ocean?" for \$3,822—111% of her goal—in February on experiment.com. As ocean warming continues to threaten coral reefs worldwide, it is uncertain whether they will survive. Dzedzic is exploring how corals will adapt, specifically investigating how thermal acclimation can be a potential mechanism for coral adaptation and evolution.

Funders can view her progress, including methods, lab notes and results, and participate in an online discussion about her work at [experiment.com/coralacclimation](https://experiment.com/coralacclimation). One funder opted to support Dzedzic's research in lieu of sending Christmas cards. #BestGiftEver



# A GENOMIC REVOLUTION

*Aiptasia* is a model sea anemone with a complete reference genome sequence that is easy to maintain and manipulate in the lab. Phylogenetic tree adapted from Baumgarten et al. PNAS 2015 112 (38).

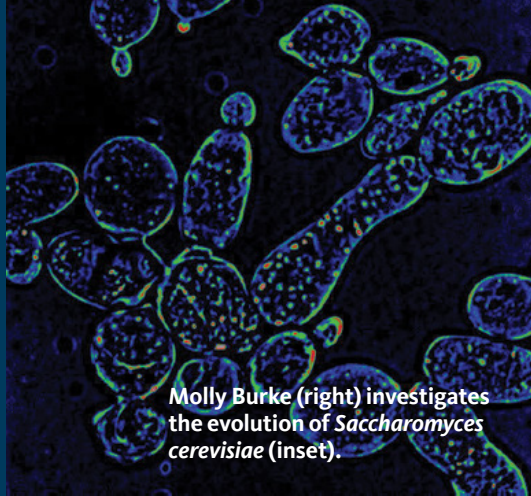


*Genomics*, the branch of biology that studies the full complement of an organism's DNA, is in the midst of an explosion in technology, innovation and discovery that is revolutionizing our understanding of living systems and how they evolve at virtually all scales. From explicating the processes that take place within individual cells to providing clues about how evolutionary processes shaped Earth's biodiversity, genomics furthers the understanding of complex biological systems.

Genomic information is so useful that it's hard to find areas of biology (ecology, medicine, comparative studies, etc.) that are not being transformed by it. Because genomics draws upon mathematics, computer science, statistics and engineering to interpret genomic data, it is by nature an interdisciplinary field of inquiry.

A hallmark of genomic research is the use of high throughput DNA sequencing to cost effectively and quickly analyze thousands of genes at once, unlike genetics, which studies individual genes and their roles in inheritance. This ability has radically changed scientists' view of evolution, which up until a few years ago was thought, per Darwin, to happen very slowly, over thousands or even millions of years. Thanks to genomics, we now understand that the pace of evolution can be extremely fast, with changes taking place over only a few generations, allowing scientists to get results in only a few years.

In numerous labs across campus, IB faculty and graduate students are using state-of-the-art genomic tools and analytical techniques to make groundbreaking discoveries.



## The power of DNA sequencing

**Dee Denver's** lab studies the evolutionary dynamics of diverse genomes, from phage, bacteria, nematodes and anemones to trees, using next-generation DNA sequencing data to investigate patterns of mutation and natural selection quickly and cheaply across entire genomes. They have also developed new "Genome Skimming" methods to discover previously undiscovered endosymbionts, genes of interest, and patterns of genetic diversity, techniques that Denver shared last year in *PLoS Pathogens*.

Denver also launched a new feature to catalyze research in the *Journal of Nematology* called "Genome Report," short technical reports of genome assemblies of nematodes that are free and open access. Denver collaborates regularly with OSU's College of Agricultural Sciences and the Agricultural Research Service within USDA, and is currently working closely with Rory McDonnell in the Department of Crop and Soil Science on the genomics of agriculture-relevant nematodes.

## How stress affects coral reefs — and human health

Marine biologist **Virginia Weis** is one of eight researchers across the country selected for a new \$14 million National Science Foundation

(NSF) program to develop enhanced genomic tools for more precise insights into how genetic makeup affects an organism's form and function. Building upon a 2016 NSF grant to identify the molecular and cellular interactions that occur during coral bleaching, Weis is leveraging a lifetime of research to map how the symbiotic partnership in a healthy coral reef functions on a genetic, cellular and molecular level.

Weis's work is vital not only to try and help save some of our dying coral reefs, but to advance human health. Our immune systems share some of the same molecular biology that corals do when it comes to stress, so understanding coral reefs could potentially advance cures for some of our most serious ailments, from asthma to arthritis to cancer.

## How stress affects evolution

**Molly Burke's** lab uses genomic tools to investigate the process of evolution in brewer's yeast (*Saccharomyces cerevisiae*). The lab uses a technique called experimental evolution, exposing populations to stressful environments and observing how the yeast DNA adapts in real time. Studying the genetic changes that occur under controlled laboratory conditions can shed light on how other organisms, including humans, evolve in nature.



## Circadian clocks

**Jaga Giebultowicz's** research explores how circadian clocks are involved in almost every significant biological process from lifespan to reproduction, metabolism, aging and disease. Her current research uses deep sequencing of genes expressed in young versus old *Drosophila*, or fruit flies, around the clock. Understanding how circadian transcription of genes changes with age in fruit flies may shed light on aging in mammals, which share many of the same basic biological properties, including circadian clock molecular mechanisms.

## Hotspots for genetic intervention

**Mike Blouin's** lab uses genomic mapping methods to find genes in steelhead trout that respond to selection in hatcheries, following on their 2016 study showing that domestication causes substantial and rapid genetic changes. The goal is to determine whether hatcheries can slow the rate at which hatchery fish evolve to have lower fitness in the wild than wild fish.

The lab also uses genomic mapping methods to identify genes in snails that make them resistant to infection by schistosomes, a trematode pathogen of humans in the tropics. The goal is to find new methods to block transmission of the parasite at the snail stage so that it cannot be transmitted to humans.

## Origin of species, redux

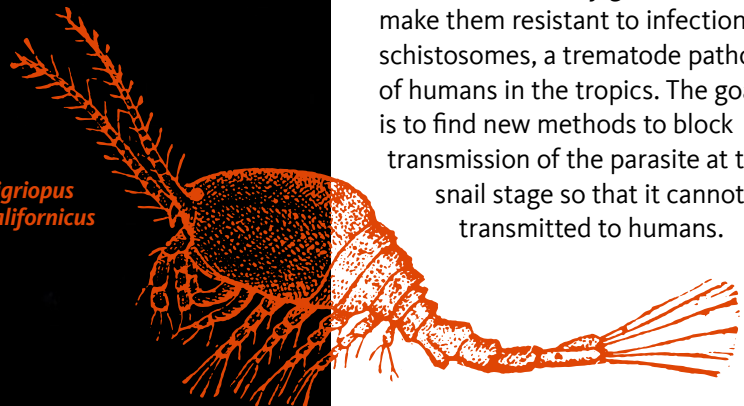
**Felipe Barreto's** lab studies the consequences of interbreeding between related but genetically different populations. They've discovered that hybrid offspring are sometimes physiologically weaker than their parents, but under certain ecological conditions such as elevated temperatures, they are healthier than the parents. Barreto's team is using genomic methods to reveal which genes are responsible for evolutionary changes in natural populations of a tiny tide pool crustacean (the copepod *Tigriopus californicus*).

also oysters. In addition, the lab is working to develop a systems biology perspective on responses to climate change, working with an interdisciplinary group of researchers across biology and other departments at OSU to examine emergent properties of coastal marine ecosystems, with the goal of understanding the rapidly evolving consequences of climate change.

## Climate change and marine ecosystems

**Eli Meyer's** lab studies the genomic basis for adaptive variation to stress from warming and increasingly acidic oceans on the part of corals and

*Tigriopus californicus*





## ▲ Robert “Doc” Storm

**Robert “Doc” Storm**, a foundational faculty member and friend of the College of Science for over 65 years, passed away in January 2016. Renowned for his pioneering research in herpetology, Doc produced nearly 50 scientific publications. But his most important and cherished contribution is the many students he mentored during his 36 years as an OSU professor. Doc influenced generations of biologists, whose theses and dissertations deal with nearly every group of vertebrates. Famous for his open-door policy and always being available to talk with students, Doc advised 71 graduate students, including 37 who completed their Ph.D. Those students produced at least another 50 doctorates, most of them herpetologists who made profound and important contributions to the field.

One of his students, **Bill Lovejoy (Ph.D., '72)** established an endowed Robert M. Storm Distinguished Lecture in Integrative Biology series in his honor that is held each spring.

Doc was also an ardent champion for undergraduate education at OSU winning the College of Science’s Loyd F. Carter Award in 1974 for outstanding and inspirational undergraduate

# IN MEMORIAM

teaching and served as head advisor in the Zoology Department for many years. Doc was an emeritus professor of zoology and up until his passing, at age 98, he still resided in Corvallis. He leaves behind a sister, Barbara Jean Jolley; his wife Patricia Elvalee Petzel; six children; three grandchildren; and twin great-grandsons. His first two wives predeceased him.

## Charles Everett King

**Charles Everett King**, emeritus professor of zoology, died in September 2016 at the age of 82. He arrived at Oregon State in 1977 and served as chair of the Department of Zoology for eight years, significantly increasing faculty hires and solidifying the department’s international reputation during his tenure. In 1986, he returned to full-time teaching and research until his retirement in 2002.

An evolutionary biologist, King used sophisticated mathematical models and field and laboratory work to study the population dynamics of rotifers, a form of zooplankton. His research advanced understanding of the evolutionary forces that control the histories and lifespans of animals.

He is survived by his wife, Davi Richards; sisters Rhoda Evers and Cher Villanova; two children; two stepchildren; and 10 grandchildren.

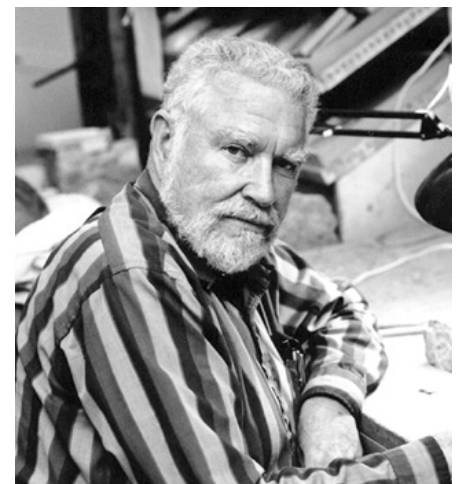
## Arthur James Boucot ►

**Arthur Boucot**, emeritus distinguished professor of zoology, passed away at the

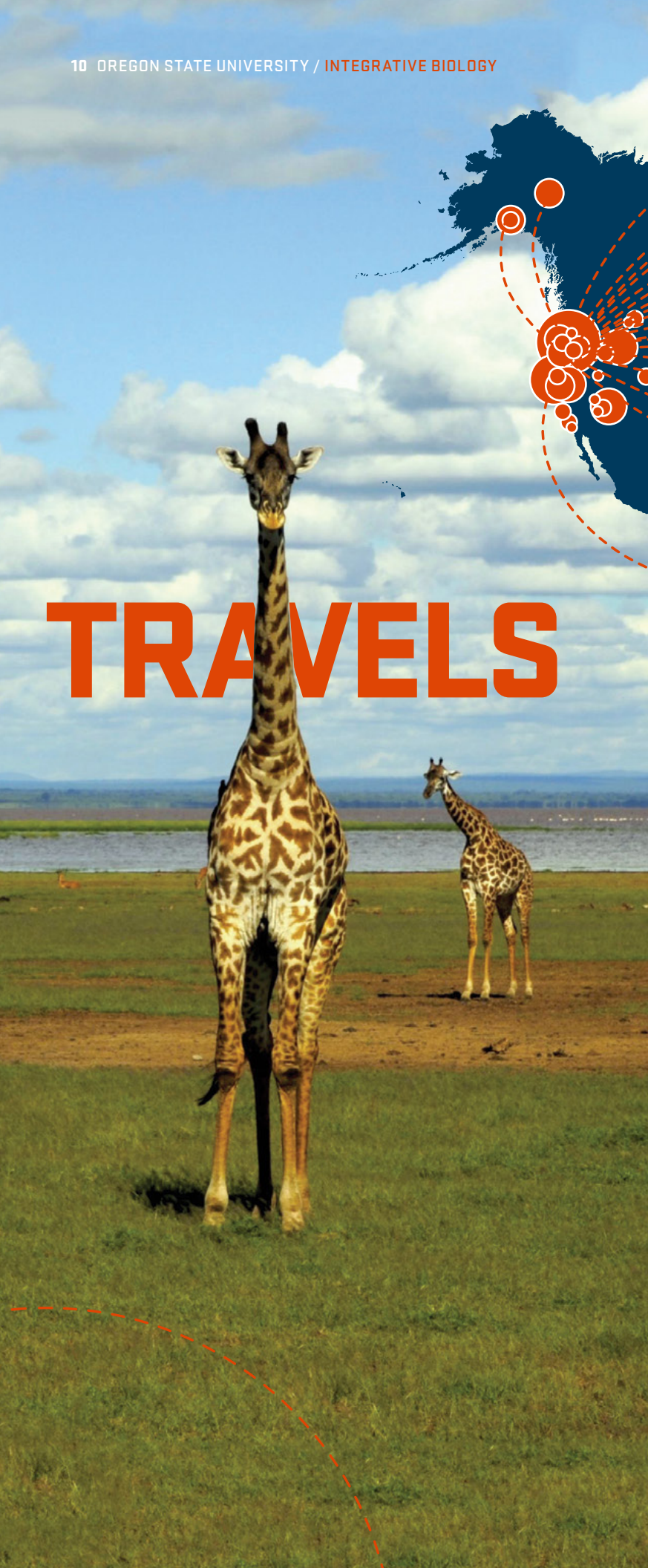
age of 92 in April 2017 while undergoing heart surgery. He taught at OSU from 1969 until his retirement in 2006, the capstone of what was a rich career. His early interests and precocious study of fossils and minerals—he started his geological studies at the Wagner Free Institute of Science at age 11—was interrupted by the mandatory military draft in 1943. Serving in the Air Force, he completed 46 missions over Western Europe and received the Distinguished Flying Cross before returning home to pursue his studies at Harvard University, where he earned a bachelor’s, master’s and Ph.D. in geology.

Boucot worked at MIT, CAL Tech and the University of Pennsylvania before coming to OSU, and received many honors throughout the years, including a Guggenheim Fellowship, Fellow to the Soviet Union, Senior Scholar to China and National Science Award. “The Boucot Plateau of the Geologists Range of Antarctica” was named in honor of his research for the U.S. Antarctic Program.

He is survived by his four children; three grandchildren; and companion Dr. Kathy Nichols.



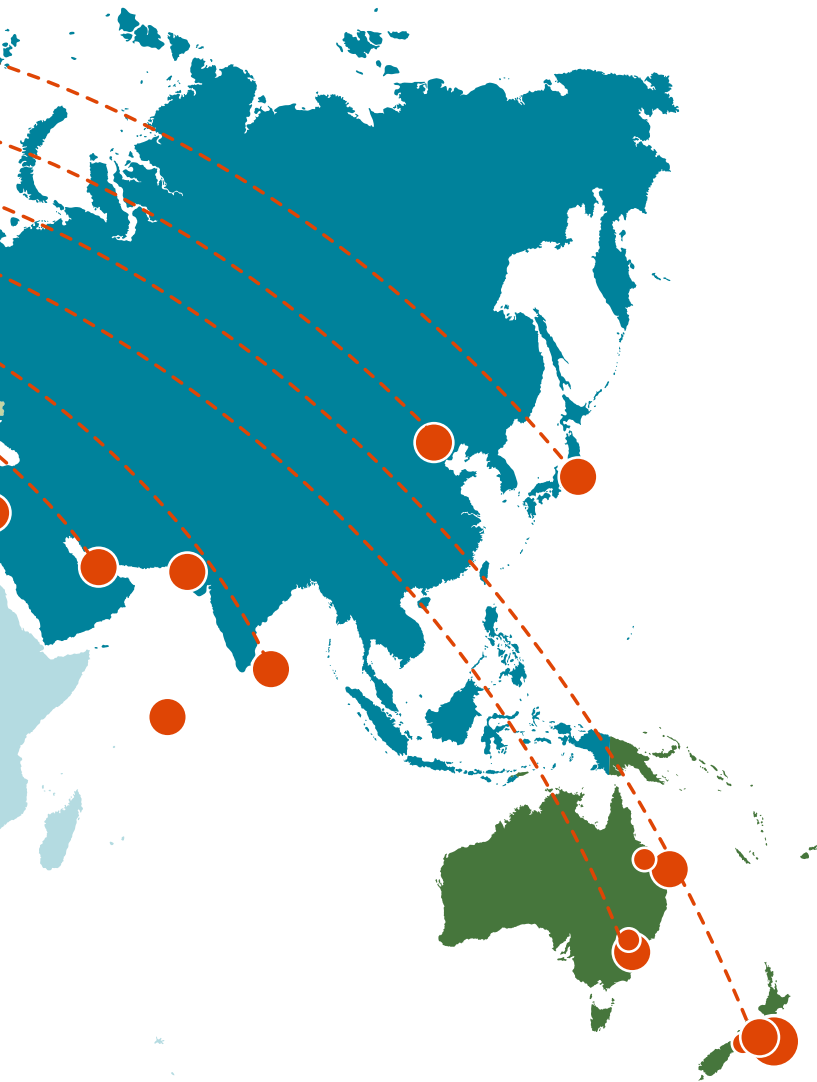
# TRAVELS



## Out of East Africa, always something new

Last spring, lead advisor **Brock McLeod** traveled to Tanzania to review and strengthen our relationship with a partner program, the School for Field Studies (SFS). During his travels, McLeod met with their outstanding faculty and staff, lived in student housing and went on student excursions to three national parks. Seeing large herds of elephants and having a lioness slink by his vehicle while stalking her prey were some of his notable wildlife adventures.

Our biology and zoology students who participated in SFS Tanzania program were immersed in the complex realities of wildlife ecology, management and conservation on the ground in East Africa. They conducted individual research projects that directly support and inform the surrounding communities and national parks. Students learned first-hand about Tanzanian culture, even using Swahili in their research and service projects, such as building the local community library.

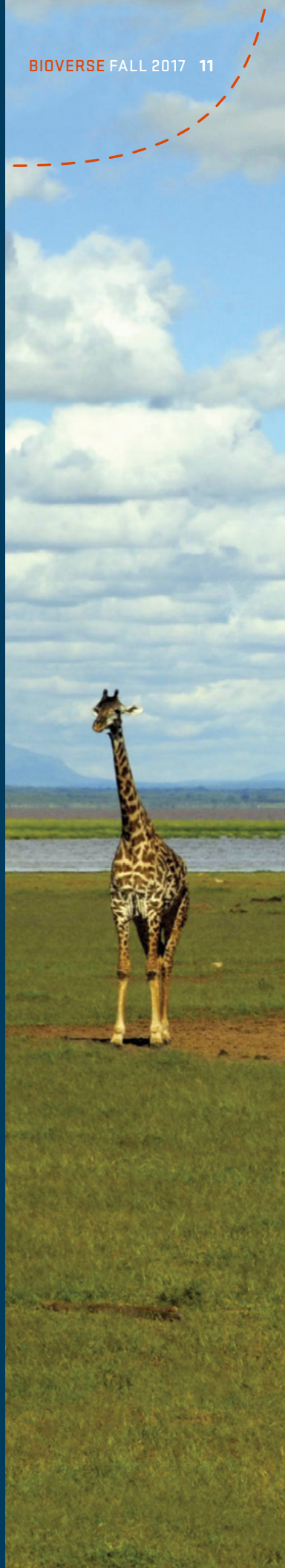


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 United Arab Emirates •  
 Vatican City •  
 Wales •

Overall, McLeod was quite impressed with both the quality and safety of the program. He came away with a renewed sense of the transformational power that international experiences have on our students.

The Department of Integrative Biology continues a long history of being a campus leader in the number of students who participate in study abroad experiences. Much of the success can be attributed to the department's deep commitment to these experiences and a belief in an undergraduate education offering a diverse set of academic programs that can be customized to the academic and professional interests of the student.

These transformative experiences, which range from clinical-based medical internships to study abroad to field-intensive programs like the one in Tanzania, are possible thanks to the generous support of our alumni and donors. The College of Science hopes to expand these transformative opportunities by providing financial support to more students, particularly those from disadvantaged backgrounds.



# RESEARCH

## Mark Novak

In his latest research, **Mark Novak** used statistical modeling that revealed factors that may slow rate of triggerfish predation. He used time-lapse photography in the Galapagos Marine Reserve suggests the presence of a key multilevel “trophic cascade” involving top-and mid-level predators as well as urchins and algae. Mark Novak, assistant professor of integrative biology, did statistical modeling to determine what factors could slow the rate of triggerfish predation on pencil urchins.

The findings are important because they include detailed information about interactions in a complex food web. Such information is crucial to knowing how to cause, prevent or reverse population changes within the web.

In the rocky, species-rich subtidal area off the Galapagos Islands, Novak and his team including researchers

from OSU and Brown University examined the relationships among predatory fishes, urchins, the algae that the urchins graze on, and how the interactions among them were influenced by sea lions and sharks at the top of the food chain.

In another study, Novak and his research team found that reducing human pressure on exploited predators and prey at the same time is the best way to help their populations recover. They published their findings in *Nature Ecology and Evolution*.

The findings about synchronous recovery are significant because historically about half the attempts at species restoration have amounted to a sequential, one-species-at-a-time tactic – usually the prey species first, then the predator.

But this study suggests that a synchronous approach almost always



From top left: Galapagos sea lion on the shore of North Seymour Island, Galapagos National Park; Mark Novak; Leah Segui and Kyle Coblentz in the Novak lab; A triggerfish and Spanish hogfish. (Photo by Jon Witman, Brown University)

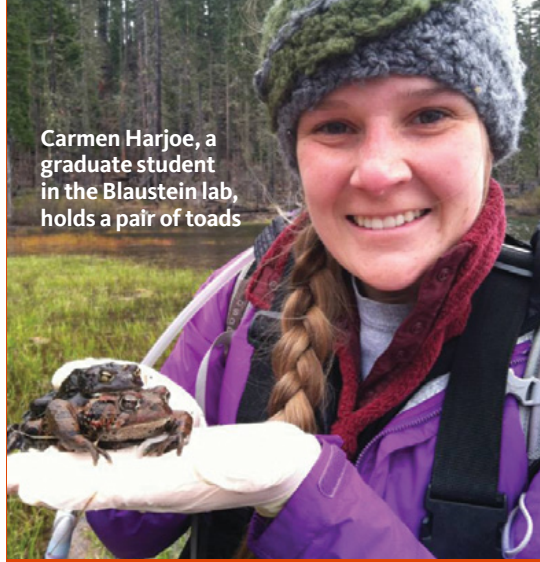
produces a recovery that is more rapid and more direct – faster than predator-first recovery and less prone to volatile population fluctuations than prey-first recovery. Just as crucial, synchronous is also better for the humans who earn a living harvesting the two species.

In November 2016, Novak and an international team of 37 scientists analyzed changes in kelp abundance in 34 regions of the planet that had been monitored over the past 50 years. This was the first global assessment of marine kelp ecosystems which shows that these critically-important habitats have exhibited a surprising resilience to environmental impacts over the past 50 years, but they have a wide variability in long-term responses that will call for regional management efforts to help protect their health in the future.

His team noted that kelp forests have a remarkable ability to recover quickly from extreme damage, but they can still be overwhelmed in some instances by the combination of global and local pressures. This points to the need for regional management efforts that carefully consider local conditions when trying to offset human-caused impacts from climate change, overfishing and direct harvests, according to Novak.

Kelp forests, the largest species of algae in shallow, coastal waters almost everywhere except the tropics, are a globally important foundation species that occupy almost half of the world's marine ecoregions. They help support commercial fisheries, nutrient cycling, shoreline protection, and are valued in the range of billions of dollars annually.

Carmen Harjoe, a graduate student in the Blaustein lab, holds a pair of toads



## Sharing biology with generations of students

Distinguished Professor **Andrew Blaustein** has taught Principles of Biology to tens of thousands of students since 1985.

He has been lauded for his outstanding teaching with College of Science awards such as the Frederick H. Horne Award for Sustained Excellence in Teaching Science and the Loyd Carter Award for Outstanding and Inspirational Teaching. In addition, Blaustein has been recognized nationally for his research in ecology, conservation biology, environmental science and animal behavior.

Blaustein's lab is at the forefront of amphibian decline. In the last 40 years, vertebrate species have declined by 52 percent, largely due to human activity. Amphibians are at the leading edge of biodiversity loss, with declines more severe than those of birds and mammals. While there are many contributing factors to amphibian decline, disease is the leading cause in terms of both population and species losses. Blaustein continues to assess the significance of declining amphibian populations, provide long-term monitoring of populations and investigate causes for declines.

Blaustein is a Fellow of three prestigious scientific professional societies: the American Association for the Advancement of Science (AAAS), the Animal Behavior Society and the Ecological Society of America.

## Su Sponaugle

In the **Sponaugle Lab** this summer, graduate students **Will Fennie** and **Kelsey Swieca** have been OUT THERE, literally on the open seas of the Pacific Ocean north of Newport where they collected juvenile rockfish as part of a collaborative research study. Rockfish aren't usually known for their good looks, but the tiger rockfish is trying to change that. Their signature feature is the thick dark stripes that run the length of their bright orange body. The researchers find them just as beautiful, though arguably not as voracious as their namesake and highly predatory cat.

Tiger rockfish favor the sea bottom in rock crevices, caves and around rocky outcroppings. The student researchers have found tiger rockfish in Oregon's Cascade Head, Redfish Rocks, Cape Falcon and Cape Perpetua Marine Reserves.

To raise awareness about their work, Will and Kelsey were live-streaming on Facebook while retrieving underwater traps. This was coordinated by the Oregon Department of Fisheries and Wildlife (ODFW). Apparently, many people were enthralled: they had more than 28,000 viewers! You can check out their video on Facebook @ODFWConservation.



Tiger rockfish

# STUDENT SUCCESS

## A redesigned biology series

We are thrilled with our newly redesigned, innovative **online introductory biology series** featuring a lab for applied life science majors. Launched in 2016, the series has already been recognized with three awards in the last two years.

Developed in collaboration with the Department of Botany and Plant Pathology in the College of Agricultural Sciences, the new Bi20x series places genetics, evolution and ecology first in the course sequence, followed by a cell and molecular biology course, and ending with courses in plant/animal physiology, evolutionary medicine, and Darwinian agriculture. By starting with genetics and evolution, instructors can weave evolution into the course series more extensively than was possible in the traditional sequence.

The companion laboratory is based strongly on several core competencies:

- Application of the process of science

- Use of quantitative reasoning, and
- Use of modeling and simulation.

The laboratory component combines innovative instructional technology, simulated experiments, and scientific writing with lab kits that provide actual experiments that students can perform at home. The laboratories in each course are built around four peer-graded writing assignments based on video-recorded data, online simulations, an online microscope tool, kit-based experiments, discussion boards and readings. The goal is to engage students in a rigorous and realistic experience akin to the scientific process.

This innovative approach has been highly successful. For instance, one anonymous student from spring 2016 had this to say: “The course does a great job of turning students into scientists. Learning how to read and write academic papers as well as learning about new research is really important as we make our way through our degree programs.”



## Making science vivid

Instructors team **Lesley Blair** and **Mark Lavery** (above) are passionate about advancing OSU’s mission to educate the public about science by teaching the popular general biology courses to hundreds of undergraduates from 72 different majors every year. For many years, they have been refining “VividScience,” which applies art and design principles to science teaching to cover topics from biodiversity, ecology, genetics, animal behavior and anatomy to disease. In the 600-seat arena classroom in the Learning Innovation Center, the duo construct “object assemblages” to explore science topics in conjunction with wall-to-wall screens, stellar acoustics, microphones and headsets to enhance student engagement and learning. Blair’s highly effective teaching methods were featured in *The Chronicle of Higher Education* last spring.





## Mathematical skills for life

There is a growing realization across the country that life science majors need mathematical skills beyond calculus to be successful in their careers. In that context, a couple of years ago Department Heads **Virginia Weis** (Integrative Biology) and **Enrique Thomann** (Mathematics) formed an interdisciplinary committee comprising mathematics and biology faculty to develop a new sequence for life science majors. The series blends calculus with ideas from probability, mathematical modeling and linear algebra, and emphasizes concepts over technical skills.

**Ben Dalziel**, an assistant professor with joint appointments in Integrative Biology and Mathematics, was the perfect person to launch the pilot of the first course, "Mathematical Ideas in Biology" last spring. He tested the concept on an eclectic group of students from pre-med to marine biology. The class worked together as a learning community and benefited from the diverse perspectives and backgrounds, including students who like math and those who have typically found math challenging or irrelevant.

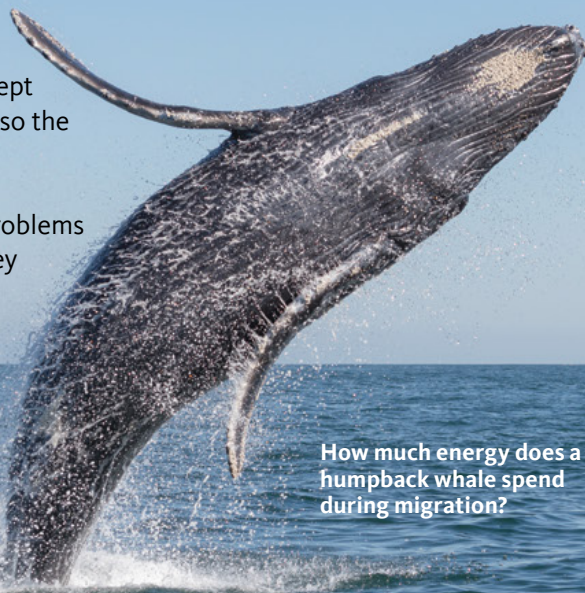
"Overall, the diversity of the students in the class not only kept the material 'on mission,' but also the instructor," said Dalziel.

Students tackled all sorts of problems in the course. For example, they

were asked to imagine they were working for the Centers for Disease Control on a mission to quantify how many cases of Ebola there would be next week, given the history of the epidemic thus far. They were asked to compute things like how much energy on average a humpback whale spends during migration, or what the weight of a cloud is.

Teaching the course was "a total blast" says Dalziel. "As a new father, I have become especially concerned with the challenges facing the world over the next 50 years, especially those posed by global climate change. I am truly counting on these students to meet those challenges, and I want to do whatever I can to help prepare them."

This fall, **Patrick De Leenheer** will teach the pilot of the second course. Other academic units across campus are watching the pilots very closely, in hopes of offering their students this new sequence instead of the more traditional STEM calculus sequence. The department is hopeful that this new sequence will better prepare undergraduates for tomorrow's challenges in the life sciences.



How much energy does a humpback whale spend during migration?

## Preparing graduates for a 21st century workforce

To help our students find rewarding jobs after graduation, the College created an innovative and unique **Integrated Professional Development Program** to promote student success and engagement during and after the undergraduate education. The program seeks to build essential professional skills that are career competencies but that are often not taught in higher education. Last spring the Department of Integrative Biology volunteered to help launch a pilot program for our students that integrates professional skill building into first-year experience courses through personal, interpersonal and career development. Student satisfaction has been extremely positive, with comments like "This course enables OSU students to push the boundaries of what can come out of an education," and "I've always been a good student but my definition has changed due to this class and what it has taught me about the balance between academics and professionalism." We are excited to roll out the course more broadly this year.

## Learning science through anatomy

The Introduction to Human Anatomy and Physiology course continues to serve Oregon State students pursuing health-related careers by providing a solid understanding of biology and scientific thinking. Students use and rely on this knowledge as they move into professional programs, including dentistry, optometry, physical therapy, physician assistantship, nursing, occupational therapy, and medicine.



Standing: Brock McLeod, Bob Mason, Sarah Mason, Lori Kayes.  
Seated: Karen McLeod, Virginia Weis, Devon Quick, Ian Quick

# AWARDS

## A Fulbright year in Poland

**Jaga Giebultowicz**, an expert on biological (circadian) clocks and their functions in organismal health, has been awarded a second Fulbright research and teaching scholarship for the year 2017-2018. Giebultowicz's Fulbright scholarship will take her to the University of Warsaw in Poland, where she will conduct research and teach in the Department of Experimental and Clinical Physiology.

## University awards

Congratulations to Senior Instructor **Devon Quick**, who received the 2016 OSU Faculty Teaching Excellence Award and to Advisor **Brock McLeod**, who won the OSU Academic Advising Award at the 2016 University Day! It is a tribute to our department and outstanding faculty and advisors that we won two out of the five of the university's most prestigious annual awards this last year.

## F.A. Gilfillan Award

**Robert T. Mason**, professor in the Department of Integrative Biology, received the F.A. Gilfillan Memorial Award for Distinguished Scholarship in Science. The Gilfillan award honors a faculty member in the College of Science whose scientific accomplishments have extended over a substantial period of time. Mason is an expert on reproduction in snakes and the physiological and endocrinological mechanisms underlying mating processes.

Since 1991, Mason and his research team have been studying the biology of the red-sided garter snake. Mason has nearly 150 peer-reviewed articles to his credit. He is currently the president of OSU's Faculty Senate.

As part of his award, Mason delivered the 2017 Gilfillan lecture, a wonderful talk entitled "The Garden of Eden revisited: What can we learn from

snakes, sex and scents." You can watch the video on the College of Science YouTube channel.

## Administrative excellence

**Traci Durrell-Khalife** won the Gladys Valley Award for Exemplary Administrative Support, which recognizes outstanding job performance and dedication by a College staff person to their department and to the College. Durrell-Khalife is the department's graduate admissions coordinator.

## Keeping the planet blue

Marine ecologist **Jane Lubchenco** joined two other previous winners of the Blue Planet Prize to celebrate the award's 25th anniversary. The annual award is given for pioneering scientific work that solves environmental problems.

At the Foreign Correspondents' Club of Japan in September, the three previous

winners issued a joint plea to world leaders to embrace effective solutions such as fishery reforms and marine reserves that bring social, economic, and environmental benefits. The other scientists were Robert Watson, former chief scientist for the U.K. Department for Environment, Food and Rural Affairs, and Thomas Lovejoy, a professor of environmental science and policy at George Mason University in Washington, D.C.

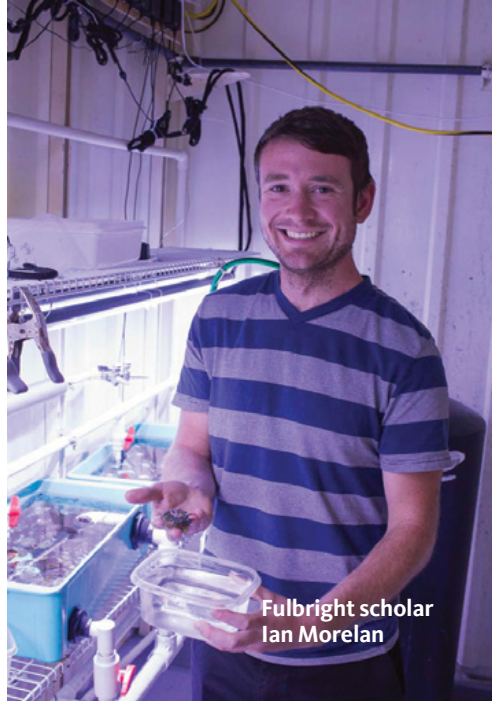
### Fulbright scholar heads to Norway

Doctoral student **Ian Morelan** won a Fulbright Scholarship to study abroad and work with Dr. Ingrid Bakke at the Norwegian University of Science and Technology in Trondheim, Norway to evaluate the feasibility of a new approach to create stable microbial communities that will outcompete pathogens in the multi-billion-dollar aquaculture industry in Norway.

### Ph.D. students get NSF Fellowships

Two Ph.D. students, **David Hubert** and **Claire Couch**, are two of seven students at OSU to receive the highly competitive and prestigious NSF Graduate Research Fellowship Program awards in 2017. Hubert, a high-school dropout who resumed his education at age 25, will study garter snakes in the world-famous snake caverns of the interlake region of Manitoba, Canada.

Couch spent eight months visiting Kruger National Park, one of South Africa's largest game reserves that is home to wonderfully diverse life forms. She studied microbe and host disease associations in the African buffalo. Couch, along with her peers, sedated the highly dangerous and large bovines in a herd with tranquilizer darts and collected blood and tissue samples.



Fulbright scholar  
Ian Morelan



NSF Graduate  
Fellow David Hubert



NSF Graduate  
Fellow Claire Couch

# OMSI

## OMSI Fellowship: Living & communicating science

The Oregon Museum of Science and Industry (OMSI) has awarded its Science Communication Fellowships to six students and faculty in our department. STEM professionals learn to better communicate with the public while exploring their broader impact in society. The program seeks to build the capacity of OSU-affiliated graduate students, faculty, personnel and post-docs in order to engage the public with OSU research.

Specifically, fellows participated in OMSI's Science Communication "Short Course," a series of workshops conducted over the course of three to four months focused on building skills to effectively communicate with public audiences, collaborated with museum educators to develop a unique, hands-on activity and display and hosted "Meet a Scientist" programs.

Congratulations to our recent OMSI Fellows!

### 2016 awardees

**James Pflug**, graduate student  
**Natalie Hambalek**, graduate student  
**Phil Pepe**, Instructor

### 2017 awardees

**Antonio Gomez**, graduate student  
**Sarah Gravem**, postdoctoral scholar  
**Jenna Sullivan**, graduate student

# ALUMNI



Biology Honors graduate Swechya Banskota ('17, inset) with Dr. Kim Eagle ('76, right).

## The Paul & Mary Roberts Fellowship

A new graduate student fellowship has been endowed by Integrative Biology Professor Emeritus **Paul Roberts**, who taught in the Department of Zoology for 35 years and his wife Mary, who worked as a research associate for many years in labs across campus. This year, three IB graduate students studying evolutionary biology — **Emily Bellis**, **John Sproul** and **Brian Tanis** — are the first to receive this generous fellowship.

## From Nepal to Portland: A journey through science

Biology Honors graduate **Swechya Banskota** made a dramatic move with her family from a Nepalese village to Portland, Oregon when she was in the middle of sixth grade. While she thrived academically in middle and high school, it wasn't until Oregon State that she broke through her shell and transformed into a confident and poised leader and peer mentor.

The enterprising undergrad moved from various leadership positions in the Honors College and College

of Science Student Advisory Board to become a Peer Mentor in the Department and in the Honors College. As a Ford Foundation fellow, Banskota has also mentored other Ford scholars at Oregon State. "Coming here as a teenager from Nepal," Banskota reflects, "it was very difficult for me to feel I belong. I faced language and cultural barriers. At OSU, I learned to take initiative and developed leadership skills through various roles and responsibilities."

Banskota also benefited from transformative experiences at OSU, such as summer interning at the Michigan Clinical Outcomes Research and Reporting Program (MCOORP) a rigorous and impactful patient outcomes research and reporting laboratory for heart disease founded by alumnus Dr. Kim Eagle ('76). As part of Banskota's work, she abstracted data for the International Registry for Aortic Dissection and, with Eagle's guidance, completed a research project on "Post-Operative Cardiac Tamponade in Type A Dissection Patients."

Eagle is effusive in his praise for Banskota, whose performance



was so "extraordinary" that he hired her as an MCOORP Student Leader to help coordinate student internships the following summer. He is eager for her to resume work in the cardiovascular center after graduation: "Swechya's intellect, compassion and organization skills are phenomenal. She has a spark for her work, her colleagues and for life that is infectious!"

The well-rounded Banskota also wrote and illustrated a graphic novel for her creative writing honors thesis about her own transplanted adolescence in America for other Nepalese-American youth.

## What can you do with a zoology degree? Become an aquarist!

"I have been in love with the ocean since I was a little girl," explains **Kaelie Sivihok** ('16), a zoology alumna who minored in marine biology and is now earning a certificate in Aquarium Science at Oregon Coast Community College. She began a blog to share her experiences with others, including her family, who generously helps her through college but lives out of state.

"I would love for people to see what they can do with a zoology degree," says Kaelie. "I just came back from an internship on Catalina Island, and have another one scheduled at Birch Aquarium at Scripps Institute of Oceanography in September."

Since October 2016, her life has been spent studying a great deal, but she has also enhanced her education with many experiential learning opportunities.

- Volunteering at the Oregon Coast Aquarium with one of the lead Aquarists, the same woman she volunteered with when she was a freshman at OSU. She spent her days cleaning filter bags and siphoning the fish tank. The fish were all so curious and kept nipping at my fingers, said Kaelie. She even cleaned the Green

Moray Eel tank by casually getting right inside the tank with him!

- Attended the 2016 State of the Coast Conference, which focused on communicating the coast through art and science, on a scholarship.
- Spent some late nights with OSU's PISCO Lab in Yachats, where she worked during her junior and senior year doing field research on intertidal ecology. Kaelie helped them with their projects during the night tides from 7:45 to 11:30 p.m.
- Fragged corals for Nutrition and Reproduction class. Fragging is basically a way to propagate the corals. "I had never done this before, and it was such a unique experience to learn!" said Kaelie.
- Spawn and sort a bunch of steelhead at the Alsea Hatchery.
- Visited the California Academy of Sciences in San Francisco, where her friend and fellow Oregon State alumna Celeste works in the Steinhart Aquarium.

"My dream to be a marine biologist has never wavered," said Kaelie. For more of Kaelie's adventures, visit her blog, which greets visitors with "Whale hello there" and ends with "Best fishes."



## A passion for animals

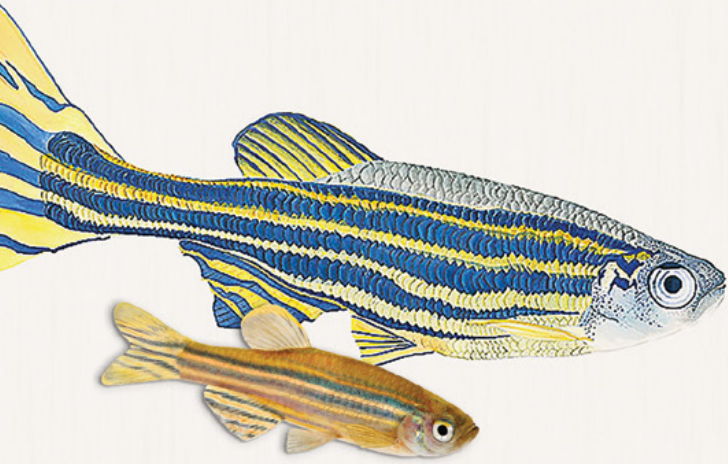
Zoology Honors alumna **Karianna Crowder** ('17) heads off to Cornell University this fall to pursue a doctorate in veterinary medicine, well prepared by her undergraduate studies and the hands-on experiences. She job-shadowed at the Small and Large Animal Teaching Hospital, observing everything from a sow C-section to the biopsy of a mini greyhound. Karianna spent many weekends volunteering at Chintimini Wildlife Center, cleaning and feeding injured wild animals, and at OSU's Sheep Center, where she mastered the art of "lambing," i.e. pulling a lamb from a pregnant ewe.

Karianna went to Thailand for three months to work in a primate sanctuary, studying white-cheeked gibbons displaced from their native habitat by human-caused rainforest destruction. These experiences gave her a new worldview and inspired her undergraduate thesis. She traveled to Nicaragua to help OSU vet students run a pet clinic for a week, where she treated 767 dogs, cats, pigs, cattle and horses.

On her time at OSU, Karianna expresses gratitude for the scholarships she received and the opportunities she discovered: "At such a big university, I wasn't sure I'd be more than just another face. But I got involved in so much. And professors know my name!"

"I have been in love with the ocean since I was a little girl."

—Kaelie Sivihok ('16)



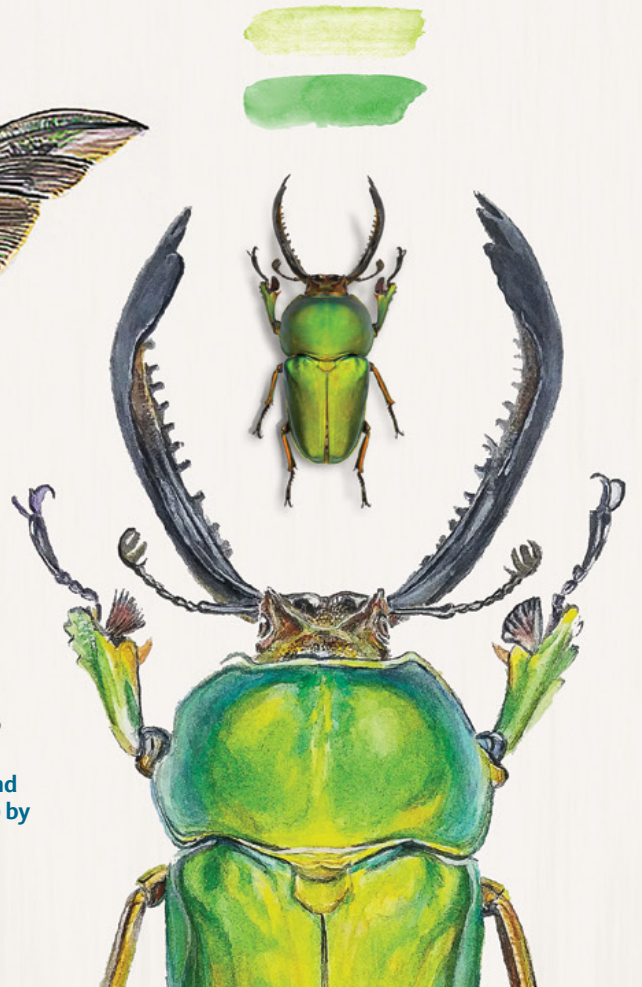
*Danio rerio* by Sarah Alto

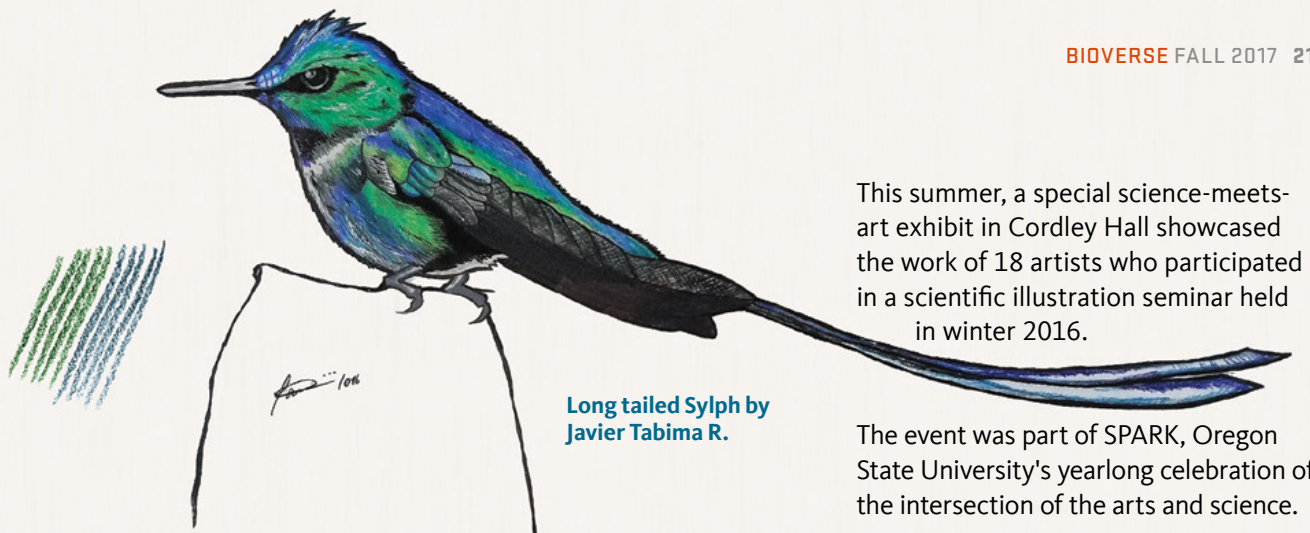


# SCIENTIFIC ILLUSTRATION



*Goliathus orientalis* (L) and *Lamprima adolphinae* (R) by Leeah Whittier





**Long tailed Sylph by Javier Tabima R.**

This summer, a special science-meets-art exhibit in Cordley Hall showcased the work of 18 artists who participated in a scientific illustration seminar held in winter 2016.

The event was part of SPARK, Oregon State University's yearlong celebration of the intersection of the arts and science.

The seminar cultivates students' passion for both science and art. Often thought of as opposite endeavors, art and science both draw from the power of human creativity and imagination to communicate and advance ideas and concepts.

Integrative Biology Professor David Maddison teaches the course biannually. It brings together graduate and undergraduate students from different majors and fields, including biology, botany and plant pathology and studio art.

Maddison has produced an extensive portfolio of illustrations, with most produced between 1976 and 1984. He began drawing again in April 2006 and hasn't stopped. The vast majority of his works are done with colored pencils, with inks and watercolors forming the highlights and shadows.

In the seminar, students bring a wide range of experiences and a common interest in biological illustration. They work to hone and share their skills using traditional and digital media, discuss the artistic process and consider the philosophical and practical relationship between art and science.

"I was so happy to take this class with my peers, many of whom had no background experience with art. Yet all of them managed to improve and make such wonderful illustrations," said Leah Whittier, a senior zoology student.



**Steller's Jay by Azita Roshani**



**Sino-Korean Owl Moth by Olivia Boyd;** *specimen photo by Anaxibia under CC BY-SA 3.0 license*





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