

COLLEGE OF SCIENCE DEPARTMENT OF INTEGRATIVE BIOLOGY

WINTER 2019 / Alumni Newsletter

BIOVERSE



Oregon State
University

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On the cover — Foot-and-mouth-disease inflicts severe economic losses in endemic countries. Researchers map disease transmission between wild buffalo and domestic cattle in Africa. See p. 12.

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Welcome alumni and friends!

This year, I am standing in for department head Virginia Weis, who is on a well-deserved sabbatical to further her studies on the symbiotic processes of cnidarians. With bleaching of coral reefs accelerating at an unprecedented rate, her research is critical on a global scale.

In this issue of our newsletter, you will find a sampling of our research, teaching and outreach. We have much to celebrate. Last year, we awarded 236 bachelor of science degrees in biology and zoology and 20 Honors College degrees. I am proud to announce that 100 of these students graduated with academic honors! We graduated 28 biology students at our OSU-Cascades campus, eight of whom earned academic honors. Eight of our students earned graduate degrees.

Overall, our research continues at a high pace and is accelerating. While the funding climate at the national level continues to be challenging, our faculty continue to compete successfully for national and private foundation grants, receiving a total of nearly \$2.5 million during fiscal year 2018. Faculty published 151 articles last year, increasing our publication rate by 23 percent and advancing the biological sciences! In the following pages, you will read about our research that reflects two themes frequently in the news today: global climate change and disease ecology.

I hope you also enjoy reading about the many awards and honors earned by our extraordinary faculty and students. I am so proud of their accomplishments!

Finally, I am delighted to announce that we are expanding our anatomy and physiology offerings to pre-health students with the addition of a new, state-of-the-art laboratory complex being built this year, thanks to a very generous \$250,000 gift from alumna Joan Suit and her husband Herman. Stay tuned for more details on this wonderful gift in the coming months.

We remain truly grateful for and are inspired by our alumni and friends around the world who continue to generously support our teaching and research mission. Read about the successes of our alumni and the impacts of your gifts in this newsletter.

I look forward to meeting you in person or by email in the coming months. Please stay in touch or reconnect with the Department of Integrative Biology and your alma mater! We would love to hear from you.

Robert Mason
Acting Head, Integrative Biology Department



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 or fill out this quick form online: ib.oregonstate.edu/alumni

Bright minds, bold moves

From class project to worldwide impact on ocean conservation

Over 50 countries, along with dozens of business, philanthropic and academic organizations, have made bold pledges at the high-profile Our Ocean Conference (OOC) over the last several years to restrict commercial use of the oceans and create Marine Protected Areas (MPAs) to sustain biodiversity, recover depleted fisheries and enhance ocean resilience in the face of climate change. But have any of these pledges actually been kept?

Doctoral students **Jenna Sullivan** and **Vanessa Constant** were the first to ask that question and the first to seek out an answer. In a graduate seminar led by Kirsten Grorud-Colvert and Jane Lubchenco, the duo started a project which gathered momentum and became an unprecedented 10-month analysis of all 202 of the MPA pledges made over the last four years. Drawing from online databases, websites, and personal communications, as well as networking with global leaders at the 5th International Marine Conservation Congress in Borneo last June, the students produced a stunning report card of ocean pledges made to date.

Sullivan and Constant's analysis showed that 46 percent of all pledges have been completed, 49 percent show evidence of at least some progress and only 5 percent show no progress. As a direct result of the OOC pledges, over 5 million square kilometers or 1.4 percent of the world's oceans have been protected by MPAs, roughly one-third of the ocean area currently protected. Nearly 2 percent of the ocean has been pledged to be an MPA but has not yet been implemented.

OOC leaders expressed delight with the analysis and the progress made to date, and as a result pledged to redouble their efforts to ensure more pledges are fulfilled. Thanks to the report, leaders immediately incorporated some of Sullivan and Constant's recommendations into the reporting requirements for the fall 2018 OOC when they learned how difficult it had been to obtain accurate information about the fate of pledges.

Thanks to the vision and persistence of these graduate students, this global ocean conference was moved to strengthen preservation efforts to secure our oceans' health for generations to come.



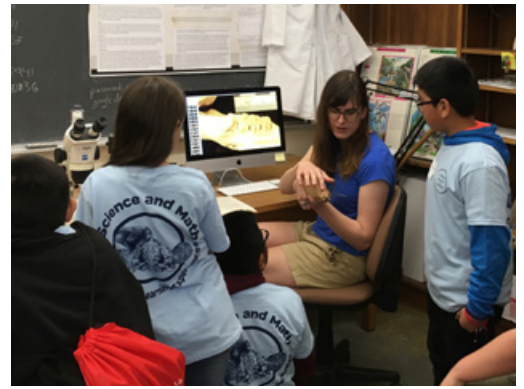
ARCS award fires up research

Jesse Laney, a first-year Ph.D. student, is one of 23 doctoral students across Oregon to be selected as a 2018 ARCS (Achievement Rewards for College Scientists) Foundation Oregon scholar. In his research, Laney employs historical records, specimens from museum collections and field surveys to investigate how terrestrial vertebrates (birds and small mammals) and communities within a montane desert ecosystem in the Northern Great Basin have responded to the intersection of climate change and anthropogenic impacts to the landscape. The ARCS award provides doctoral students with \$18,000, payable over three years at \$6,000 per year.

Science sparks SMILEs

The Integrative Biology Graduate Student Association (IBGSA) hosted a daylong science field trip on campus for over 80 elementary students from across Oregon last May. The students all participate in afterschool clubs coordinated through Science & Math Investigative Learning Experiences (SMILE), a precollege program at OSU that helps minority and rural students gain STEM (science, technology, engineering and math) skills and to consider a college education. The trip to OSU was their out-of-classroom adventure for the year.

Strategically planned activities encourage students to experience what science “looks, sounds and feels like” as a way to engage them in descriptive writing, deep observing, and visualizing themselves as scientists. The Novak and Terry Labs ran interactive classes featuring live crayfish, owl pellet dissection and a dodgeball feeding frenzy game. The IBGSA outreach committee ran several interactive stations: **Rebecca Mostow** demonstrated scientific illustration and haiku writing; **Dave DuBose** and **Antonio Gomez** showcased beetle diversity, and **Anne Devan-Song** and **Anh Ha** introduced the concept of genes and inheritance. Students bit into a fun workshop on teeth: **Brian Tanis** introduced the ins and outs of tooth form and function; **Juniper Grimes** showed how to image tiny rodent teeth; and **Michael Brawner** and kids created a 3D scan of a tribosphenic molar. To top it all off, the kids wore sculpin fish shirts designed by **Shannon Hennessey**. Overall, students said it was a blast!





Fresh perspectives

Menge Lab members in the field at Boiler Bay, a long-term study site. (L to R) Sarah Gravem (postdoc), Chenchen Shen (Ph.D. '16), Amanda Coracao (visiting from Brazil), Bruce Menge, Jenna Sullivan (doctoral student) and Kris Bauer (undergraduate).

Kris Bauer grew up in the farmlands of Colorado far from the ocean, yet an early interest in marine biology and an enterprising personality led the senior to pursue biology at Oregon State, where he has crafted a truly unique and remarkable college experience. Based on advice from his advisor, Brock McLeod, he pursued summer internships in marine biology and landed a volunteer position in Bruce Menge's lab, where he assisted with data collection for long-term ecological studies in the rocky intertidal zone. The work "wasn't glamorous, and was maybe a tiny bit tedious, but it was incredibly rewarding to be a part of the team," says Bauer.

Through the Menge Lab, Bauer met Sarah Gravem, a postdoctoral scholar in the PISCO (Partnership for the Interdisciplinary Studies of Coastal Oceans) program, as well as biology researchers Jonathan Robinson and Brittany Poirson. They invited Bauer to join them on their 3 a.m. field excursions to observe Oregon Coast tidal pools. Gazing into these beautiful and complex micro-universes for the first time, Bauer was hooked. While

doing this coastal work, Bauer became involved in genetic research on sea star wasting disease. A SURE science summer scholarship with Felipe Barreto resulted in a co-authored paper that Bauer presented at the Western Society of Naturalists last year.

As impressive as his research has been, Bauer is most proud of his role as a learning assistant. Working with Lori Kayes in her 200-level biology courses, Bauer — along with a few other upper-class biology majors — learned about teaching methods and applied them to assist their classmates. He relished not only the chance to gain real-world instructional skills, but also the opportunity to give back to other students some of the guidance and mentorship he felt privileged to have received himself.

Hayden Ton (Biology '18) juggled a busy pre-med course load while discovering a love for poetry and doing hands-on research in the Meyer Lab, where he studied changes in symbiont densities during thermal acclimation and stress in nine coral reef species. He also interned in an anthropological



Hayden Ton repairing a boardwalk as founding member of Corvallis Clean!

osteopathic lab and took on multiple leadership roles, including serving as vice president of the Poetry Club, assistant track-and-field coach at Linus Pauling Middle School and treasurer of Oregon State Cycling Club.

A natural entrepreneur, Ton was part of two start-up teams on campus, winning an Oregon State InnovationX competition for a nutritional food product and developing a smart lightbulb for indoor farming that was a semi-finalist for the Draper Competition. He also founded Corvallis Clean!, an organization that coordinates over 50 student volunteers who work directly with Parks and Recreation of Corvallis to clean up trash, restore native plants and repair pedestrian boardwalks and bridges in local parks and woodlands.

Ton's core passion, however, is to "help children reach their full potential." On campus he volunteered with IMPACT, a motor skills fitness program for children with special needs, and curated "Art Saves Lives" at The Arts Center in Corvallis, a joint project with OSU's Counseling and Psychological



“I got to actually grab a sloth, put it on the tree and release it to the wild. It was an unforgettable experience.”

Tonya Allison, Costa Rica



Prema Nissinen and gelding Copper.
Photo by Amanda Marmon Takagi

Services showcasing art by young adults with mental health challenges.

Currently a children’s behavioral art therapist in Portland, Ton will start med school next fall in pediatrics, subspecializing in child psychiatry. He’s happy to have gotten through the “bottleneck” of med school admissions, already admitted to one school and waiting to hear from another before making his decision. He is grateful for the strong support he received from his pre-med advisor, Cody Duncan, and all of the “doers” and “people all around who continuously welcome creativity” at Oregon State.

Tonya Allison (Zoology ’18) handled sloths, toucans, owls, nutria and kinkajous as a wildlife husbandry and rehabilitation intern at the Toucan Rescue Ranch in Costa Rica during a three-month study abroad experience her senior year. Allison, who never imagined she would be able to study abroad, was thrilled by her experience, supported by a Benjamin Gilman International Scholarship. At the ranch, which housed almost 150 animals across a wide variety of species, she

cleaned cages, prepped the food and fed the animals and tackled any other odd task that came her way with enthusiasm. Her fluency in Spanish enabled her to take on a leadership role and train other volunteers.

“Overall, my internship abroad gave me a wider perspective on a lot of things,” reflects Allison, “like understanding the importance of conservation, learning to get out of my comfort zone and trying out different things.”

Allison is a first-generation student who has worked two jobs continuously to support herself since the age of 16. She was able to realize her dream of going to college thanks to her hard work and the generosity of others. Oregon State offered her an OSU Diversity Achievement Scholarship, the Oregon Opportunity Grant and Federal Pell Grants. Allison plans to attend graduate school to study animal behavior or wildlife conservation.

Prema Nissinen, a Presidential Scholar and Honors College sophomore in biology, has been riding and caring for horses since she was a five-year-old in

Norman, Oklahoma. After moving to Condon, a small farming community in Eastern Oregon, at age seven, Nissinen started raising and training animals while participating in 4-H activities. As a teen she added volunteering at a local veterinary clinic. Along the way, she “fell in love with science” and solidified her childhood dream of becoming a veterinarian.

At OSU, Nissinen brought her love for animals to campus and wasted no time in getting hands-on freshman year with the Pre-Vet Medical Association and the OSU Sheep and Horse Centers. Now a sophomore, she seeks a broad exposure to different subjects. She hopes to enroll in business and computer science classes and pursue a minor in animal sciences. Nissinen is also keenly exploring campus research labs focused on biological and animal sciences, and is looking forward to getting a head start on her honors thesis. Her undergraduate goals include securing summer internships in veterinary clinics in different parts of the country and even abroad. “I realize that’s a lot. I probably have to narrow it down at some point,” says Nissinen. ■

Ready, set, *go*

Championing student success

Lori Kayes and others are making strides toward a more inclusive Oregon State

Our secret sauce

First impressions mean a lot. New and prospective biology students on campus interact early in their academic career with at least one of “the four T’s” in our main office: **Tara Bevandich, Traci Durrell-Khalife, Trudy Powell** or **Tresa Bowlin**. The four T’s ensure students navigate the vast array of department activities smoothly and efficiently and see the big picture as well as zero in on the nitty-gritty logistics to maximize their time here and get their degree. Our students (and faculty!) benefit from their professionalism, caring demeanor and dedication.

When it comes to academic guidance, our advisors lead the pack. **Brock McLeod, Jennifer Olarra, Maureen Leong-Kee** and **Cody Duncan** are professionals with a keen ability to match undergraduate students’ interests, passions and skills to the many academic resources and opportunities in the department, in the College and on campus. Their coaching and stewardship start well before students set foot in a classroom and continue through graduation and beyond.

We host orientation courses for all new biology and zoology majors to help them learn the basics and make a smooth transition to university life.

Boosting diversity

Ongoing efforts to increase inclusion, access and excellence in science education at Oregon State received a significant impetus with a recent five-year \$1 million grant from the Howard Hughes Medical Institute to improve instruction in undergraduate STEM (science, technology, engineering and mathematics) classrooms. The ambitious project, called Inclusive Excellence @ Oregon State, aims to produce sweeping cultural changes in post-secondary institutions through a variety of pedagogical approaches to increase diversity and inclusion of underrepresented minority students, first-generation students and economically disadvantaged students in science.

Biology instructors **Lori Kayes** (a co-principal investigator) and **Devon Quick**, along with acting department head **Robert Mason**, are involved with

the project. How will it affect teaching in the department? “We have already done a lot of transformative work in many of our biology classrooms,” says Kayes. “This grant will allow us to more specifically address those hard-to-get-at inclusivity practices in our courses to promote active learning and instill culturally responsive pedagogies to make *all* our students feel like they are a part of our learning community.” The project will provide direct training to faculty as well as financial and logistical support for implementing new practices in the classroom.

Lowering student costs

Lindsay Biga and **Devon Quick** coordinated a team of faculty from Oregon’s two-year and four-year public institutions to edit and improve a free online human anatomy and physiology textbook. The team reframed chapters with clear objectives, added text where descriptions lacked and edited for clarity and accuracy. **Leah Whittier** (Zoology ’17) increased inclusivity by adding and editing illustrations to include men and women representative of a variety of

races, ages and abilities. Thanks to this revision, all of our anatomy and physiology students are using this free textbook, saving them an estimated \$100,000 or more annually.

Building professional skills

Thanks to the College of Science's newly launched Integrated Professional Development program, biology and zoology majors now take first-year professional development courses that improve student networking and career development skills. In addition, biology and zoology students can further enhance their career skills through the College's new Science Professional Pursuits Program (SP³).

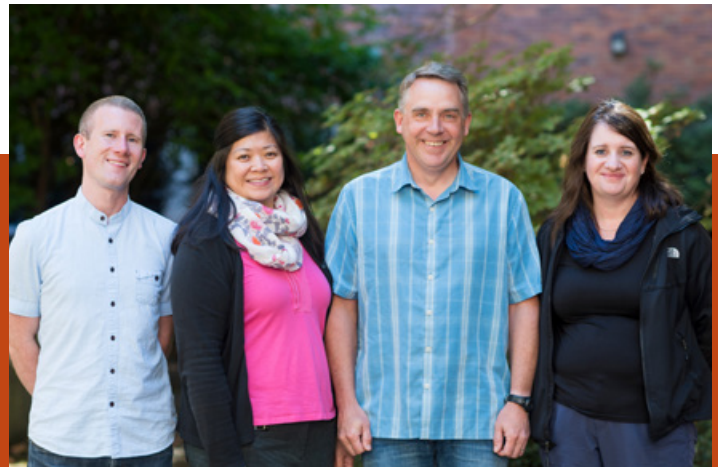
Undergraduate science students have the option to participate in a three-term program to learn the tools and get the guidance necessary to identify, assess and compete for experiences beyond the classroom to accelerate their professional and academic goals.

SP³ makes students more competitive for the pre-professional internships, research lab positions, job shadowing opportunities and other hands-on experiences that provide a real-world context and depth to students' classroom learning.

Students in these programs gain confidence and valuable transferable skills, from teamwork and

communication to creative problem-solving. In SP³ students also learn to translate their experiences, within the classroom or outside it, into an engaging and confident presentation of themselves, whether in a resume, interview or an elevator pitch. Students participate in one-on-one coaching, group exercises and mock interviews to rehearse and gain fluency and build confidence in different settings.

Launched last year, SP³ has received many positive reviews from students. This student's comment is typical: "It forced me to step out of my bubble and start applying for internships, attend career expos, and to just stop and think about where I wanted my life to lead."



Above: IB staff Traci Durrell-Khalife, Trudy Powell, Tara Bevandich and Tresa Bowlin; IB advisors Cody Duncan, Maureen Leong-Kee, Brock McLeod and Jen Olarra; Below: Lori Kayes mentors students in Principles of Biology; along with co-PI Lori, Devon Quick and Robert Mason are making strides in raising inclusivity and access via the Inclusive Excellence @ Oregon State project.



Ecologist Francis Chan
installs sensors in the
intertidal zone at Otter
Rock to monitor dropping
pH levels (photo by the
Surfrider Foundation).

FROM THE LABS

Navigating climate change

FRANCIS CHAN LAB

Hypoxia upon us: Pacific Coast climate stress

“Our ocean is changing,” said **Francis Chan**, the principal investigator on a new, four-year \$1.1 million grant funded by the National Oceanic and Atmospheric Administration (NOAA). The project seeks to detect, track and model hypoxia, or low oxygen, and its impact on fish populations.

“When we first measured hypoxia off Newport in 2002, we thought it might be a local phenomenon. That is no longer the case. Low oxygen is striking a big swath of the West Coast and is returning year after year.”

2018 was one of the worst summers yet for low oxygen waters on the Oregon Coast. Along with a prolonged and more intense wildfire season, the new “hypoxia season” is heavily influenced by climate change. Roughly a third of the human carbon dioxide emissions in our atmosphere are absorbed by our oceans, but this buffering effect comes at an increasing cost. The additional carbon dioxide makes our oceans more acidic. And ocean acidification both reduces the ability of marine creatures such as coral reefs and shellfish to attain the carbon they need for calcification and reduces the amount of available oxygen.

Hypoxia devastates not only fish and crustaceans but the near-shore Oregon communities and commercial fisheries that depend on them. “All our crabs were dead,” cried a Newport fisherman in the summer of 2018.

Chan’s research plays a key role in a large collaborative initiative involving many partners and funding sources, including the David and Lucile Packard Foundation, the PISCO (Partnership for the Interdisciplinary Studies of Coastal Oceans) program and the

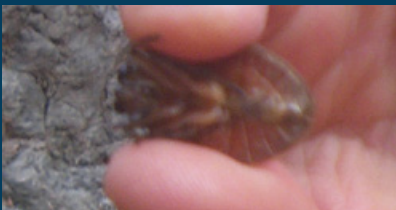
State of Oregon Vessel Funds Program in addition to the NOAA grant. He has marshaled a vast network of “citizen science” volunteers to place and collect pH monitoring containers along the West Coast and involved many young scientists in his research. Earlier this year, working with Steve Rumrill from the Oregon Department of Fisheries and Wildlife, Chan brought Oregon State undergraduates on a cruise to gather data on the effects of ocean acidification and hypoxia on the planktonic juveniles of important shellfish species like crabs and clams.

Cumulatively, Chan’s team has made several important discoveries. Unfortunately, global changes in ocean chemistry are disproportionately impacting Oregon ecosystems. Our productive coastal waters sit at a natural threshold where small changes in carbon dioxide and dissolved oxygen levels have outsized impacts on marine life. On the positive side, acidification is uneven; pockets of more moderate pH waters provide havens for some marine organisms.

Chan’s research has found immediate applications, from better fishery management to carbon-absorbing kelp farms. He’s regularly involved in policy-making at the state and regional level. The policy recommendations from a 2016 West Coast science panel that Chan co-chaired ultimately led to two pieces of legislation in California and one in Oregon that establish state policies for addressing ocean climate change challenges. He is currently co-chairing the California Ocean Acidification and Hypoxia Task Force to help them think strategically about science investments to support their recently released Ocean Acidification Action Plan. In Oregon, Governor Kate Brown recently committed to develop a similar action plan, and Chan is poised to play a significant role.



Dave Lytle holds a giant water bug.



DAVE LYTLE LAB

From saltwater to fresh

Dave Lytle and postdoc **Jonathan Tonkin** study how changing rainfall patterns affect water flow in rivers and the animals and plants that depend on them. Working in collaboration with researchers at the U.S. Forest Service and the U.S. Geological Survey, the duo use empirical fieldwork as well as theoretical models to show that riparian plant, fish and aquatic insect communities, which are delicately “tuned” to historic natural cycles of flooding and drought, cannot adapt quickly enough to cope with recent and projected climate-induced changes. Increases in drought frequency — even the relatively small increases that are likely to occur over the coming decades — can lead to large-scale changes in plants (like cottonwood, willow and other riparian species), fish and aquatic insect species loss and community degradation.

SALLY HACKER LAB

Where ocean meets land

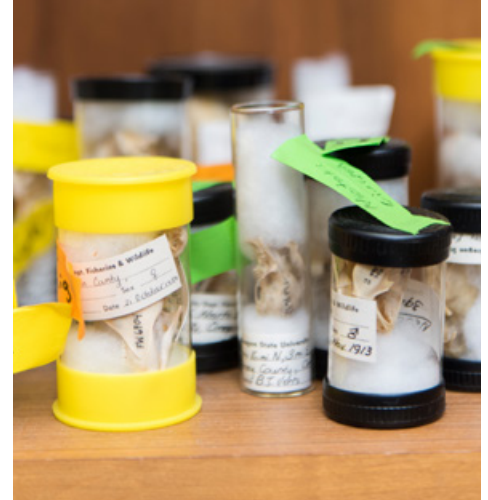
Sally Hacker examines how sand dune communities and estuaries are shaped and changed by both natural and human-induced events. The Hacker Lab probes how eelgrasses and algae in estuary systems help mitigate effects of ocean acidification by absorbing CO_2 . As such they play an important role in both the ecosystem and the estuary-based shellfish industries, such as oysters, that are negatively impacted by acidic water. In dune systems, Hacker looks at patterns involved with the distribution and abundance of specific dune grasses. These grasses stabilize the sand dunes and protect shoreline communities against extreme storms and sea level rise. Rising global temperatures and changes in nearshore marine communities may influence the distribution and abundance of these grasses, and therefore influence the dunes’ protective capacity.



Sally Hacker collecting samples along the Oregon Coast.



Clockwise from top left: Students examine kangaroo rat skulls; sketches of woodrat skulls; specimens from the OSU mammal collection; Rebecca Terry perched by a saber-toothed cat.



REBECCA TERRY LAB

Tiny bones tell a tale

Ours is not the only era to experience climate change. How did life respond to global warming in Earth's distant past? **Rebecca Terry** and team seek to find out by comparing global warming 10,000 years ago to climate change today, using the recent fossil record, modern death assemblages, museum specimens and the lab's own mammal survey fieldwork. The lab focuses on small rodents because they are climate and habitat sensitive and hold terrestrial ecosystems together in terms of linking energy transfer between primary producers and top-of-the-food-chain consumers.

So far, Terry and team are finding that recent loss in native biodiversity

combined with other anthropogenic factors limit the ability of today's ecosystems to withstand global warming as they have in the past.

"Basically, our world today represents a novel, species-poor system that is unlike the world 1,500 years ago, let alone 10,000 years ago," says Terry. "Some species are winners with respect to climate change, but many more are losers, and the winners and losers aren't necessarily the ones we think should be winning or losing."

Unexpected consequences loom. For example, counter to expectations, arid-adapted desert species are faring poorly in today's drier, hotter climates because other human-caused changes such as invasive species, habitat fragmentation and domestic or commercial use of land

are also placing pressure on them. The Terry Lab tries to disentangle the relative strengths of these different drivers of environmental change.

Paleontologists' time in the lab is typically devoted to working with tiny fossilized bones over long hours, but Terry has some modern tricks up her sleeve. By examining stable isotopes in the fossil bones, she can begin piecing together the diets of these fossil rodents and how they competed for resources. This incredible work, funded by a recent National Science Foundation grant, as well as her popular course in paleobiology, is providing many biology students with hands-on experience in the lab and out in the field. All of the hands make tiny work lighter: "This research would not be possible without awesome undergrads!" says Terry.

FROM THE LABS

Crossing new frontiers in disease ecology



Left: Matt Orr in the field. Right: Anna Jolles measures growth in an African buffalo calf in a disease study in South Africa.

MICHAEL BLOUIN LAB

Targeting genes to thwart parasites

Over 200 million people worldwide are affected by *Schistosomiasis*, a disease caused by a tiny parasitic worm, second only to malaria in its devastation.

Michael Blouin and students are mapping and characterizing parasite-resistant genes in the freshwater snails that transmit the infection to humans. Their research has the potential to help target symptoms and/or develop cures for infected individuals, as well as to reduce the likelihood of infection in the first place by genetically modifying the natural populations of snails so that they are less able to transmit the parasite.

ANDREW BLAUSTEIN LAB

Multiple pathogens and species loss

Andrew Blaustein and his team of graduate and undergraduate students research how the susceptibility of frogs to chytrid fungal pathogens varies with species, population, age and environmental conditions. As many frogs carry multiple pathogens simultaneously, the Blaustein Lab is interested in how the interaction between pathogens influences the ongoing decline of amphibians worldwide.

MATT ORR LAB

Better health through gut microbiome

Matt Orr and undergraduate **Deborah Young**, both at the OSU-Cascades campus, worked with a local physician to apply the principles of restoration ecology to health and the human gut microbiome. In a study recently published in *The Quarterly Review of Biology*, they apply principles of restoration ecology to the human gut microbiome, which can be damaged by both a Western diet and the use of antibiotics. They argue that a healthier diet or, if needed, more active interventions like probiotics, antibiotics or fecal microbiota implants can improve our ability to treat chronic diseases such as cancer, autoimmune disorders and obesity.

BEN DALZIEL LAB

Travel patterns of influenza

In collaboration with researchers from Cambridge University, National Institutes of Health, Penn State University and Princeton University, population biologist **Ben Dalziel** recently published research in *Science* showing that the epidemic dynamics of seasonal influenza differ

systematically among U.S. cities, driven by interactions between climate, population size and structure. Understanding the variable spread of the flu, which in 2017 affected nearly 30 million Americans, is critical to prevention and disease management.

ANNA JOLLES LAB

Chasing disease, Africa to Oregon

With a joint appointment in the Department of Integrative Biology and the Carlson College of Veterinary Medicine, Anna Jolles attracts students to her lab who have a wide range of interests, from African buffalo and lions to Oregon's bighorn sheep and wild rodents. Disease ecology is the common thread. Students focus on a wide variety of areas from understanding concurrent infections by multiple pathogens, eco-immunology and the roles of environmental variation and host physiology to host microbiomes and the genetics of disease susceptibility. The lab is best known for showing that concurrent infections in wild host populations can dramatically change disease risk, outcomes and the spread of infection, challenging the conventional approach that examines each pathogen separately. ■



Front runners

Integrative Biology takes top honors

Seeding innovation

Two biologists won \$10,000 awards from an exciting new College of Science Research and Innovation Seed Program:

James Strother will collaborate with chemist Sandra Loesgen on a project to identify novel microbial natural products with antinociceptive, or pain-relieving, activity using a zebrafish-based behavioral assay and neural activity mapping. This innovative approach addresses major challenges in neuroactive drug discovery and is highly likely to produce potent new bioactive compounds to develop improved drugs for chronic pain.

Francis Chan will work with Stephen Giovannoni, Distinguished Professor of Microbiology, to pursue research on zero oxygen (anoxic) events in ocean ecosystems that are of greatest concern for ecosystems and fisheries. While it's clear that climate-dependent factors determine the formation of hypoxic (low oxygen) zones, the onset of anoxia remains both difficult to predict and surprisingly infrequent.

Achieving excellence

Jane Lubchenco received both the National Science Board's 2018 Vannevar Bush Award and the Ecological Society of America's Sustainability Science Award and was named a California Academy of Sciences Fellow for outstanding contributions to the natural sciences. Lubchenco, Distinguished Professor at Oregon State and marine studies adviser to OSU President Ed Ray, is one of the world's most highly cited ecologists.

Sally Hacker and **David Maddison** were elected fellows of the American Association for the Advancement of Science (AAAS), the world's largest multidisciplinary scientific society, a lifetime honor. Hacker was nominated in 2017 and Maddison in 2018. AAAS Fellows are chosen by their peers "in recognition of their contributions to science and technology, scientific leadership and extraordinary achievements across disciplines."

Hacker was recognized for her research in the field of coastal ecology, particularly the interaction of native and non-native species. Maddison was honored for his work in phylogenetic systematics, particularly software tools that have revolutionized the discipline.

Jerry Krantz received the inaugural Systematic and Applied Acarology Society's James Allen McMurtry Award, given for outstanding contributions to acarine systematics, applied acarology or both.

Rebecca Mostow, a Ph.D. student in the Hacker Lab, won a prestigious National Science Foundation Graduate Research Fellowship award in 2018. Her award-winning research project will focus on unearthing the mechanisms of hybridization that underlie beachgrass invasion and proliferation on the Pacific Northwest Coast.

OSU's groundbreaking, first-of-its kind 3-D Virtual Microscope and online introductory biology course series won a 2017 WCET Outstanding Work award. The award recognizes innovative, technology-based solutions that transform the college learning experience. Developed by Integrative Biology in partnership with OSU Ecampus and

Botany and Plant Pathology, our 3-D Virtual Microscope essentially puts a microscope in the hands of every distance education student so they can complete the full biology series online. **Andrew Bouwma** piloted the integration of the virtual microscope into the online biology sequence.

Jenna Sullivan, a Ph.D. student in the marine community ecology lab of Bruce Menge and Jane Lubchenco, is one of 10 recipients of the Ecological Society of America's 2018 Katherine S. McCarter Graduate Student Policy Award. The award provides students with the opportunity to travel to Washington, D.C. for policy experience and training. Sullivan researches the Oregon Coast rocky intertidal system to gain insights into how human-induced changes cause sea star wasting disease, and the community effects of the decline of the top predator sea star, *Pisaster ochraceus*.

Robert Mason won the Frederick Horne Award for his exceptional qualities as a teacher and a mentor. Since joining OSU in 1991, Mason has inspired and guided many students to research careers in zoology and herpetology. He teaches the department's highly popular course on vertebrate biology, bringing to it his distinctive gifts as an ace scientist.

Robert Mason was also named an OSU ADVANCE Faculty Fellow for 2018. Supported by the National Science Foundation with a five-year, \$3.5 million grant, the Oregon State ADVANCE program seeks to create an equitable and socially just academic climate for women scientists and other underrepresented minorities who are faculty in the university. Along with seven other fellows across OSU, Mason will work to help the College and the university enhance awareness about diversity and inclusion.

Nate Kirk received the Oregon State Phi Beta Kappa award for Outstanding University Instruction.

Jaga Giebultowicz won the Margaret and Thomas Meehan Honors College Eminent Mentor award.

Lori Kayes received the 2017 Faculty Scholar for Teaching Excellence Award. Kayes has distinguished herself as an outstanding instructor, teaching coordinator and biology education researcher. Her redesign of the Principles of Biology series, a large enrollment introductory biology course for life-science majors, created a more inclusive, modern and best practices-based course series, while supporting diverse student populations and providing faculty professional development.

Jonathan Robinson won the 2017 Outstanding Faculty Research Assistant award. This award recognizes a faculty research assistant who has a record of outstanding job performance and contributions.

Lindsay Biga received this year's departmental *Castor canadensis* award in recognition of her leadership and commitment to the newly formed Equity, Justice and Inclusion committee.

Brian Tanis received the *Castor canadensis* award for Graduate Students for his diligent work in organizing the J.C. Braly Natural History Collection specimens.

David Taylor won the Paul A. and Mary Ann Roberts Fellowship, which recognizes academic excellence in graduate studies related to evolutionary biology. Paul Roberts, professor emeritus of zoology, and his wife, Mary, personally congratulated David at the annual department award ceremony last June.



Moving on up

Congratulations to several faculty who were promoted! **Andrew Bouwma** was promoted to Senior Instructor, **Sarah Henkel** was promoted to Associate Professor, Senior Research, and both **Mark Novak** and **Rebecca Terry** were promoted to Associate Professor of Integrative Biology with tenure.





Above: *Terra Matter*, designed and produced by students. Below: Endangered butterflies and a bird from the Oregon State Arthropod Collection and J.C. Braly Collection, respectively.



Science in the mix

Our faculty regularly get involved with projects that extend beyond science to reach a broader audience in fun and exciting ways. Take a look!

Nate Kirk, Rebecca Vega-Thurber, Kirsten Gorrod-Colvert, Su Sponaugle and Eli Meyer were part of a lively panel discussion at the on-campus screening of “Chasing Coral,” the 2017 Sundance Film Festival award-winning documentary about the alarming global disappearance of coral reefs. The event was organized by biology graduate students last fall to engage the public to care about these precious ecosystems before the window of opportunity to save them closes. If you missed it, the excellent documentary is available on Netflix.

Earlier this year, **Dee Denver** was invited to participate in an international

symposium in Shenzhen, China organized by the Venerable Dr. Yifa, a Chan Zen Buddhist nun. His talk, “From Bodhi Trees to Biotechnology: Exploring the Intersections of DNA and Human Intention,” examined the ethics of new genetic biotechnologies through both Buddhist and Western lenses. The conference was live-streamed in China and watched by over 900,000 viewers.

Christopher Marshall joined forces with curators, humanities faculty and undergraduates to produce “Terra Matter,” a book to raise awareness about the significance of Oregon State’s scientific research collections, several managed by the Department of Integrative Biology. Students enrolled in two humanities courses – science writing and photography/book production – and designed, printed and hand-constructed professional-quality prototypes of the book, one of which was chosen to print. ■

Elaphrus olivaceus and *Bembidion alaskense*, drawn by accomplished illustrator David Maddison.



David Maddison’s artwork was featured along with Portland artist Renée Zangara in the show “Languages of Nature” at Oregon State’s Little Gallery last spring. The two artists’ work, one more literal and one more expressive, illuminated nature through opposing yet complementary perspectives. Maddison, who teaches biological illustration along with other courses in systematic entomology and genomic analysis, draws exquisitely intricate and detailed portraits of flora and fauna that enable the viewer “to crawl up close to nature, to kneel down in the grass with our magnifying glass.” Zangara’s paintings and installations have been exhibited nationally and are in many private and public collections, including at the Portland Art Museum.

Making waves

Alumni and friends

New gift supports summer research

We are pleased to announce a new fellowship, the Alexei Lubchenco Menge Undergraduate Research Fellowship. Open for competition in early 2019, the fellowship will support one undergraduate each summer with a \$5,000 stipend to conduct ecological field research.

The fellowship is possible thanks to the generosity of an anonymous donor and the friends and family of Alexei Lubchenco Menge, the son of Distinguished Professors Bruce Menge and Jane Lubchenco. Alexei died at age 27 in 2006. A natural athlete, artist and charismatic leader, he loved field biology and being in, on or near

the water. He was fortunate to assist with marine research projects in the Bahamas, Baja California, Oregon, New Zealand, Arizona and beyond.

Congratulations!

Drs. Nathan and Luisa Snyder (Biology '09) won the 2017 Young Alumni Award in the College of Science for extraordinary professional accomplishments achieved within a decade after graduation. The married couple, both dentists, run two highly regarded dental clinics in Salem, Oregon and are loving parents to Patrick Antonio and Isabel Rosalina.

Biologists **Allie Graham** (Barreto Lab) and **John Sproul** (Ph.D. '18) won prestigious and highly competitive

two-year National Science Foundation postdoctoral fellowships in 2018. Graham will use her award to study how Pacific Coast marine organisms cope with stressful situations like hypoxia. Sproul, a former member of the Maddison Lab, will do his fellowship work at the University of Rochester.

Dr. Kent Thornburg (MS Zoology '70) received the 2018 March of Dimes Agnes Higgins Award for distinguished achievement in research, education or clinical services in the field of maternal-fetal nutrition. Kent, the M. Lowell Edwards Chair and Professor of Medicine at Oregon Health and Sciences University, is a globally renowned scientist in cardiovascular physiology, adult-onset chronic disease and maternal-fetal health.



L: Emma Fraser ('09) at Zion National Park. R: Alexandra Gulick ('13) holds a juvenile green turtle tagged as a part of a long-term monitoring project. Photo by Dr. Kristen Hart, NMFS Permit #16146

ALUMNI UPDATES

Fieldnotes

Alexandra Gulick (Biology '13):
 “Hello fellow beavers! I am fortunate to have spent the first two years of my Ph.D. in zoology at the University of Florida studying green turtle grazing dynamics and behavior in the Cayman Islands at the Central Caribbean Marine Institute and the U.S. Virgin Islands at the National Park Service. My dissertation focuses on the potential ecological impacts of recovering green turtle populations on seagrass productivity and community dynamics. “I remain grateful for my time at OSU. From the advice that I was given by my academic and career ▶



Howieson scholar
Rachel Blood

“Receiving this scholarship has been a great honor: someone believes in me and what I can do with a degree.”

Momentum for aspiring zoologists

The **John and Diane Howieson Scholarship**, established in 2003, provides funds for undergraduate zoology students who show promise as a scholar, research scientist or teacher. Three recent Howieson scholars spoke about the impact of this support.

Rachel Ann Blood (Zoology '19) has put both her Spanish minor and science major to use. She studied abroad as part of a Costa Rican

Tropical Ecology and Conservation Program, volunteered at Chintimini Wildlife Center and worked as a technician in a horticultural lab.

“In my senior year, I was able to dedicate enough time to earn a research spot as an author on my first scientific paper.”

Katrina Hiebel (Zoology '18) is currently a graduate student in veterinary medicine at OSU. She enhanced her academic studies by volunteering at local animal shelters



Howieson scholar
Lindsey Ferguson

and attending a national conference as an officer of OSU's Pre-Veterinary Medical Association.

“I was able to focus on school instead of having to get a job.”

Lindsey Ferguson (Zoology '17) is also a graduate student in veterinary medicine at OSU. She researches the function of hormone receptors in coral and sea anemone reproduction and the epigenetic links between breast cancer and night exposure to artificial light.



► advisors (Brock McLeod and Virginia Weis), to the hands-on experience I gained while living at the Hatfield Marine Science Center to my study abroad experience in Bonaire, I would not have been as prepared to excel in my field if it were not for the support of the Department of Integrative Biology. The connections I made with faculty and the skills I gained have enabled me to work on multiple federal and academic marine research projects around the world, including Western Australia, Virgin Islands, Florida, and the Cayman Islands.”

Emma Fraser (Zoology '09): “Since graduating, I've been traveling the world and working on a variety of

conservation research projects, including studying sea turtles in Hawaii and hummingbirds in the rainforests of Trinidad. I currently reside in San Diego, California and work full time as a wildlife biologist for AECOM, a global infrastructure company, and hold permits from the U.S. Fish and Wildlife Service for desert tortoise, California least tern and western snowy plover.”

Peter Rothlisberg (Joint Ph.D. Zoology/Oceanography '75): “I'm currently an Honorary Research Fellow with the Commonwealth Scientific Industrial Research Organization Division of Oceans and Atmosphere in Brisbane, Australia. In semi-retirement, I'm still publishing research

on zooplankton ecology and larval ecology related to Australia's tropical prawn fisheries. I'm also mentoring staff on project development, scientific writing, and presentation skills. When not in the lab I'm a volunteer guide at the Queensland Art Gallery and Gallery of Modern Art and active in conservation activities principally with globally migrating shorebirds as part of the Queensland Wader Study Group.”

Justin Conner (Zoology '15): “After graduation, I went on to pursue a Ph.D. at the University of North Texas in Denton, Texas. Currently in my fourth year, I have aspirations to become an assistant professor at a major public institution in the near future.”



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