

**I ILLINOIS**

School of Integrative Biology

COLLEGE OF LIBERAL ARTS & SCIENCES

2020 Newsletter



# Biodiversity

Guiding education and scholarship through  
research excellence

Dear Friends: This magazine was going to press just as we recognized that we would not return to campus following spring break due to the COVID-19 pandemic. We transitioned to supporting our students, faculty, staff and community, resulting in a delay in sending you this summary from 2019. We recognize how difficult a time this is, and we send our best wishes for your health and safety. For more information on the University of Illinois response, please visit [covid19.illinois.edu](https://covid19.illinois.edu).

## From the Director



Dear Friends,

We have redesigned our annual magazine to include a few theme-based stories in addition to highlighting some news from our faculty, students and staff. We selected Biodiversity as our first theme.

Biodiversity in microbes, plants and animals influences our daily lives in countless ways. In this issue you can read about some of the exciting interdisciplinary studies that are addressing issues of both scientific and societal concern. The three department heads have also featured key faculty accomplishments. Although only a few stories are featured here, you can read more at [sib.illinois.edu/news](https://sib.illinois.edu/news).

We continue to be grateful for the generous support of our alumni and friends, without which so much of our work would not be possible. Through this support, our students and faculty are able to tackle some of biology's most valuable and pressing questions, with our students gaining the experience to lay the foundations for their own successful careers. We are extremely grateful for this support, and you can read more about the 2019 award recipients on pg. 18-19. I am thankful to Steve Caldwell (BS '93, MS '96) for all his work in launching our mentoring program for undergraduates. We now have over 50 alumni who are working with our current students to help them to understand their career options. You can read more about this program, including how to get involved, on page 21.

We always enjoy hearing from our alumni and friends, so when you are next in Champaign-Urbana, please come and visit us in 286 Morrill Hall. When you do visit campus, be sure to walk through the Natural History Building to see the renovations. You can also follow us on social media (Facebook, Twitter and Instagram) by [@iBioIllinois](https://twitter.com/iBioIllinois).

With my best wishes,

Director, School of Integrative Biology

## From the Departments



### Evolution, Ecology and Behavior

*"What's in a name? That which we call a rose by any other name would smell as sweet?"*

It may have taken 20 years, but we finally changed the Department of Animal Biology's name to ***Evolution, Ecology, and Behavior***.

While Romeo's family name may not have mattered much to Juliet, a Department's name provides essential context to the research conducted by its faculty and students. Despite being less than a year since changing names, we have already seen an increase in applications to our graduate program.

We are excited to add a new faculty member in 2020. **Dr. Eva Fischer** will be joining the Department in the Fall. Her research is very integrative, combining approaches in neurobiology, physiology, behavior and evolution.

One of her main foci is examining the evolution of parental care, specifically paternal care in poison frogs. She will bring exciting new research directions to the School, while adding to our strengths in evolution and behavior. You can learn more about her research from her website: [evakfischer.weebly.com](https://evakfischer.weebly.com).

I am elated to report that we had 15 different faculty and graduate students formerly recognized for teaching excellence by their students this past fall semester.

Our unit has also received extensive media coverage of our research accomplishments: **Dr. Anderson's** work on viper fangs (The London Economic); **Dr. Catchen's** work on Antarctic icefish (New York Times); **Dr. Cheng's** work on anti-freeze protein evolution in Arctic fish (The Atlantic), and **Dr. Fuller's** work on darter genomics and speciation (Inside Illinois). Not to be out done, **Dr. Hauber** had four different studies, ranging from the shape of murre eggs to the passwords that cowbirds use to recognize their own song, featured widely in the media. Finally, Adrian Smith at the North Carolina Museum of Natural Sciences continues to support our research with amazing video content. Check out this link to a video on our latest research on how ants jump: [go.illinois.edu/Gigantiops](https://go.illinois.edu/Gigantiops).

Interested in keeping up with Departmental accomplishments and events? Follow us on Twitter: [@iBioIllinois](https://twitter.com/iBioIllinois) [@AndrewVSuarez](https://twitter.com/AndrewVSuarez) ❖

- Andrew Suarez



## Entomology

In 2019, the Senckenberg German Entomological Institute in Müncheberg, Germany named *Osmia bicornis*, the rust-red mason bee of Eurasia, as its insect of the year.

Given the opportunity, our department would probably have selected a bee, too--2019 was a great year for bees of all kinds at the University of Illinois. In terms of research, just in 2019, in addition to multiple ongoing projects, three faculty received funding for new projects focused on bee health, ranging from **Alex Harmon-Threatt's** investigations of impacts of soils and pesticides on ground-nesting bees, to **Adam Dolezal's** studies of viral pathogen effects on honey bee behavior, to **May Berenbaum's** examination of nontarget toxicity of pesticide tank mixes on honey bees in California almond orchards.

Bees also inspired beverage giant AB InBev to connect their new sparkling honey-based beverage called "B" with us, contributing \$1 from every case sold to our Healthy Bee Fund. It's being test-marketed right now, but by next year it might "B" available across the USA. You can read more about our bee research on pg. 10-11. As for outreach, Chancellor Robert Jones helped the UI Pollinatorium celebrate its tenth anniversary by providing a budget for expanding outreach beyond the local community.

Other orders haven't been neglected—including our affiliates, in 2019 our entomologists published on 10 orders of insects (or 9, depending on how biting, sucking, and bark lice are classified), along with some ticks, mites, and crustaceans.

Our newest Assistant Professor, **Marianne Alleyne**, who transitioned in October from 15 years as a Research Scientist to a tenure-track faculty position, spent 2019 publishing on cicadas, beetles, and, yes, bees. Faculty and students received accolades for their work on a wide variety of entomological subjects. **Gene Robinson** was the Dean's choice to present the inaugural LAS Dean's Distinguished Lecture, speaking on the Earth BioGenome Initiative (encompassing all eukaryotes).

**Andy Suarez** was designated a Fellow of the American Association for the Advancement of Science (and with dracula ant *Myrmica camillae* set a new record for fastest animal movement ever recorded). **Brian Allan** exemplified the land grant mission by winning 2019 LAS and Campus Undergraduate Teaching Excellence Awards, as well as being named a University Scholar, designated an Early Career Fellow of the Ecological Society of America, and awarded a \$2.5 million grant from the Department of Defense grant on climate change impacts on fire, plant invasions and tick-borne diseases (and with former student **Allie Gardner** as PI, awarded a \$1.6 million grant from NSF's Coupled Natural and Human Systems program).

Our graduate students also won awards—most recently, **Rachel Skinner** and **Scott Clem** won prizes for oral and poster presentations, respectively, at the Entomological Society of America meeting in St. Louis, and Scott also received a USDA-NIFA Predoctoral Fellowship for his research on midwestern hover flies (many of which look like bees).

As for teaching, our portfolio expanded beyond SIB, with **Alex Harmon-Threatt** developing and soon offering IB 110 Race and Environmental Biology, a course fulfilling the new campus general education requirement in minority cultures.

**Esther Ngumbi**, who now has a joint tenure-track appointment between Entomology and African American Studies, is teaching Humanist Perspectives of the Afro-American Experience Race and Food Security for the first time in Spring 2020. Across 2019, seven Entomology faculty and nine graduate students were named to the List of Teachers Rated Excellent by their Students.

Alumni continue to win accolades, with the election of **Gene Kritsky** as Fellow of the Entomological Society of America. Gene is Dean of the School of Behavioral and Natural Sciences at Mount St. Joseph University (among the ten books he has written, two were about honey bees) and for 15 years was editor-in-chief of *American Entomologist*. As for faculty service as editors, **Jim Whitfield** and **Sydney Cameron** continue to serve as co-editors of *Insect Systematics and Diversity*, and, in January 2019, **May Berenbaum** became Editor-in-Chief of *PNAS*, among the world's leading multidisciplinary science journals. She's not the first female EIC (she's the third), but she's the first entomologist to serve in that capacity in its 105-year history.

After four decades on our faculty, **Stewart Berlocher** retired on December 31. His longstanding contributions to Honors Biology and Integrative Biology Honors as well as to the Entomology graduate program as a classroom instructor and mentor will be much missed and we're planning a symposium in his honor during AY2021. By the way, among his 150+ publications, Stewart has published four papers on honey bees, including one in *Science*. We're aiming to re-establish our equilibrium population with an ongoing search this year to fill our Kearns, Metcalf, and Flint Endowed Chair in Insect Toxicology.

In closing, I note that **Gene Robinson** published a PNAS paper in 2019 ([go.illinois.edu/RobinsonBeePNAS](https://go.illinois.edu/RobinsonBeePNAS)) showing that honey bees remember positive and negative experiences and store memories in specific brain regions; we hope our alumni also have a store of happy memories of their time at the University of Illinois! ❖

- May Berenbaum



## Plant Biology

I'm delighted to report that the Department of Plant Biology has had another highly successful year. We were very fortunate to have **Mark Lara** join the faculty ranks, with the special distinction of being our first

recruit to graduate from the LAS STEM diversity post-doctoral fellowship program into the position of Assistant Professor. Within just a few weeks of starting, Mark got off to a flying start by landing his first grant from the National Science Foundation, which will fund him to use multi-scale drone, aerial, and satellite observations to study ecological responses of Arctic ecosystems to global environmental change.

Mark will be benefiting greatly from interactions with his one of his faculty mentors, **Wendy Yang**. She was awarded the prestigious I.C. Gunsalus Scholarship while being awarded tenure and promotion to Associate Professor in recognition of her exceptional record of scholarship and teaching on the controls of greenhouse gas emissions from soils.

In addition to Wendy, we are excited to congratulate a number of other faculty for awards they have won this year for work on diverse areas of plant biology. Stephen Long has been recognized for his study of photosynthesis and plant responses to global change by election to the National Academy of Sciences. Emeritus Professor **David Seigler** was elected as a fellow of the Royal Society of Chemistry for research on the chemical ecology of plants. Emeritus Professor **Govindjee Govindjee** was elected as a Pravasi Fellow of the National Academy of Agricultural Sciences, India for his studies of photosynthesis.

**Elizabeth Ainsworth**, a scientist with the USDA-ARS who is affiliated with our department, was awarded the National Academy of Sciences Prize in Food and Agriculture Sciences as well as the Presidential Award from the Crop Science Society of America for research on how climate change will affect crops. **Andrew Leakey** and **Ray Ming** were elected as fellows of the American Association for Advancement of Science for advancing understanding of plant responses to drought and using genomics to understand the evolution of plant sex chromosomes, respectively.

Increasingly, our collective study of plants extends beyond traditional academic boundaries to include a diverse array of approaches and techniques. One notable example this year was a publication in the prestigious journal, *Nature*, by **Tandy Warnow** who shares appointments in the Department of Computer Science and Department of Plant Biology. The paper used methods developed by Tandy to analyze new genomic data to map out the family tree of more than 1100 species of plants. This was a project that took almost 200 scientists nine years to complete! This now provides a framework for many studies of plant evolution over the last 1 billion years.

Looking forward into the future, a team of scientists from our department, led by **Stephen Long** and **Donald Ort**, are looking to address the need for greater food production by improving the efficiency of photosynthesis. If you'd like a primer on their work you can get it from none other than Bill Gates. In addition to funding the project, he wrote about it on his blog, GatesNotes this year ([go.illinois.edu/GatesNotes](http://go.illinois.edu/GatesNotes)).

Our undergraduate students are also doing plant biology research that addresses grand societal challenges. Their work under the leadership of **Jim Dalling** to census the trees in Trelease Woods, a remnant of the Big Grove – a prairie forest that existed for centuries in east-central Illinois before white settlers arrived in the early 1800s – grabbed attention as the lead article in this year's *News* magazine from the College of Liberal Arts and Sciences (which you can read on p. 17).

The project will provide insights into changes in carbon storage by the forest over time by contributing to ForestGEO, a worldwide network of researchers devoted to long-term studies of forests. ❖

- *Andrew Leakey*

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## DEPARTMENTS AND PROGRAMS

### DEPARTMENTS

Department of Entomology  
 Department of Evolution, Ecology & Behavior  
 Department of Plant Biology

### UNDERGRADUATE PROGRAMS

Integrative Biology  
 Integrative Biology with Honors  
 IPS – Entomology  
 Teaching of Biology

### GRADUATE PROGRAMS

Entomology  
 Evolution, Ecology & Behavior  
 Plant Biology  
 Program in Ecology, Evolution &  
 Conservation Biology (PEEC)  
 Online Master of Science Teaching  
 Biology Program (OMST)

## SIB BY THE NUMBERS

### FACULTY (2019)

Professors	23
Associate Professors	7
Assistant Professors	11

### STUDENTS

Undergraduate Students - 365	
Out-of-state	3%
International	7%
Graduates – 133	
Entomology	26
Evolution, Ecology & Behavior	20
Plant Biology	33
Program in Ecology, Evolution and Conservation Biology (PEEC)	26
Online Master of Science Teaching Biology Program (OMST)	26

### DEGREES AWARDED

Bachelor of Science	153
Master of Science	13
Doctor of Philosophy	19

### FUNDED RESEARCH

The following numbers are as of 1/1/2020

NSF	\$8,570,181
USDA	\$3,709,672
NIH	\$1,551,587
Dept of Energy	\$2,155,075
Dept of Education	\$1,306,675
DOD	\$1,187,232
Misc. Federal	\$14,982
Private	\$1,848,516

**TOTAL \$20,343,920**

## NEW FACES IN SIB



**Marianne Alleyne – Assistant Professor of Entomology** – Marianne is not really a new face in SIB since she arrived on the Illinois campus in 1995. However, in 2019 she became an Assistant Professor in Entomology. The research of the Alleyne Bioinspiration Collaborative (ABC Lab)

focuses primarily on the multi-functionality of insect cuticle and how structure and chemistry can be used to fabricate novel bioinspired materials. For instance, her lab studies the anti-microbial and hydrophobic characteristics of cicada and fly wings. Marianne teaches courses on insect physiology and bioinspiration and is the Graduate Director for the Online Master of Science Teaching Biology Program. She also serves on the Governing Board of the Entomological Society of America. Other work-related interests include science policy and science communication with a special focus on how to promote insect science. Visit her lab website: [go.illinois.edu/abclab](http://go.illinois.edu/abclab)



**Mark J. Lara – Assistant Professor of Plant Biology, Geography and GIS** – Mark is originally from the blistering arid southwestern U.S.A., where he grew to love the harsh polar climate during his Ph.D. research at the University of Texas at El Paso. His research has taken him to tundra ecosystems

within polar deserts, the Arctic Coastal Plain, upland hillslope tundra, and the Antarctic Peninsula (mostly for fun). The focus of his research is to understand the impacts and implications of high-latitude climate change and disturbance on ecosystem structure and function. He aims to advance earth system model projections by characterizing the dynamic spatiotemporal patterns of tundra landscape evolution and interacting biogeophysical feedbacks in response to warming, wildfire, and permafrost degradation. Mark looks forward to building new and strengthening old collaborations for improving our ability to work across ecosystems and biomes here at the University of Illinois. Visit his lab website: [go.illinois.edu/LaraLab](http://go.illinois.edu/LaraLab)



**Esther Ngumbi – Assistant Professor of Entomology, African-American Studies** – Esther is originally from Kenya and obtained her Ph.D. from Auburn University in Alabama. She started in March of 2018 as a DRIVE Post-Doctoral researcher in May Berenbaum's lab. Her research aims to find sustainable

ways to reduce crop losses due to insect pests and improve productivity amidst a changing climate. She is currently focusing on tomato and corn plants. Her research seeks to understand how chemical cues (both volatile and non-volatile) mediate interactions between beneficial soil microbes, plants, insects, and their natural enemies. These chemical mediated interactions are poorly understood, but, once deciphered, they provide novel opportunities to manipulate these interactions to reduce insect pests, improve crop productivity and food security. She is passionate about science communication and writing opinion pieces, and is looking forward to a productive career at the University of Illinois. Visit her website: [estherngumbi.com](http://estherngumbi.com)

## FACULTY PROMOTION



**Wendy Yang – Associate Professor of Plant Biology – Dr. Wendy Yang** joined the Department of Plant Biology and the Department of Geology as an assistant professor in 2013. In 2019, Dr. Yang was promoted to associate professor.

Research in the Yang Lab focuses on elucidating mechanisms that regulate rates of microbially-driven chemical transformations in both natural and agricultural ecosystems. This will improve predictions of how land management practices and future global change will affect soil greenhouse gas emissions and their feedback effects on climate change, as well as soil nutrient cycling and its implications for crop production and water pollution.

Dr. Yang currently serves as the Deputy Leader of the Center for Advanced Bioenergy and Bioproducts Innovation's Sustainability Theme, which is generating the knowledge needed to develop and economically and environmentally sustainable bioeconomy. Visit her website: [go.illinois.edu/YangLab](http://go.illinois.edu/YangLab)



**Plant Biologist Lisa Ainsworth Receives 2019 National Academy of Sciences Prize in Food and Agriculture Studies – Lisa Ainsworth**, USDA, received the 2019 NAS Prize in Food and Agriculture Studies. This award recognizes research that has made an

extraordinary contribution to agriculture or to the understanding of the biology of a species fundamentally important to agriculture or food production. Dr. Ainsworth is being recognized for her pioneering research unraveling how anthropogenic atmospheric changes affect the physiology and growth of crops, and for being a science ambassador and role model for the next generation of scientists. Learn more: [go.illinois.edu/AinsworthNASPrize](http://go.illinois.edu/AinsworthNASPrize)



**Entomology Researcher Brian Allan Receives Three Campus Awards – Brian Allan**, associate professor of entomology, received three separate awards in 2019, recognizing his contributions to research and undergraduate teaching and mentoring.

He was named one of the 2019 University Scholars, which acknowledges outstanding members of the faculty and provides a funding allocation to enhance their scholarly activities. Learn more: [go.illinois.edu/2019UScholar](http://go.illinois.edu/2019UScholar)

Dr. Allan also received the 2019 Campus Award for Excellence in Undergraduate Teaching, which recognizes sustained excellence and innovative approaches in undergraduate teaching and contributions beyond classroom instruction that have an overall positive impact on undergraduate student learning. Learn more: [go.illinois.edu/AllanUndergraduateTeaching](http://go.illinois.edu/AllanUndergraduateTeaching)

Lastly, Dr. Allan was recognized with the College of LAS' Dean's Award for Excellence in Undergraduate Teaching. This award recognizes faculty at the forefront of some of the University's best efforts in teaching, advising, and mentoring. Learn more: [go.illinois.edu/AllanLASDeanAward](http://go.illinois.edu/AllanLASDeanAward)



**Two SIB Members Elected AAAS Fellows – Andy Suarez**, professor and head of evolution, ecology & behavior, and **Lisa Ainsworth**, USDA and professor of plant biology, are among the eight professors from the University of Illinois who have been elected 2019 Fellows of the American Association for Advancement of Science. Learn more:

[go.illinois.edu/2019AAASFellows](http://go.illinois.edu/2019AAASFellows)



## FACULTY AWARDS



**Three Plant Biologists Rank Among World's Most Influential –** Three faculty members in plant biology have been named to the 2019 Clarivate Analytics Highly Cited Researchers List: Lisa Ainsworth, USDA, Stephen Long, and Don Ort.

This is the second year in a row that these three researchers have been named to the list. The list recognizes researchers “who produced multiple papers ranking in the top 1% by citations for their field and year of publication, demonstrating significant research influence among their peers.



**Lisa Ainsworth** - Her research examines genetic variation in crop responses to air pollution and climate change.

**Don Ort** - His research focuses on improving photosynthesis and addresses crop responses to global change factors including increases in atmospheric carbon dioxide and temperature.



**Steve Long** - His research uses computational and experimental approaches to improve photosynthetic efficiency, and works to address the effects of climate change on crop yield. Learn more: [go.illinois.edu/2019Clarivate](http://go.illinois.edu/2019Clarivate)

## FACULTY AWARDS



**Plant Biology Researcher Steve Long Elected to NAS** – Steve Long, professor of plant biology and crop sciences, has been elected to the National Academy of Sciences. He is recognized for his “distinguished and continuing achievements in original research.”

His research uses computational and experimental approaches to improve photosynthetic efficiency and aims to address the effects of climate change on crop yield. Learn more:

[go.illinois.edu/SteveLongNAS](http://go.illinois.edu/SteveLongNAS)



**EEB Researcher Mark Hauber Elected Fellow of the Animal Behavior Society** – Mark Hauber, professor of evolution, ecology & behavior, was elected a 2019 Fellow of the Animal Behavior Society. Mark’s research is focused on the evolution of recognition

systems using behavioral, developmental, physiological, and molecular tools with an emphasis on avian brood parasites and their hosts.



**Plant Biology Researcher Wendy Yang Named I.C. Gunsalus Scholar by LAS** – Wendy Yang, associate professor of plant biology and geology, was named an I.C. Gunsalus Scholar by LAS in recognition of her outstanding portfolio of research.

This award was established by Professor Emeritus I.C. Gunsalus for the development of the scholarship and teaching of young faculty members in the physical and life sciences.



**Plant Biology Researcher James O’Dwyer Named Associate of the Center for Advanced Study** – James O’Dwyer, associate professor of plant biology, was named an associate of the Center for Advanced Study at the University of Illinois. The Center for

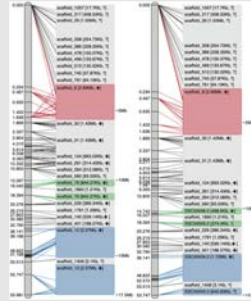
Advanced Study sheds light on interdisciplinary thought that starts conversation, inspires action, and transforms the world.



**Plant Biology Researcher Jessica Conroy Receives NSF CAREER Award** – Jessica Conroy, assistant professor of plant biology and geology, received an NSF Career Award to support her upcoming work investigating long-term patterns of the water cycle in the tropical

Pacific. The Career Award is designed to support early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization.

## FACULTY NEWS



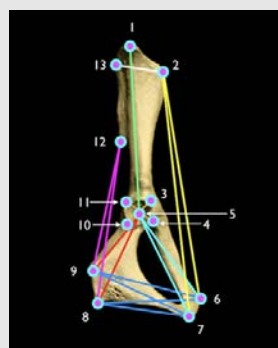
**Scientists Develop Software to Improve Genome Modeling of Evolution** – The question of how genomes change over time is critical to our understanding of how broader evolution occurs. Julian Catchen (assistant professor of evolution, ecology & behavior) and his research group have developed new software

tools to optimize the accuracy and volume of data available to that use 100 year old technology to assemble genomes processed on the latest DNA sequencers. Using genetic mapping crosses, the software, Chromonomer, can assemble full length chromosomes in many species for the first time. Additions to the Catchen Lab’s widely used Stacks software are enabling mutations to be tracked across natural populations of thousands of individuals. Learn more: [go.illinois.edu/CatchenLab](http://go.illinois.edu/CatchenLab)

**Researchers Discover How Ant Species Uses Abdomen and Legs During Jumps** -

Researchers in the Andy Suarez (professor and head of evolution, ecology & behavior) lab have

shown how a species of ant uses its abdomen to add power to its jump, in a recent study published in *Integrative Organismal Biology*. *Gigantiops destructor* is one of only four types of ants that are known to use their legs to jump as a way to move. The ants use their legs to make precise directional jumps, aided by how they move their abdomens. The results indicate that moving their abdomens aids the ants to jump further, higher, and faster overall. Learn more: [go.illinois.edu/Gigantiops](http://go.illinois.edu/Gigantiops)



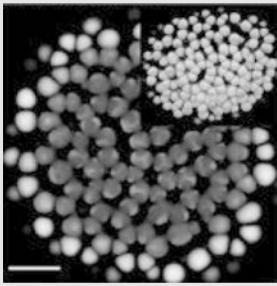
**New Mechanisms of Genomic to Phenotypic Variation Identified in Pelvic Development in Mice** –

In a recent study published in the *Journal of Experimental Zoology*, Charles Roseman (associate professor of evolution, ecology & behavior and anthropology) and colleagues showed that channeling of genetic influences can lead to biases in covariation and

development. By studying the architecture and development of the pelvis in mice, the researchers found that the amount of genetic covariation in populations can be influenced by mechanisms (such as gene regulation) not previously associated with covariation. Learn more:

[go.illinois.edu/RosemanPelvicMorphology](http://go.illinois.edu/RosemanPelvicMorphology)

## FACULTY NEWS



### Improved Microscopy Sheds Light on Pollen Characteristics -

Pollen can be used as a valuable taxonomic diagnostic tool in the study of plant biology. Traditional methods of microscopy have limitations, however, with optical microscopy limited by light diffraction and electron microscopy

by workflow and time. Research from **Surangi Punyasena's** (associate professor of plant biology) lab is assessing the utility of new microscopy methods, by testing the surface texture and 3D shape of pollen. Results suggest that new methods such as Airyscan and SR-SIM can overcome previous study limitations and provide new high-quality data for researchers. Learn more: [go.illinois.edu/PunyasenaLab](http://go.illinois.edu/PunyasenaLab)

### Study Showing Importance of Herbivory and Plant Response Recommended as “Exceptional” by F1000 –

Research from the **Ken Paige** (professor of evolution, ecology & behavior) lab was recommended by the Faculty of 1000 (f1000.com) this year, for their paper in *Oecologia*.



Results show that endopolyploidy leads to rapid regrowth of tissue as well as increased reproductive success and enhanced chemical defense following mammalian or insect herbivory. These results could have important applied significance, potentially explaining why many plant species are so successful at invading. Learn more: [go.illinois.edu/PaigeLab](http://go.illinois.edu/PaigeLab)



### New Study Shows Link Between Iridescence and Friction – A new study from Marianne Alleyne's

(assistant professor of entomology) lab explores the link between iridescence and

the biomechanical properties of beetles' cuticle, in an effort to better understand what other functions iridescence might serve. Results showed that different families of beetles have evolved different types of structures that result in iridescence, and both the gratings on their exoskeletons and the wettability of the insect cuticle combine to influence the friction coefficient on the beetles. Future research will examine the connection between surface features to the behavior of the beetles as they move through their environment. Learn more:

[go.illinois.edu/BeetleIridescence](http://go.illinois.edu/BeetleIridescence)

### Study Examines Wood Decomposition in the Tropics

A recent study published in *FEMS Microbiology Ecology* explores the roles of biotic and abiotic processes in wood decomposition in the tropics. Jennifer Jones,



graduate researcher advised by co-authors **Katy Heath** and **Jim Dalling**, tracked wood decomposition in aquatic and terrestrial ecosystems in Panama to compare decay processes. Results showed that abiotic and biotic factors drive different decay dynamics in streams and on land, with wood decaying faster on land than in streams. Future research will better inform our understanding of carbon modeling and nutrient cycling at the ecosystem scale. Learn more:

[go.illinois.edu/WoodDecomposition](http://go.illinois.edu/WoodDecomposition)

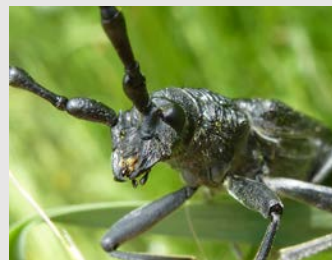


### Study Shows Link Between Landscape Change and Increased Methane –

A study published in the *Journal of Geophysical Research: Biogeosciences* is showing

links between changing vegetation types and increased methane release in Alaskan tundra wetlands. **Mark Lara** (assistant professor of plant biology, geography and GIS) determined that as methane was being emitted due to landscape changes, this encouraged the growth of a different type of vegetation. This new type of vegetation could encourage more methane release. Future research will examine how measurements at the plot-level can inform and be used in tandem with data taken from the landscape level to improve our understanding of these processes. Learn more:

[go.illinois.edu/AlaskaLandscapeMethane](http://go.illinois.edu/AlaskaLandscapeMethane)



### New Study Explores Pheromone Chemistry and Purpose in Longhorn Beetles –

A 2019 study published by the **Larry Hanks** (professor of entomology) lab explores the chemistry behind pheromones in fourteen

longhorned beetle species. The results suggest that there are several pheromones that have not been reported in many of the species, and the data lend support to the hypothesis that pheromones developed to reduce unsuccessful breeding attempts between different species. Learn more:

[go.illinois.edu/LongHornBeetlePheromones](http://go.illinois.edu/LongHornBeetlePheromones)



## Herbaria: Collecting Insights from Inventory of Plant Life

Nestled in the heart of Research Park just south of campus, the Robert A. Evers Laboratory houses an incredible resource for plant research, the **University of Illinois Herbarium**. Herbaria are collections of preserved plant specimens and associated data used for scientific study.

Built in 1868, just after the founding of the University of Illinois in 1867, the Illinois Natural History Survey Herbarium is one of the oldest and largest collections on campus. Housing well over 1,200,000 specimens, the herbarium is comprised of three smaller herbaria collections supported by the Department of Plant Biology, the Illinois Natural History Survey, and the University of Illinois Crop Evolution Laboratory.

The University of Illinois Herbarium houses collections which are comprised of plants, fungi, bryophytes, and algae, including samples from The Great Smoky Mountains National Park, China, Kyrgyzstan and Dominica.



One-third of the specimens are from early Illinois, one-third from other states (largely from the western US), and the last third of the specimens are from outside the United States. Most of these international are from Canada, Mexico, Latin American, South America, and Europe. Within the bryophyte collection are 286 specimens collected by Thomas Drummond during the Second Land Arctic Expedition under the command of Captain Franklin. These specimens were published in 1828 and likely the oldest specimens held in the Herbarium.

The algae collection contains about 90% of all the marine algae found on the coasts of the United States. The collection has over 2600 algae exsiccata (referring to dried samples) - with the most notable being a complete set of the *Phycotbeka Boreali – Americana*, donated by Mrs. Mary S. Snyder in 1914. These holdings make the University of Illinois Herbarium the second largest in Illinois and the 10th largest in the United States, with one of the most comprehensive records of Illinois vascular plants found anywhere in the world - including a large number of threatened and endangered species (over 2,200)!



The research potential of the INHS Herbarium is invaluable. By taking information from the samples related to site, time, and manner of collection, researchers can create data-driven snapshots of environmental conditions for different time periods.

As most plant species are unable to escape when climate change or environmental conditions deteriorate, they must adapt or risk extinction. In this way, herbarium specimens become time capsules of past environmental conditions. Through studying these samples, researchers can learn how and when plant species change their spatial distribution, how their key life events change (flowering time, leaf development, etc.), and what that might mean as our climate continues to impact ecosystems around the world.

Under the guidance of director **Andrew Miller** (affiliate, department of plant biology) and collections manager **Jamie Minnaert-Grote**, current efforts in the herbarium include further inventory of samples, digitizing the collection, and aiding researchers with their work. Digitizing the records (using high-definition imagery and linking to external databases) allows the samples to be used by other researchers, and links the University of Illinois to other collections around the world. ❖

## Putting the “B” in Biodiversity: Research to Protect Our Pollinators

Bees play a crucial role in preserving our world’s biodiversity. Through pollination and honey production, bees actively support agricultural and natural ecosystems around the world, contributing to complex and interconnected ecosystems which support a wide range of life.

While we might recognize the honey bee and the bumble bee most readily, there are an estimated 20,000 species of bees worldwide. Bees are found on every continent except Antarctica, and in every habitat on Earth that is home to insect-pollinated flowering plants. Populations have been declining in recent decades, leading to increased interest by researchers to identify the causes and reverse these trends. Climate change, pollution, habitat loss, pesticides, changes in food availability, and other human-related impacts can interact to influence the success of a nest, or change bees’ behavior in ways that threaten their survival.

Researchers in the department of entomology are on the front lines of bee research, studying everything from where bees live to how bees behave to learn how we can help them survive.



When most people think about bees and where they live, a honey bee hive comes to mind. However, only a small number of bee species nest in colonies of this size and structure. Many bee species are ground-nesting, meaning that they will nest with others (in nests of varying numbers of individuals) underground, or in the first few feet of soil.

**Alex Harmon-Threatt**, assistant professor of entomology, studies how landscape features can impact the health and success of ground-nesting bee species. Her lab investigates the connections between exposure risks from pesticides and how that can impact ground-nesting bees, as well as how habitat degradation or restoration might intersect with pollinating plants that the bees use as food sources. Some of her latest work is paving the way for how we can better understand and categorize impacts (from pesticides or nutritional insecurity) based on bees’ habitat and foraging behaviors.



Modern agriculture can create nutritional monocultures for bees in many parts of the country, where bees can only access one kind of food source (from one crop, for example). The intersection of habitat and nutritional quality for bees is also the focus of research done by **Adam Dolezal**, assistant professor of entomology. Through analyses of bees’ genetic information, the quality of their diets, and disease stressors bees might experience, researchers in the Dolezal lab study how those factors interact with each other at the individual, colony, and landscape scale. Results from recent research indicate that a varied diet can provide bees with increased resilience to disease.

**Sydney Cameron**, professor of entomology, has documented recent bumble bee declines across North America and is testing the likelihood that a fungal pathogen was involved, possibly in combination with pesticide usage. She recently published a review on global trends in bumble bee health, underscoring the importance of experimental research to better identify and understand species-level and regional impacts on populations in different parts of the world.

Department head and professor of entomology **May Berenbaum** studies the chemical interactions between insects and host plants, and what those interactions might mean for how natural communities are structured. In terms of bee research, this has involved looking at colony collapse disorder (a term used to describe large scale losses of adult bees, resulting in the collapse of the hive), and at pesticide impacts on bee health.



Recent work from her lab is identifying ever more complete ways of conceptualizing research related to issues faced by honey bees. Just this past year, Berenbaum and her postdoc **Ling-Hsiu Liao** determined that research examining toxicology in the honeybee requires a new perspective, due to the social nature of the bees.

Social interactions among individual bees can influence how stressors are shared within the hive – and that “footprint” of stressors can be seen in bees that did not necessarily come into direct contact with the stressor (such as pesticides, habitat degradation, limited food resources). Studying the behavior of bees provides researchers with information about how species could be affected by climate change, habitat loss, or increased disease.

**Gene Robinson**, professor of entomology and director of the Carl R. Woese Institute for Genomic Biology, leads research efforts to study the social life of honey bees. His work aims to explain how behavior is influenced and driven by social evolution.

Information from genetic analyses is coupled with behavioral studies to provide insight into honey bee brain plasticity and development. In recent projects, he and his colleagues are studying how gene activity interacts with neurons in the brain to regulate behavior, and exploring how gentleness evolved in a unique population of otherwise notoriously aggressive Africanized bees. His lab has developed a way to automatically monitor colonies using barcodes attached to individual bees, which can be used to study how the bees’ social networks influence their resilience and division of labor.

Collaboration and support for the groundbreaking bee research at Illinois comes from partnerships with agencies, universities, and companies around the world. The university, with its own apiaries and access to many square miles of flowering plants, is an ideal site for bee research, which requires repeated, statistically robust experiments on multiple colonies - each of which comprises tens of thousands of bees.

A new partnership between Illinois and St. Louis-based Anheuser-Busch, LLC was announced this year that will raise money for bee research at Illinois. Anheuser-Busch has pledged \$5,000 to The Healthy Bee Fund at Illinois. In addition, the company will donate \$1 to the fund for every case sold of b, a new alcoholic honey beverage.



The new beverage will come as a significant boost to bee research at Illinois, where scientists are leading vital research into the threats facing bees across the world. Berenbaum said that it’s too early to know exactly how much will be raised for research by the partnership, but that it could potentially fund summer assistantships for students, who are essential to collecting data on bees during the critical warm weather months when most bee research is conducted.

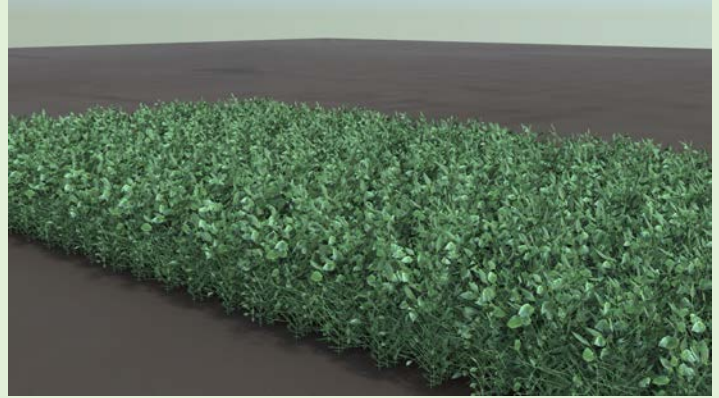
Bee researchers at Illinois engage in partnered research with federal agencies such as the Department of Agriculture, National Science Foundation, National Institutes of Health, Department of Defense, and the US Fish and Wildlife Service. Future research projects at Illinois include a targeted effort to apply bio-manufacturing techniques toward mass-rearing disease-free bees, an analysis of the genome of the greater waxworm (a pest that damages honey bee hives around the world), a study of how disease-causing viruses manipulate the behavior of bees to increase disease transmission, genomic analysis of how genes supporting the immune system are turned on in response to pathogens and pesticides, and an investigation into the effects of persistent exposure to heavy metals on the health of native bees in urban ecosystems.

Illinois has become established as a global leader in using rigorous science to understand bee biology, behavior, health and conservation. Future research will build upon these accomplishments and continue to improve our understanding of how to best protect and learn from bees. ❖

## Research for a Changing Climate: Genomics of Future Crops

Human impacts to our global climate are continuing to compound, even as researchers race to find answers for how to lessen their severity. For our agricultural systems, that means learning more about how plants will respond to changing environmental conditions, such as elevated carbon dioxide, changes in the soil quality, changes in plant genetics in response to the changes, etc. Researchers in the department of plant biology are tackling these critical questions on a variety of scales, from larger scale landscape and crop questions right down to the molecular foundations of photosynthesis.

As the principal investigator of **Crops *in silico*** with co-principal investigator **Steve Long** (professor of plant biology and crop sciences), **Amy Marshall-Colon** (assistant professor of plant biology) studies how to use modeling, big data, and computation to glean insights from plant biology. By modeling crop performance based on data collected from the field, the **Crops *in silico*** project aims to reduce the time and resources necessary to accurately predict how crops will change in changing environmental conditions in the future. In 2019, the project hosted their 4<sup>th</sup> annual symposium/workshop, drawing in researchers from around the world to explore the needs of the plant biology and computer science communities for building virtual crops.



To measure the impacts of the changing climate in the field, researchers in the department of plant biology have collaborated with other experts across campus on SoyFACE. **SoyFACE (Soybean Free Air Concentration Enrichment)** is an innovative facility for growing crops under production field conditions in an atmosphere that has higher levels of carbon dioxide and ozone, higher temperature and altered soil water availability. SoyFACE was designed to discover the effects of atmospheric change on the agronomy and productivity of Midwestern crops as well as to find solutions that will lead to crops better adapted to this future.

USDA-ARS researcher **Lisa Ainsworth's** (professor of plant biology) lab uses the SoyFACE facilities to answer critical questions about how plants respond to increased carbon dioxide, with recent studies showing that there is significant variation in carbon dioxide response within soybean. Other research in her lab is looking at how maize responds to elevated ozone, results from which will aid in quantifying genetic variation between different maize lines, learning how ozone impacts plants at the leaf and organ level, and determining how other stress responses in the plants might interact.



This interdisciplinary research team is interested in learning how yield and quality changes might occur as a result of rising carbon dioxide, what genetic impact that will have on the plant, the role that soil plays in plant growth and success in a changing climate, and more. CNN's Sanjay Gupta covered the state-of-the-art facility earlier this year, through an interview with **Andrew Leakey** (associate professor and acting head of plant biology). Learn more and watch the video: [go.illinois.edu/LeakeyCNNSoyFace](https://go.illinois.edu/LeakeyCNNSoyFace)

Recent research from the Leakey lab has identified a plant's water use efficiency as another area of study that might be impacted by future environmental conditions. The water use efficiency (WUE) of a plant refers to how much carbon it can gain relative to how much water it takes to do so. As this is such an important part of a plant's growth and maintenance, WUE can be studied at many different scales. In a recent study published in the *Annual Review of Plant Biology*, Andrew Leakey and collaborators provided a state-of-the-science look at the study of WUE – through advances in phenotyping, modeling, physiological data, genetics, and molecular biology.

On another molecular scale, collaborations across campus such as **RIPE (Realizing Increased Photosynthetic Efficiency)** are engineering crops to be more productive by improving photosynthesis, the natural process all plants use to convert sunlight into energy and growth.

Spearheaded by **Don Ort** and **Steve Long** (professors of plant biology) and established in 2012, the work done by the RIPE team will improve our understanding of how to better grow staple crops, such as soybean and corn in the US. One such way these improvements are studied and built upon are through “growth labs,” housing plants that have been altered through the introduction of foreign genes and synthetic pathways that allow them to process more carbon dioxide through photosynthesis.

USDA-ARS researcher **Carl Bernacchi** (associate professor of plant biology) studies the role of natural and managed ecosystems in managing impacts of climate change. Recent work from the Bernacchi lab showed how management decisions for subtropical wetlands can impact the amount of methane emissions. Researchers collected data at the plot and ecosystem scale to quantify the fluxes of carbon dioxide, methane, and nitrous oxide from wetlands in Florida. The results suggest that the interaction between agricultural practices and wetland functioning needs to be more clearly represented in biogeochemical models. Without it, researchers are limited in their ability to adequately predict intensification effects on how methane is emitted or absorbed.



Turning to crops for our energy is also being studied at the University of Illinois. The **Center for Advanced Bioenergy Products Innovation (CABBI)**, established in 2017 by **Evan DeLucia** (professor of plant biology and principal investigator of CABBI), focuses its research power on growing the right crops for bioenergy by turning plants into high-value chemicals while improving the economic and environmental bottom line. With 21 partner institutions and over 70 research publications in its first year (several authored by researchers in the department of plant biology), CABBI is innovating new solutions for how we address our energy needs in the future.



Recent CABBI research is creating next generation feedstock varieties by modifying carbon allocation and metabolism to produce lipids in vegetative tissues, as well as increasing productivity, resource use efficiency, and resilience to stress. Scientists across the department of plant biology are involved in this project, including **Andrew Leakey** (theme leader), **Lisa Ainsworth**, **Steve Long**, **Don Ort**, **Amy Marshall-Colon**, and **Li-Qing Chen** (assistant professor of plant biology). This work involves crops such as sorghum, sugarcane, energycane, and miscanthus.

Future research in these and other initiatives will continue to build upon the success of SIB’s plant biology researchers, who are paving the way for a better prepared and more secure climate future. ❖

## Water Women: Exploring Aquatic Systems for Evolutionary Insights

Many science fields remain male-dominated. According to data from the United Nations, women make up less than 30% of scientific researchers worldwide. Women researchers within SIB are responsible for some of our most impactful and inspiring work, including research looking at aquatic biodiversity. From how species behave and evolve to how the environment can drive change, SIB research into aquatic communities is helping improve our understanding of evolution and make meaningful progress towards conservation.

**Carla Cáceres**, professor of evolution, ecology & behavior and director of SIB, uses *Daphnia* (also called water fleas) as a model organism to study the community ecology of disease. *Daphnia* are tiny, semitransparent freshwater crustaceans that occur in many lakes and ponds and are surrounded by numerous other freshwater organisms.



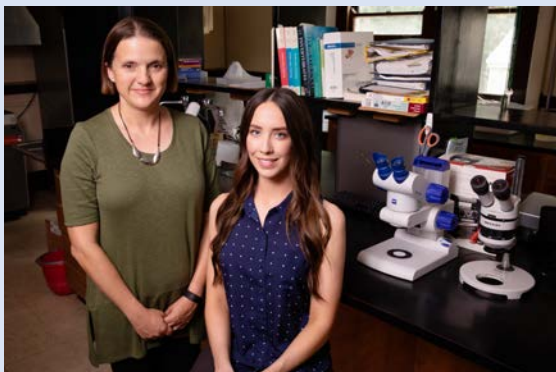
As new diseases continue to appear, ecologists are increasingly interested in answering questions regarding the distribution and prevalence of infection. In some disease systems, species other than the host and parasite can even inhibit or facilitate disease spread. For researchers in the Cáceres lab, this means studying how *Daphnia* are infected by an aquatic fungal parasite to better understand how diseases can spread – directly or indirectly. Research results have indicated that everything from natural variation in immune systems, water temperature, seasonality, and more can come together to create these direct and indirect effects on host species.



**Becky Fuller**, professor of evolution, ecology & behavior, studies how natural and sexual selection occurs across time and space and how genetic variation and phenotypic plasticity interact. One of her study systems is the darter, a family of fish species that is found in freshwater streams in North America. Recent research from the Fuller lab includes an analysis of the genomic changes that occur when darter fish from different species hybridize, offering insight into the gradual accumulation of incompatible traits that likely drives them to diverge.

When they share habitat, darters from different species tend to avoid one another, even though they are closely related and can produce “hybrid” offspring. The males compete with males of their own species and will almost always ignore females of the other species. To understand how genomic factors influence this process, the researchers mated orangethroat and rainbow darters in the lab and analyzed the genomes of the few hybrid offspring that survived past hatching.

They found that areas of the genome that had a lot of genetic divergence between the two species likely contributed to their reproductive incompatibility. These differences are widespread and include problematic variations in the sequence and order of genes on the chromosomes. The study opens a window on post-reproductive mechanisms that contribute to the evolution of different traits in closely related species.



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Sticklebacks are the aquatic organism of choice in the Bell lab. **Alison Bell**, professor of evolution, ecology & behavior, leads research efforts to better understand individual animal behavior, and the role that genetics and environmental inputs can play in changing behavior.



A recent study from the Bell lab offered a framework for understanding the mechanisms and consequences of transgenerational plasticity – in other words, that the environment experienced by parents can influence the phenotypic development of their offspring.

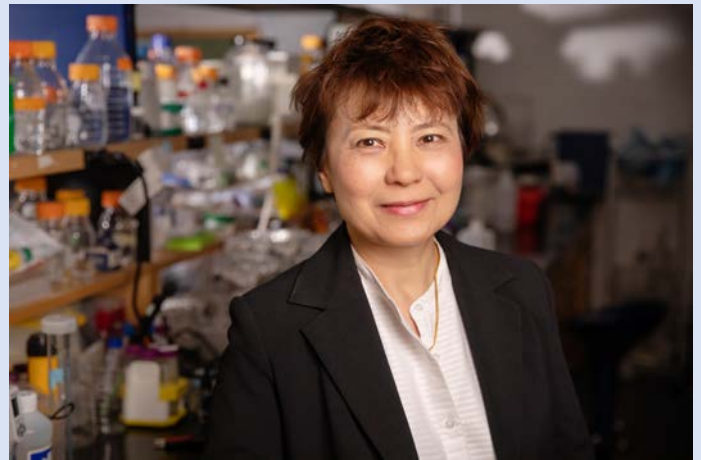
Through that study, researchers were aiming to understand how we can generate predictions about how transgenerational plasticity might result in adaptation to multiple kinds of environmental stressors. Results suggest that while in many cases, offspring inheriting environmental information from their parents can be adaptive, there are many cases where it is maladaptive, and can have considerable negative impacts.

In saltier waters, **Chris Cheng**, professor of evolution, ecology & behavior, studies evolutionary cold adaptation in polar fishes. Her work takes her to the Southern Ocean of Antarctica, where they look at what changed in the genome of Antarctic notothenioid fishes over evolutionary time, enabling them to thrive in the world's coldest marine water.

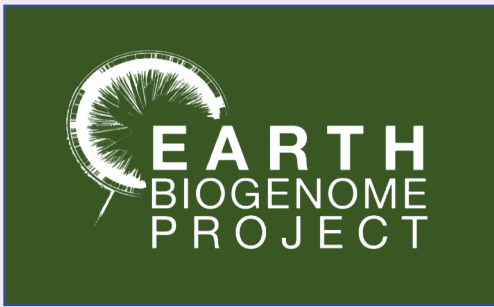
A recent study from the Cheng lab showed that two unrelated fish groups (one in the Arctic, another in the Antarctic) both evolved the ability to produce the same special brand of antifreeze protein in their tissues. After successfully discovering how antifreeze glycoproteins evolved in Antarctic notothenioid fishes, Cheng and her team wanted to know how the Arctic cod evolved an identical version – but not in the same way.

To solve that puzzle, the researchers scoured fish and other vertebrate genomes for a gene that might have been the ancestral precursor to the codfish antifreeze gene. They found the ancestor of the antifreeze gene in a region of noncoding DNA, which, as its name implies, does not code for a viable protein. The findings offer fresh insights into how a cell can invent a new, functional gene from scratch.

Future research in these labs will build on these findings, and better guide subsequent work on behavior, evolution, and how the genotype and phenotype can be impacted by the environment. ❖



## Diverse Partnerships Power Catalog of World's Eukaryotic Biodiversity



An international consortium of scientists is undertaking a massive project to sequence, catalog and analyze the genomes of all known eukaryotic species on the planet, a task the researchers say will take 10 years, cost \$4.7 billion and require more than 200 petabytes of digital storage capacity. Eukaryotes include all organisms except bacteria and archaea. There are an estimated 10-15 million eukaryotic species on Earth. Of those, the team proposes sequencing 1.5 million.

The reasons for undertaking such an ambitious project are many, said **Gene Robinson**, a leader of the proposed effort, a professor of entomology and the director of the **Institute for Genomic Biology (IGB)**. “For the first time in history, it is possible to efficiently sequence the genomes of all known species and to use genomics to help discover the remaining 80 to 90 percent of species that are currently hidden from science. Genomics has helped scientists develop new medicines and new sources of renewable energy, feed a growing population, protect the environment and support human survival and well-being,” Robinson said. “**The Earth BioGenome Project (EBP)** will give us insight into the history and diversity of life and help us better understand how to conserve it.”



During its inaugural year, the EBP has established a foundation that will carry it toward completion of Phase I of the project – the sequencing of a representative species of each of the approximately 9,300 known eukaryotic taxonomic families of plants, animals, protozoa, fungi, and other microbes in the next three years.

Highlights of progress reported at a meeting of the EBP partner institutions and affiliated projects include the initiation of the Darwin Tree of Life program at the Wellcome Sanger Institute with \$10 million USD over the next two years to establish the program (\$10 million USD); a \$10 million grant from the State of California to support the California Conservation Genomics Project, which has as its primary mission the conservation of California's threatened and endangered species; a commitment by Illumina Inc. to contribute complementary short-read data to aid in the creation of 100 annotated reference-quality genomes for basic and conservation science; the Vertebrate Genomes Project (VGP) and collaborators will release 101 reference genomes, the first demonstration that high-quality genomes can be produced at scale; increased institutional membership by 53 percent to 26 since EBP launched in November 2018, and increased Affiliated Projects by 40 percent to 21.

Growth in membership broadens the reach of the EBP by including organizations of varied size, composition, focus and location. Engaging a network-of-networks approach enlists a collective for solving many of the world's problems, such as conserving and responsibly stewarding its resources.

Creating and sharing EBP standards with the international genomics community encourages individual countries and groups to form their own projects that mirror and support EBP goals, and offers guidance to existing large-scale genome projects that have already joined the EBP.



Together these foundational projects set the stage for future technical achievements and growth in funding from other governmental organizations, philanthropic entities and the private sector.

The coming year of EBP will emphasize the collection of samples for completing EBP Phase I objectives, the adoption of standards for sample acquisition, processing, sample metadata, DNA sequencing, and genome annotation, and the production of 1,000 reference quality genomes by Member organizations and Affiliates. Learn more: [earthbiogenome.org](http://earthbiogenome.org) ❖



## Trelease Woods: Centuries-Old Forest Teaching Students, Professors

Many of our students and alumni might recall performing field work in Trelease Woods for independent research or their own coursework. The following is an excerpt from a piece written by College of LAS Senior Editorial Specialist Dave Evensen. To view the full article, visit [go.las.illinois.edu/TreleaseWoods](http://go.las.illinois.edu/TreleaseWoods). To watch the video, visit [go.las.illinois.edu/TreleaseWoodsVideo](http://go.las.illinois.edu/TreleaseWoodsVideo).



One morning last summer, a half dozen Illinois students climbed into cars and drove east of campus. They passed a few miles of houses and farmland before they turned onto a country road and parked near something unusual, at least for these parts. It was a forest. They put on their boots. They had a lot of work to do—and that’s an understatement. The students’ job was to document every single tree in that forest, from saplings angling for sunlight to stately giants with trunks more than a meter in diameter.

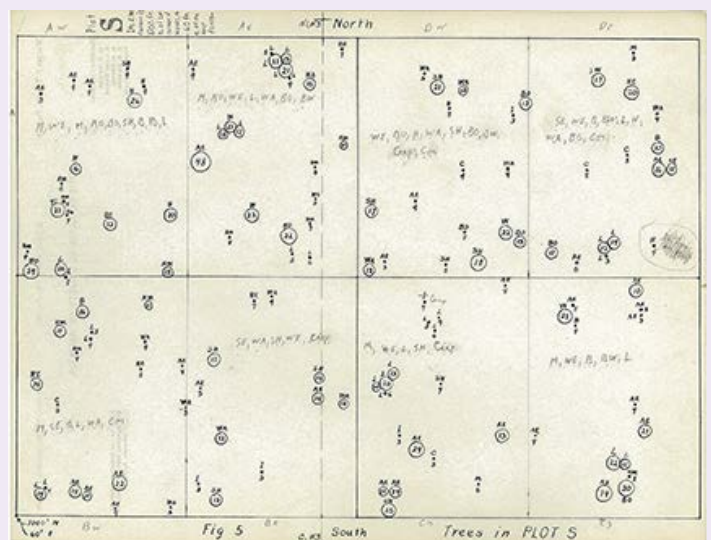
There’s a unique kind of magnetism emanating from Trelease Woods. Partly because of its close proximity to the University of Illinois, which owns it, and partly because it’s so old and rare, the 60-some acres of woodland is one of the most-researched tracts of forest in the world. Nobody really knows how old it is, other than it pre-dates the United States as we know it. Trelease Woods is one of the last remaining fragments of the Big Grove, a prairie forest that existed for centuries in east-central Illinois before white settlers arrived in the early 1800s.

Most of the Big Grove subsequently fell to loggers, but somehow Trelease Woods eluded the axe until 1917, when it was acquired by the university. Today it’s managed by the University of Illinois Committee on Natural Areas, and it has much to offer researchers and students.” Named for William Trelease, an eminent early 20th century botany professor at Illinois, Trelease Woods is host to several classes each year, from integrative biology to civil and environmental engineering. It’s the site of numerous, important research projects on topics ranging from butterfly ecology to mosquito control and genetics.

**Carol Augspurger**, for example, professor emeritus of plant biology, has been visiting Trelease Woods every week for 27 years to study the effects of climate change on forest phenology: the timing of leaf budding, expansion, coloration, and dropping. She collaborates with Chunyuan Diao, professor of geography and geographic information science (GIS), to compare satellite and drone data with observations on dozens of plant species that Augspurger has made in Trelease Woods.

There’s also much to be learned from Trelease Woods about forest ecology. That’s why the students were there that morning last summer—and many mornings after that. They were collecting data for a research project led by **Jim Dalling**, head of the department of plant biology, and **Jennifer Fraterrigo**, professor of natural resources and environmental sciences in the College of Agricultural, Consumer and Environmental Sciences.

If you had joined them, however, you might get the feeling that this research touched on something deeper than plotting coordinates and measuring tree diameters. Maybe you’d sense it before you even reached the tree line and peered into the dark, green gloom, and heard the creak of trunks, the scream of a hawk, or the knocking of a red-headed woodpecker on a hickory. Maybe you’d sense it when you spotted the shadows of behemoths: massive bur and chinkapin oaks, some of which were saplings about the time that Galileo was arrested for arguing that Earth revolved around the sun. ❖



# GRADUATE STUDENT AWARDS

**Our graduate students are incredibly talented and valued members of the SIB community, and we recognize their many achievements. Congratulations to our award winners for 2019!**

## **Robert Emerson Memorial Award**

Rachel Moran (Advisor: Becky Fuller)

## **Lebus Graduate Scholar Awards**

Joshua Gibson (Advisor: Andy Suarez)

Kelsey Low (Advisor: Matthew Allender)

Bradley Scott (Advisor: Philip Anderson)

## **Harley J. Van Cleave Research Awards**

Nicholas Anderson (Advisor: Alex Harmon-Threatt)

Jessica Lira Viana (Advisor: Jim Dalling)

Sierra Perez (Advisor: Jim Dalling)

Kevin Ricks (Advisor: Anthony Yannarell)

Cameron Schwing (Advisor: Carla Cáceres)

Jonathan Tetlie (Advisor: Alex Harmon-Threatt)

## **Francis M. and Harlie M. Clark Summer Fellowships**

Tolulope Perrin-Stowe (Advisor: Alfred Roca)

Ingrid Romero Varlero (Advisor: Surangi Punyasena)

Rachel Skinner (Advisor: Christopher Dietrich)

## **Francis M. and Harlie M. Clark Research Support Grants**

Nicholas Anderson (Advisor: Alex Harmon-Threatt)

Colby Behrens (Advisor: Alison Bell)

Amanda Curtis (Advisor: Eric Larson)

Hannah Darcy (Advisor: Philip Anderson)

Joseph Edwards (Advisor: Anthony Yannarell)

Michael Rivera (Advisor: Andy Suarez)

Angel Rivera-Colón (Advisor: Julian Catchen)

Sana Saboowala (Advisor: Ripan Malhi)

Hannah Scharf (Advisor: Mark Hauber)

Sarai Stuart (Advisor: Gene Robinson)

Nicholas Sutton (Advisor: James O'Dwyer)

Loralee Wilson (Advisor: Chris Cheng)

## **GAANN Fellowships**

Gabriel Beuchat (Advisor: Li-Qing Chen)

Hannah Darcy (Advisor: Philip Anderson)

Robert de Moya (Advisor: Kevin Johnson)

Shelby Lawson (Advisor: Mark Hauber)

Alec Luro (Advisor: Mark Hauber)

Jennifer Quebedeaux (Advisor: Andrew Leakey)

Jacob Torres (Advisor: Adam Dolezal)

## **Program in Ecology, Evolution and Conservation (PEEC) Biology Summer Research Grants**

Amanda Curtis (Advisor: Eric Larson)

Alida de Flamingh (Advisor: Alfred Roca)

Shay-Akil McLean (Advisor: Charles Roseman & Joyce Hedrick)

Sierra Perez (Advisor: Jim Dalling)

Tolulope Perrin-Stowe (Advisor: Alfred Roca)

Kevin Ricks (Advisor: Anthony Yannarell)

Michael Rivera (Advisor: Andy Suarez)

Sana Saboowala (Advisor: Ripan Malhi)

Sarai Stuart (Advisor: Gene Robinson)

Nicholas Sutton (Advisor: James O'Dwyer)

## **Animal Biology Summer Stipend Awards**

Samantha Capel (Advisor: Ken Paige)

Niraj Rayamajhi (Advisor: Julian Catchen)

## **Edwin M. Banks Memorial Award**

Shelby Lawson (Advisor: Mark Hauber)

Lynnette Strickland (Advisor: Carla Cáceres)

## **Odum-Kendeigh Research Awards**

Alec Luro (Advisor: Mark Hauber)

Lauren McDaniel (Advisor: Becky Fuller)

Bradley Scott (Advisor: Philip Anderson)

## **Herbert Holdsworth Ross Memorial Awards**

Robert de Moya (Advisor: Kevin Johnson)

Bradley Scott (Advisor: Philip Anderson)

Eric South (Advisor: Ralph Dewalt)

Milton Tan (INHS Assistant Research Scientist)

Jared Thomas (Advisor: Sam Heads)

## **Philip W. Smith Memorial Award**

Hannah Scharf (Advisor: Mark Hauber)

## **Fred H. Schmidt Summer Scholars**

Nathalie Baena Bejarano (Advisor: Sam Heads)

Elijah Juma (Advisors: Juma Muturi & Brian Allan)

## **Entomology Summer Stipend Awards**

Charles Dean (Advisor: May Berenbaum)

Kristen Reiter (Advisor: Marianne Alleyne)

Eric South (Advisor: Ralph Dewalt)

## **John R. Laughnan Awards**

Alex Riley (Advisor: Katy Heath)

Georgia Seyfried (Advisor: Wendy Yang)

## **Govindjee and Rajni Govindjee Award for Excellence in Biological Research**

Jessica Lira Viana (Advisor: Jim Dalling)

## **Graduate Students in Ecology and Evolutionary Biology (GEEB) Symposium Awards**

### **Best Overall:**

- Kira Long (Advisor: Jeffrey Brawn)

### **Most Outstanding Talk by a Ph.D. Candidate:**

- Jaime Coon (Advisor: James Miller)

### **Most Outstanding Talk by a MS Candidate/Pre-Prelim Ph.D.:**

- Ophelia Bolmin (Advisors: Kai James & Aimy Wissa)

## **UNDERGRADUATE SCHOOL HONORS**

### **Distinction**

- Justin Falk
- Laura Janousek
- Jacob Delos McArtor
- Joshua Nielsen
- Peter Timothy Schmuker

### **High Distinction**

- Rose Marie Louise Aubery
- Aleyna Grace Brunner
- Laura Burns
- Eunice Chen

### **Highest Distinction**

- Aleeza Leder Macek

# UNDERGRADUATE STUDENT AWARDS

## **Robert H. Davis Research Scholarship**

Abby Weber

## **Robert H. Davis Excellence Scholarship**

Alyssa Petko

## **Camp Family Research Awards**

Pawel Kaminski

Salvador Luna-Guardado

## **Spyros Kavouras Summer Research Award**

Jacqueline Trujillo

## **Joann Kavouras Memorial Scholarship**

Hayley Henderson

## **iBio Summer Internships**

Zoe Gasson

Katharine Stenstrom

Jay Wilson

## **Oliver J. Bell Merit Scholarship in IB**

Izabella Lach

## **Judy Willis Scholarship**

Deniz Namik

## **IBH Sophomore Achievement Scholarship**

Cassandra Afseth

## **IBH Junior Achievement Scholarship**

Taskeen Khan

## **Delcomyn International Study in Biology Award**

Claire Williams

## **SIB Merit Fellows**

Daniel Garza

Gabriela Murillo

## **Richard Ware Family Scholarship**

Anna Grommes

## **Dr. Stamatiki Blanas Scholarship**

Daniel Clark

## **Dr. Kevin and Julia Kays Scholarship**

Bryana Rivera

## **Chester W. and Nadine C. Houston Scholarships**

Jacob Andersen

Hayley Ban

Haley Fuoco

Alina Yang

## **Robert J. Graesser Research in Plant Biology**

Emina Sipic

## **Entomology Research Award**

Justin Falk

## **AB/AAP Summer Research Fellowships**

Eric Arredondo

Ayomide Averihi

Elina Back

Anthony Guaman

Lisbeth Perez

Zoe Trujillo

Fahren Zackery

# TEACHING AND MENTORING AWARDS

## **Ellis MacLeod/DuPont Award for Outstanding Teaching by a Graduate Student in the Department of Entomology**

Nicholas Anderson

## **Award for Outstanding Teaching in Plant Biology**

Ingrid Romero Valero

## **John G. & Evelyn Hartman Heiligenstein Outstanding Teaching Assistants**

Jennifer Jones

Tolulope Perrin-Stowe

Nick Sutton

## **Sharon Gray Memorial Award**

Nicholas Anderson

Anna Grommes

## **Teachers Ranked Excellent**

*by Students in Integrative Biology Courses Taught in Spring, Summer and Fall 2019*

Rafael Achury Morales

Brian Allan

Nicholas Anderson

Philip Anderson

May Berenbaum

Gabriel Beuchat

Charles Burroughs

Daniel Bush

Carla Cáceres

Sydney Cameron

Samantha Capel

Julian Catchen

Yaping Chen

Chris Cheng

Ben Clegg

Catherine Dana

Alida de Flamingh

Charles Dean

Stephen Downie

Becky Fuller

Sarah Giers

Mark Hauber

Edward Hsieh

Sarah Huss

Cody Jones

Kavya Kannan

Shelby Lawson

Kira Long

Kelsey Low

Lauren McDaniel

Miles Mesa

Andrew Miller

Mario Muscarella

Allison Parker

Rachel Paul

Tolulope Perrin-Stowe

Daniel Raudabaugh

Bradley Scott

Lynette Strickland

Andy Suarez

Nicholas Sutton

Christina Swanson

Daniel Swanson

Jacob Torres

Erin Welsh

Michael Wong

Dessiree Zerpa Catanho

## Alumni Award Program Now Accepting Nominations

The School of Integrative Biology has a tradition of teaching and research excellence over 150 years old, when courses in Zoology, Botany, and Entomology were first taught at the University of Illinois. Our departments were founded in 1884 (Zoology/EEE, Genetics and Development, Animal Biology, Evolution, Ecology & Behavior), 1901 (Botany/Plant Biology), and 1909 (Entomology). In the last century and a half, our faculty have had the pleasure of working with tens of thousands of undergraduate and graduate students who have gone on to change the world through their impactful and cross-cutting work.

To celebrate the accomplishments of our alumni, the School of Integrative Biology is pleased to announce the second annual call for the SIB Alumni Awards Program, to recognize exceptional alumni who have made significant contributions through outstanding professional achievement or have provided exceptional service to the School or the departments. We seek nominations for the two following awards:

- **Achievement Award** for outstanding professional achievement that demonstrates the value of an education (BS, MS, or PhD) from the University of Illinois.
- **Outstanding Recent Alumni Award** for a recent graduate (within 10 years of final Illinois degree) for outstanding or noteworthy professional achievement.

Nominations may come from alumni, faculty, commercial enterprises, college of campus advancement personnel, friends of the University, or other academic institutions that employ Illinois graduates. Nominees must have earned a BS, MS, or PhD in Biology (with or without a concentration), Botany, Ecology, Evolution and Conservation Biology, Entomology, Genetics and Development, Integrative Biology, or Plant Biology. To nominate an alumnus for either the Achievement Award or the Outstanding Recent Alumni Award, please include the nominee's name, address, degree(s)/years at Illinois, employers, career path, C.V., statement of recipient's achievement or significant accomplishments, and at least two letters of support from individuals familiar with the nominee in a single PDF and submit to **Rose Keane** at [rkeane3@illinois.edu](mailto:rkeane3@illinois.edu) by December 1<sup>st</sup> annually. ❖

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## Alison Kirby Receives LAS Alumni Humanitarian Award



Seven alumni from the College of Liberal Arts & Sciences were named recipients of the college's 2019 annual alumni awards. **Alison Kirby** (BS, '84, biology) received the LAS Alumni Humanitarian Award. The award is given to LAS alumni who, through outstanding leadership or service, demonstrate the values derived from a liberal arts and sciences education by significantly improving or enhancing the lives of others.

From volunteering at a clinic for homeless youth to opening a free school-based health center, to staffing a rest stop on the MS Bike Ride when she was no longer able to ride due to her MS, Kirby has always thought about how her talents and skills could help others. She was part of a 35-doctor practice in Walla Walla, Washington, when the principal of an alternative school first asked her to do free physicals for the kids joining their basketball team.

"I said sure, send them over," Kirby recalls. "But as I began to see these students, I asked them when was the last time they'd been to see a doctor. They'd say, 'Not since kindergarten.' How could that be? These were 16- to 17-year-old boys! So, I went to a school meeting about truancy, and it was like a gentle slap of reality," she continues. "I found we had kids missing school because of dental abscesses and untreated strep throat. I thought: 'What?'"

Kirby decided to take action, and she co-founded a school-based health clinic that helped to turn around both the school and the lives of hundreds of students. Today, the Health Center at Lincoln is a full-service, mostly volunteer-run health clinic located adjacent to the school that provides free services to students. The clinic and school have drawn nationwide attention, even being featured in "Paper Tigers," a documentary about Lincoln High School directed by Robert Redford's son, Jamie. Kirby's vision has reached five other schools in the community, with onsite health centers providing immediate care and monitoring the needs of students served by the Health Center at Lincoln. ❖

## What Can You Do with an IB Degree? Our Grads Have the Answers!

This has been the driving question of the Alumni Mentoring Program for the past three years. Our students come to us with concern about their future, especially about what they can do with their degrees.

We wanted to change that. We dug in to figure out what exactly our graduates were doing with their degrees, and how they got there, to give our students data-driven resources and tangible examples of their (many) options. Even better, by connecting back with our IB community we found a passionate group of mentors, excited to share their experiences with our current students.

*“The unique aspect of having alumni in almost every lecture helping out with every step of the job search process is an experience I couldn’t have gotten anywhere else.”*

These individual connections with alumni mentors have been pivotal for our students, and our career class, IB292: Translating your IB Degree into Career Success, is a great example of how impactful these relationships have been. Students engaged with professionals in a variety of fields, learning about their options and what it takes to be successful. The alumni could relate to feeling lost and were excited to share the insights and perspective they gained after graduation.

By the end of the class students felt knowledgeable, comfortable, happy, confident, and that they had resources for success. They gained a knowledge of what they can do with their degree and were motivated to take initiative and make actionable changes to improve their own career outcomes.

This past year alone we’ve facilitated over 30 mentor-student connections, and we’re excited to grow that number as our Program expands! I have personally experienced the incredible impact these relationships have had on students’ confidence, and the shift from dread to excitement about their future. It really does change lives (which is why I love this job!).

The reason this Program works is because of the participation of alumni, so if you have even a few minutes we would love to hear from you – even just to say hello and add your job title to our growing list. To learn more, contact me, **Christina Swanson** ([silima2@illinois.edu](mailto:silima2@illinois.edu)) or fill out our short profile survey at [go.illinois.edu/SIBAlumniProfile](http://go.illinois.edu/SIBAlumniProfile).

This course couldn’t have happened without the 30+ mentors who have dedicated their time and energy to our students – thank you for making it a huge success! A special thank you to Steve Caldwell who has been an indispensable collaborator and mentor. ❖

*- Christina Swanson, Alumni Mentoring Program Coordinator*



## School of Integrative Biology Seniors Reflect on Their Major

Graduating seniors answered a survey about their experiences in Integrative Biology. Here, in their own words, they recall the most positive aspects of being an IB major at the University of Illinois. Our 2019 convocation speaker was alumna **Dr. Rebecca Klaper**, Director of the Great Lakes Genomics Center (BS, 1992).

"I feel like it introduced me to topics and global concerns that I would have never been able to find or understand by myself. I have a better understanding of accessing and conveying scientific information, and it introduced me to a lot of people who share similar passions."



"Excellent instructors; SIB clearly values undergraduate instruction and I learned a lot. I appreciate the emphasis on how to think like a scientist and interpret and communicate scientific data. I felt very prepared for graduate school after that."

"The professors and TAs made for a welcoming environment, with plenty of opportunity for research experience if you were interested. There was a lot of hands on experience. The curriculum not only taught me information, but how to think critically and how to understand the world around me."



## How Can I Stay Connected to SIB?



We would love to hear from you! Our website includes all of our recent news, research updates, student blogs and more, and can be accessed at [sib.illinois.edu](http://sib.illinois.edu).

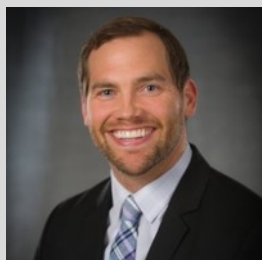
Our blog, written by students about their research experiences, offers a unique look at the ways our students add value and perspective to SIB's research. You can read their accounts at [sib.illinois.edu/blog](http://sib.illinois.edu/blog)

SIB is also active on social media! Be sure to like, share and subscribe to stay up to date on our news, events and accomplishments. You can find us on Facebook, Twitter and Instagram by our handle [@iBioIllinois](https://www.instagram.com/iBioIllinois).

Our alumni play an important role in helping to guide and mentor our undergraduate students through the SIB Alumni Mentoring Program. For more information about the program, and to get involved, contact Christina Swanson, [sillima2@illinois.edu](mailto:sillima2@illinois.edu) or visit [sib.illinois.edu/alumni/mentor](http://sib.illinois.edu/alumni/mentor).

For everything else, send us an email at [sib@illinois.edu](mailto:sib@illinois.edu). We look forward to hearing from you and celebrating your success! ❖

## Giving to the School of Integrative Biology



Alumni and friends play a vital role in the success of our students, faculty, and staff.

Your investment supports the best and brightest students with fellowships and scholarships, supports world-renowned faculty and their innovative research and teaching, and it funds essential upgrades to laboratories, classrooms, and technologies.

You can make a gift online, by phone, or by contacting Braden Shain with the LAS Office of Advancement.

In addition to outright gifts, you can support the School of Integrative Biology as part of your overall financial, tax and estate planning with deferred gifts such as bequests, charitable trusts and annuities.

We will work with you to arrange options most suitable to you. If you are interested in learning more about these or other gift options, please contact:

Braden Shain, Associate Director of Development  
LAS Office of Advancement  
[bshain@illinois.edu](mailto:bshain@illinois.edu) | Office: (217) 300-9993

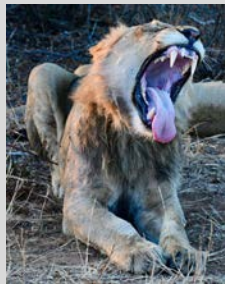
**Congratulations to our 2019 Photography Contest Winners!**

Categories were Nature: Landscape, Nature: Organisms, Biologists at Work, and Biological Imaging

**1st Place**



"Erosion Swirls"  
Daniel Urban



"Yawning"  
Evan DeLucia



"Up Close Pollination"  
Alex Harmon-Threatt

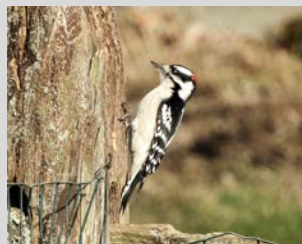


"Spined Assassin Bug"  
Scott Clem

**2nd Place**



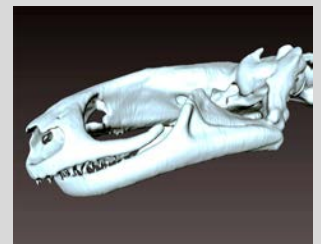
"Mendenhall Glacier"  
Hannah Scharf



"Downy Woodpecker"  
Hannah Scharf

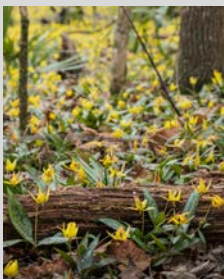


"Dirty Dirt Diggers"  
Jessica Lira Viana



"Toothy Smirk"  
Hannah Darcy

**3rd Place**



"Trout Lilies"  
Sierra Perez



"Wood Nymph of the Cloud Forest"  
Ed Hsieh



"Angry Boy"  
Jessica Lira Viana



"Unidentified"  
Vicente Aldunate