

A collage of various crabs and marine life on a black background with a white geometric pattern. The crabs are in various colors and sizes, including blue, orange, white, and green. Some are shown in their natural habitat, while others are shown in a more stylized, geometric arrangement. The pattern consists of white lines forming a grid of squares and rectangles, some of which are slightly offset or rotated, creating a complex, maze-like structure.

Department of Organismic
& Evolutionary Biology
Harvard University

Newsletter
2022-2023



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About the cover: The endless diversity of crab body forms, including *Callinectes perplexa* in the center. Featured in *iScience*. Figure by Postdoctoral Researcher Javier Luque, image by Arthur Anker and Javier Luque.



Welcome from the Chair



Scott Edwards

DEPARTMENT CHAIR
PROFESSOR OF ORGANISMIC AND EVOLUTIONARY BIOLOGY,
CURATOR OF ORNITHOLOGY
ALEXANDER AGASSIZ PROFESSOR OF ZOOLOGY IN THE MUSEUM
OF COMPARATIVE ZOOLOGY

Dear Colleagues, Alumni, and Friends,

I write to you having spent a productive summer with research and catching up with colleagues and collaborators overseas – sort of a post-pandemic re-meet and re-greet. It is great that the world is finally opening up, although of course the challenges of covid are still with us. We hope that you and your loved ones are safe and that you have been able to take at least a little break during the summer.

Since becoming Chair in July 2022, I have learned that OEB was handed to me in very good shape by former Chair Elena Kramer, who shared with me her secrets for effective leading of the department. As well, working with such a professional and efficient administrative staff frankly makes my job so much easier. I approach my new post with humility and excitement to work together to improve the department for our faculty, graduate and undergraduate students, and staff.

Last year we hit several milestones and accomplished some important unfinished business. Most importantly, we were overjoyed when our own Mansi Srivastava was granted tenure in OEB! We are delighted that she will continue with us with all her great research and teaching. We finally finalized the search for a Director of the Harvard University Herbaria (HUH) and are delighted to announce that Dr. Jeannine Cavender-Bares, University of Minnesota, will join OEB as faculty and HUH Director! This is a major accomplishment for our department and the long process (which started before the pandemic) could not have been successful without the tireless work of several faculty who served on the search committee. We are delighted to have Jeannine join us!

We are also embarking on some new ventures. The search for a Director of the Harvard Forest has begun, with interviews beginning in the fall. We successfully hired a new Education and Outreach Manager, Ogenka “Ogie” Avramovska. Ogie is already helping revamp the curriculum for OEB 10 and is poised to assist faculty set up productive summer internships and other engagements with high school students and undergrads. We graduated an incredible group of 14 OEB PhD students and 17 IB Concentrators! I also look forward to seeing the continued progress made by the Diversity, Inclusion and Belonging (DIB) Committee, which has been developing ideas ranging from high school internships to a symposium and workshop focused on rising stars in evolution and ecology. Although challenges were handed down to us by the recent Supreme Court ruling on undergraduate admissions (many of which also apply to graduate admissions), we remain committed to creating and fostering a diverse and inclusive department at all levels.

Please take some time to peruse the entire newsletter, there is more to celebrate within. Remember, you can follow all the latest news from OEB on our [website](#), [Instagram](#), and [Twitter](#). And, we always welcome updates on your activities and accomplishments.

Best wishes,
Scott Edwards

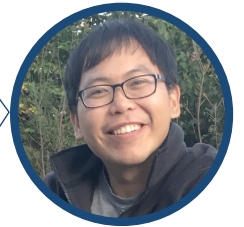


Congratulations to our Graduates!



ABAGAIL BURRUS

The development and evolution of glands in the Malpighiaceae (Elena Kramer and Charles Davis, Co-Advisors)



WEI-PING CHAN

Analyzing the evolution and diversification of Lepidoptera using multi-spectral images (Naomi Pierce, Advisor)



AUSTIN G. GARNER

Evolutionary and functional genomics of the origin of species in *Phlox* (Robin Hopkins, Advisor)



RYAN E. HULETT

On building brains and making diverse neurons during whole-body regeneration in the acoel *Hofstenia miamia* (Mansi Srivastava, Advisor)



SANG IL KIM

Genomics and evolutionary origin of longhorned beetles in the temperate zone (Brian Farrell, Advisor)



AMANEET K. LOCHAB

Early germ line development in the hemipteran insect *Oncopeltus fasciatus* (Cassandra Extavour, Advisor)



ANJU MANANDHAR

Making space for the pore: Stomatal movement when guard cells and epidermal cells interact (N. Michele Holbrook, Advisor)



Congratulations to our Graduates!



ARTUR REGO-COSTA

On pleiotropy and evolutionary dynamics in the budding yeast *Saccharomyces cerevisiae* (Michael Desai, Advisor)



SAMANTHA ROYLE

Limb initiation across tetrapods (Cliff Tabin, Harvard Medical School, and James Hanken, Co-Advisors)



SHOYO SATO

Worming my way into onychophorology: A multilevel approach to an enigmatic panarthropod (Gonzalo Giribet, Advisor)



JACOB S. SUISSA

The structure, function, and evolution of the fern vascular system (William Friedman, Advisor)



CHRISTOPHER TOMKINS-TINCH

Examining viral pathogen evolution and spread through genomic data (Pardis Sabeti, Advisor)



ZANE WOLF

Hook, line, and tinker: Using robotic models to understand undulatory locomotion in fish (George Lauder, Advisor)



TIANZHU XIONG

On the genetic rules of interspecific hybridization (James Mallet, Advisor)



Research Highlights

~ In a study published in *Science Advances*, **Zachary R. Lewis** (PhD '16) and **Professor James Hanken** examined Plethodontidae, a dominant family of salamanders that are lungless as adults. Lungs are essential to many vertebrates, including humans, yet four amphibian clades (including Plethodontidae) independently eliminated pulmonary respiration and lack lungs, breathing primarily through their wet skin. However, when Lewis and Hanken examined plethodontids they discovered they actually do develop lungs as embryos. They hypothesize that lung development ceases in these species due to a lack of cues that maintain lung development which arise from the tissue, mesenchyme, that surrounds the lung as it develops. The study sheds light on the evolution of lung loss over millions of years, which could also shed light on organ loss in other vertebrates.

~ The Permian-Triassic (P-T) crisis was a series of climatic shifts that occurred between 265-230 mi-

llion years ago. These shifts caused two of the largest mass extinctions in the history of life, eliminating 86% of all animal species worldwide. During the next period, the Triassic (252-200myo), reptiles evolved at rapid rates, creating an explosion of diversity. In a study published in *Sciences Advances*, **postdoctoral researcher Tiago R. Simões** and **Professor Stephanie Pierce** reveal that the rapid evolution and diversification of reptile body plans was actually triggered much earlier than the P-T extinction. They also show it occurred in connection to steadily increasing global temperatures through a long series of climatic changes that spanned almost 60 million years in the geological record. Simões and Pierce combined their dataset of more than 1,000 fossil specimens from 125 species of reptiles, synapsids, and their closest relatives from approximately 140 million years before and after the P-T extinction with global temperature data from the geological record. They found that periods

Faculty Notable Awards

- **Hopi Hoekstra** named Edgerley Family Dean of the Faculty of Arts and Sciences.
- **Cassandra Extavour** awarded the Human Frontier Science Program (HFSP) Research Grant to address the many ways cells change shape and coordinate their behavior in groups. The awarded project is in collaboration with MPI-CBG of Molecular Biology and Genetics (Dresden), The Institute of Science and Technology (Austria), and The University of Bergen (Norway).
- The University of Bristol (United Kingdom) featured **Scott Edwards** and **Cassandra Extavour** in a Black History Month display honoring African and African American Scientists.
- **Peter Girguis** elected 2023 Class Fellow by the American Academy of Microbiology.
- **Hopi Hoekstra** appointed C.Y. Chan Professor of Arts & Sciences, the highest honor recognizing scholarly achievement by the Faculty of Arts and Sciences.
- **Pardis Sabeti** honored by the National Human

Genome Research Institute at the National Institutes of Health for her achievements in enhancing diversity, equity, inclusion, and accessibility in the genomics workforce.

- **L. Mahadevan** elected Fellow of The American Academy of Arts and Sciences.
- **Peter Girguis** one of five Harvard faculty awarded funding from the Harvard Grid Accelerator for work that will de-risk promising ideas and aid in launching startups.
- **Naomi Pierce** elected member of The National Academy of Sciences.
- **Hopi Hoekstra** recipient of the Lowell Thomas Award from the Explorers Club.
- **Mansi Srivastava** recipient of the Roslyn Abramson Award from Harvard University for excellence in teaching undergraduates.
- **Gonzalo Giribet** elected Académico Extranjero (Foreign Member) to the Real Academia de Ciencias Exactas, Físicas y Naturales de España (the Spanish Royal Academy of Sciences).



of fast climatic shifts and global warming are associated with exceptionally high rates of anatomical change in most groups of reptiles as they adapted to new environmental conditions.

~ The texture of shark skin, which is composed of ridges on the surface of individual tooth-like scales called denticles, is what many believe helps sharks reduce drag and enhance thrust in water. Attempts to replicate the hydrodynamic performance of shark skin have involved manufacturing both engineered riblets and fabrics for competition swimsuits that are often proposed as having a comparable surface texture to shark skin. Yet, no studies have compared the surface ornamentation of shark denticles to bioinspired materials. In a study published in *Frontiers in Marine Science*, postdoctoral researcher **Molly Gabler-Smith** and **Professor George Lauder** used 3D surface profilometry to analyze the cross-sectional profile of the surface of shark denticles at two locations on 17 species. They found that, overall, engineered riblet surfaces were very different from biological shark skin.

~ In a study published in *Frontiers in Genetics*, postdoctoral researcher **Daren Card** and **Professor Scott Edwards** provide the first detailed characterization of the reptile squamate major histocompatibility complex (MHC), an important genomic region for adaptive immunity. They used the genomes of two anole species, the green anole (*Anolis carolinensis*) and the brown anole (*Anolis sagrei*), to reveal the complexity of the structure and evolution of MHC. They localized the MHC in the genomes of each species, detailing the composition of genes and the overall genomic structure. They found that the MHC is located at the end of chromosome 2 in both species and that the composition of genes more closely resembles mammals versus birds. The study is the first to thoroughly describe the MHC immune region of squamates, producing data and knowledge that will be important for future studies of squamate and vertebrate immunogenetics and evolution.

~ The most famous fossils from the Cambrian explosion include the five-eyed *Opabinia* and the fearsome apex predator *Anomalocaris*. Though both are icons in popular culture, they were only quite recently recognized as extinct stages of evolution that

Mansi Srivastava Promoted



Mansi Srivastava has been promoted to Professor of Organismic and Evolutionary Biology.

Srivastava's ground-breaking work has consistently propelled her fields forward. Her research program combines approaches from the fields of genomics, evolutionary biology, and functional genetics in novel ways that shed light on how animal genomes have evolved, and how the genes that they contain determine why some animals can regrow lost body parts while others cannot. Srivastava has brought new depth, creativity, and insight to the problem of regeneration, and in doing so has shed new light on a centuries-old problem: the mechanisms and evolution of whole-body regeneration. She achieved this by developing the marine acoel *Hofstenia miamia* as the next model organism to study regeneration. Her work and the insights *H. miamia* provide are widely recognized by the scientific community.

are crucial for understanding the origins of arthropods. In an article published in *Nature Communications*, **Former postdoctoral researcher Stephen Pates** (University of Cambridge) and **postdoctoral researcher Joanna Wolfe** describe two new specimens, with striking similarities to *Opabinia*, found in a fossil deposit from the Ordovician Period (40 million years after the Cambrian explosion) in mid Wales (UK). Analysis strongly favored these specimens being considered true opabiniids, the first from outside North America and the youngest by 40 million years.

~ In a study published in *Communications Biology*, **Professor Stephanie Pierce**, **former postdoctoral researcher Megan Whitney**, and researchers from the Field Museum of Natural History cracked open the fossil femora (thigh) bone of a range of growth stages in the early tetrapod, *Whatcheeria deltae*, and found evidence that the animal grew quickly into adulthood; contrary to early hypotheses of slow growth throughout their lifetime. Pierce and Whitney examined nine samples spanning the known size



classes from juvenile to adult and found fibrolamellar bone in the juvenile bone, which is primary bone tissue associated with fast growth. *Whatcheeria*'s large size combined with the evidence of fibrolamellar bone led them to hypothesize that it may have grown fast to quickly reach the large size necessary to be a top predator in its environment. The study showed fibrolamellar bone evolved close to the origin of the first tetrapods (385-320 million years ago), much earlier than anybody ever expected, and was not exclusive to amniotes as previously assumed.

~ Root exudates are organic carbon compounds released from living plant roots into the soil. They can bind directly to soil minerals, making them important regulators of soil carbon formation and loss due to their immediate effect on mineral-associated organic matter (MAOM). In a study published in *Nature Geoscience*, **PhD candidate Nikhil Chari** and **Professor Benton Taylor** tested how human-elevated atmospheric CO₂ concentrations are likely to increase the rate of plant root exudation and change the chemical composition of root exudates. They fabricated three carbon-13 root exudate “cocktails”, which they delivered to soil cores collected from Harvard Forest. They discovered that contributions of root exudates to soil carbon were driven by contributions to the long-cycling MAOM fraction, creating a priming effect where the input of new soil carbon prompts the decomposition of old soil carbon. The findings suggest the larger microbial community enhances the microbial priming effect, and validate that predicted increases in root exudation rates and a shift toward simple sugars caused by global change may reduce soil's carbon storage capacity.

~ In a study published in *Cell*, **Julian Kimura** (PhD '22) and **Professor Mansi Srivastava** identified the cellular mechanism and molecular trajectory for the formation of adult pluripotent stem cells (aPSCs) in the acoel worm, *Hofstenia miamia*. *H. miamia* can perform whole-body regeneration through aPSCs called “neoblasts”. Kimura performed lineage tracing through transgenesis, following the embryo's development as it split from single cell to multiple cells. He created a full fate map at the eight-cell stage, and at the sixteen-cell stage embryo Kimura found a very specific pair of cells, called 3a/3b, that gave rise to

HMSC Spotlight on OEB Faculty



HMSC Connects! podcast featured interviews with several OEB faculty.

Scott Edwards, Chair of OEB and Curator of Ornithology in MCZ. A longtime champion of promoting diversity in the sciences, Edwards discusses ways to make Nature and Science accessible to everyone.



Andy Knoll, Professor Emeritus of Earth Sciences and Biology, discusses how physical and biological processes have interacted throughout our planet's

history to shape our world.

Stephanie Pierce, MCZ's first female Curator of Vertebrate Paleontology, shares how her interests in the early evolution of terrestrial animals evolved growing up in Alberta, Canada, and what it means to be the first woman curator of the vertebrate collection.



Gonzalo Giribet, Curator of Invertebrate Zoology and Director in the MCZ, recounts scouring the beach for shells while growing up in Barcelona, Spain and how that led him to a career

in science.

These episodes and more can be found [online!](#)



cells that looked to be the neoblasts. He found that the progeny of only those cells made new tissue during regeneration and that at the molecular level only the progeny of the 3a/3b cells matched stem cells and not the progeny of any other cell. Kimura generated a massive dataset of embryonic development at the single-cell level detailing which genes were being expressed in all of the cells in embryos from the beginning to the end of development, revealing a set of genes that could be very important controllers for the formation of stem cells across species.

~ In a study, published in *eLife*, researchers, led by **Professor L. Mahadevan**, sought to understand how individual social insects (such as ants, termites and bees) work collectively to perform complex tasks. Ants use antennation, using their antennae to interact with the environment and other ants. The researchers examined how black carpenter ants work together to escape from a soft corral. They identified two important parameters, the strength of collective cooperation and the rate of evacuation, showing the ants were only successful when they cooperated with each other. They then built robotic ants, nicknamed RAnts, to see if they could work together to escape a similar corral. The RAnts used “photormones,” fields of light that are left behind by the roving RAnts that mimic antennation. The study showed that a cooperative completion of tasks arises from simple rules that can be applied to solve other complex problems. This approach can be scaled up to teams of dozens or hundreds using a range of various communication fields.

~ In a study published in *Nature* postdoctoral researcher **Taihong Wu** and **Professor Yun Zhang** discovered a biological pathway through which *Caenorhabditis elegans* hermaphrodites respond to bacterial infection by suppressing their response to a dispersing pheromone. This cues an increase in the rate of outcrossing with males, enhancing their ability to generate genetic diversity in the progeny. *C. elegans* have two sexes, hermaphrodites (which produce both eggs and sperms) and males. Hermaphrodites reproduce mainly through self-fertilization, but maintain the ability to outcross with males. Under normal conditions, adult hermaphrodites avoid a mixture of pheromones that serves as a dispersing cue. However,

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- **Isobel Ronai** (C. Extavour) recipient of the 2022 Entomological Society of America (International Branch) Early Career Research and Leadership Award. Elected 2023 Presidential Member of the Genetics Society of America's Presidential Membership Initiative for her work on tick-borne diseases.
- **Peter Flynn** (C. Davis) awarded the National Science Foundation Postdoctoral Fellowship in Biology for his proposal, "Understanding the evolutionary importance and vectoring mechanisms of horizontal gene transfer within a parasitic plant system."
- **Yan Gong** (E. Kramer) awarded the National Science Foundation Postdoctoral Fellowship in Biology for his project, "Elucidating the cellular and molecular dynamics behind nectary development in *Aquilegia*."
- **Sonali Garg** (J. Hanken) awarded the Indian National Science Academy Medal for Young Scientists.
- **Allison Kann** (M. Srivastava) awarded the Jane Coffin Child Postdoctoral Fellowship for her project, "How to build (and rebuild) an animal."
- **Michael Bradshaw** (D. Pfister) awarded the National Science Foundation Division of Environmental Biology Grant as Co-PI on a joint project with Professor Don Pfister titled, "A North American monograph of the powdery mildews (*Erysiphaceae*)."
- **Elsa Goerig** (G. Lauder) awarded Early-Career Research Board Fellowship, making her part of the Great Lake Fishery Commission Research Board.
- **Kiah Hardcastle** (B. Olveczky) awarded Harvard Brain Initiative (HBI) Pioneer Grant. for his proposal, "Examining how basal ganglia supports the shaping of new motor behaviors."
- **Mark Little** (P. Girguis) awarded National Science Foundation Postdoctoral Research Fellowship in Biology for his proposal, "Viral-microbial founder effects, gene transfer, and adaptation on successional coral reefs."

the study found that infection by a virulent *Pseudomonas aeruginosa* bacterial strain, PA14, suppresses the avoidance. The researchers sequenced the transcripts in AWA neurons in PA14-infected hermaphrodite worms, identifying a single chemoreceptor, STR-44, that is highly induced in AWA by PA14 infection. They showed that STR-44 functions as a pheromone receptor and its activity in AWA is required for pathogen-induced suppression of pheromone avoidance and AWA's response to the pheromones.



Because avoiding pheromones disperses the hermaphrodites, the researchers think that suppressing the avoidance increases the effective density of the host hermaphrodites and facilitates the encounter of the hermaphrodites with males to promote mating.

~ Munidopsid squat lobsters are the most diverse squat lobster group in the East Pacific region and make their homes in one of the harshest ocean environments, the abyssal depths of the ocean. Every year dozens of new species are described, yet the real diversity of these animals is poorly known as current classification has relied historically on the morphology of these animals. In a study published in *Invertebrate Systematics*, **postdoctoral researcher Paula Rodríguez Flores** describes five new deep-sea squat lobster species. Combining molecular data and microCT, Rodríguez Flores showed a wider species distribution range and shallower genetic diversity, calling for a revision of the current classification of squat lobsters. An examination of their genetics revealed the specimens were very evolutionary

divergent and their morphology did not match their genetics, leading to a rearranging of the group's phylogeny. The new species were named in honor of the researchers who led expeditions or were collaborators, the expedition ship, and the unique locations they were found. One specimen, *Munidopsis girguisi*, honors OEB **Professor Peter Girguis**, Chief Scientist on the E/V Nautilus oceanic expedition that collected many of the species used for the study.

~ In a study published in *Nature*, **postdoctoral researcher Anshuman Swain** and Adam Woodhouse, Institute for Geophysics at The University of Texas, examined the fossil record of the planktonic foraminifera and found communities made a global shift south to warmer waters during the Late Cenozoic period likely driven by climatic events, specifically the development of bipolar ice sheets. Marine organisms are shifting towards the Earth's poles in response to climate change and planktonic foraminifera's placement in the food chain (upper reaches of the ocean) can be a predictor of future shifts depen-

Graduate Students Notable Awards

-Maya Woolfolk (H. Hoekstra) awarded the Howard Hughes Medical Institute Gilliam Fellowship for Advanced Study for her project, "Understanding the ultimate and proximate causes of natural variation in infant vocal behaviors using a novel rodent model."

-Jacob Suissa (N. Friedman) awarded the National Science Foundation Division of Biological Infrastructure Fellowship Award for his project, "The origin and evolution of nectaries in nonflowering plants."

-Lydia Krasilnikova (P. Sabeti) one of nine featured Harvard Horizon Scholars to speak at the Harvard Horizons 2023 Symposium. Her presentation was, "Tracing COVID-19 outbreaks to learn about the effect of vaccination and boosting on risk of infection and transmission."

-Mia Miyagi (J. Wakeley and M. Desai) awarded the National Science Foundation Division of Biological Infrastructure Fellowship Award for her project, "Coalescent modeling of sex chromosome evolution with gene flow and analysis of sexed-versus-gendered effects in human admixture."

-Inbar Maayan (D. Haig) awarded the National Science Foundation Division of Biological Infrastructure Fellowship Award for her project, "The impact of

changes in genome structure on diversification in adaptive radiation."

-Julius Tabin (H. Hoekstra)

- Recipient of the DeLill Nasser Award for Professional Development in Genetics from the Genetics Society of America.
- Awarded the Summer Institute in Statistical Genetics Scholarship and Travel Grant from the University of Washington for his project, "Embracing evolution: A high school introduction to evolutionary research."
- Awarded the Society for the Study of Evolution grant for Local and Regional Outreach Promoting the Understanding of Evolutionary Biology.
- Awarded the Grant-in-Aid of Research from the American Society of Mammalogists for his project, "Using Congenic Mice to Investigate the Genetics of Burrowing Behavior in *Peromyscus*."
- Tabin is further honored by the American Society of Mammalogist. with the Elizabeth Horner Award bestowed upon the project that receives the highest rank across all reviewers.



ding on how the forams respond to climate change. Swain and Woodhouse plotted the biogeographical distribution patterns in the ecogroups and morphogroups of Triton, a global dataset of planktonic records with more than 500,000 individual species occurrences during the Late Cenozoic. The findings showed a global latitudinal shift towards the Equator regions within clade-wide communities, especially during the past eight million years. The study noted that the expansion of polar ice caps impacted the latitudes where the ecological groups were happiest, causing them to shift due to a number of factors, including where oxygen was most available. The foraminifera's correlation with anthropogenically important marine animal groups may lead scientists to predict more alterations driven by ongoing climate change.

~ In a study published in *eLife*, **postdoctoral researcher Carolyn Elya** revealed the molecular and cellular underpinnings behind the parasitic fungus, *Entomophthora muscae*'s, ability to manipulate the behavior of fruit flies. The behavior, called summitting, occurs at sunset when the infected flies climb to an elevated location, extend their proboscises to the surface and adhere via a sticky droplet, then raise up their wings from their body and die. Summitting has appeared several times in scientific literature, yet no one has ever observed flies in the last hours of life. Elya developed a laboratory model system that allowed her to continuously infect fruit flies, as well as culture the fungus independently of the fly host. She tracked hundreds of infected flies and discovered that summitting is not about climbing, it's actually a burst of locomotor activity that starts about two and a half hours before the flies die. Elya and co-authors collected a behavioral dataset consisting of hundreds of infected flies and discovered that fungal cells invade the fly's brains in an organized way, occupying specific regions of the brain during summitting.

~ In a study published in *Nature Communications*, **postdoctoral researchers Karma Nanglu and Rudy Lerosey-Aubril**, and **Professor Javier Ortega-Hernández** describe a new 500-million-year-old tunicate fossil that reveals the ancestral state of tunicates. Tunicates are the closest relatives of vertebrates, which includes fish, mammals, and even humans, which

HMSC Spotlight on PhDs



HMSC Connects! podcast featured newly minted PhD, Shoyo Sato (Gonzalo Giribet, Advisor)

Shoyo, an invertebrate biologist, discusses his experience volunteering at the Harvard Museum of Natural History since age 12, and how both he and the museum have changed. He recounts how his parents sparked his love of the outdoors, and how tying flies for fly fishing led to his interest in entomology. Shoyo also talks about his work studying social spiers in the Ecuadorian Amazon and velvet worms at the Museum of Comparative Zoology.



Alumni News

~ **Dakota McCoy** (PhD '21, David Haig, Advisor) awarded the [Theodosius Dobzhansky Prize](#) by the Society for the Study of Evolution. Dakota is honored for her work which unites methods from applied physics, evolutionary theory, and ecology to research biophotonics (how organisms manipulate light) and evolutionary conflict (how organisms manipulate one another). Dakota's advisor, David Haig, also received the award in 1995. Dakota is currently a Stanford Science Fellow and a National Science Foundation Postdoctoral Research Fellowship in Biology (PRFB) Fellow at Standford University.

~ **Shane Campbell** (PhD '15, Scott Edwards, Advisor) travels the globe exploring our human footprint and its impact in a new PBS series hosted by Campbell. "Human Footprint" addresses Earth's most destructive and adaptable species: humans. Watch Shane wrestle a python, hunt Hawaiian pigs, and get sucker-punched by a carp (!) while he explores the invasive species, humans, impact on Earth. The episode "The Replacements" features Professor James Hanken. [Episodes of Human Footprint](#) are now streaming on PBS. Shane is currently an Assistant Professor at Princeton University.



makes studying them critical for understanding our own evolutionary origins. Because tunicates are almost completely absent from the entire fossil record scientists have relied mainly on modern tunicates to construct the last common ancestor. The fossil, named *Megasiphon thylakos*, had a barrel-shaped body and two prominent siphon-like growths. But the feature that stood out to the researchers was the dark bands running up and down the fossil's body. High powered images allowed the researchers to conduct a side-by-side comparison to a modern ascidiacean tunicate, *Ciona*, which revealed remarkable similarities between *Ciona*'s muscles (which allow the tunicate to open and close its siphons) and the dark bands observed in the fossil. *M. thylakos* is the only definitive tunicate fossil with soft tissue preservation that has been discovered to date and it is the oldest of its kind, originating from the middle Cambrian Marjum Formation in Utah. *M. thylakos* provides evidence that most of the modern body plan of tunicates was already established soon after the Cambrian Explosion.

~ Hairworms are parasitic worms that manipulate the behavior of their hosts. They have no excretory, respiratory, or circulatory systems, spending most of their life inside the bodies of other animals. A study published in *Current Biology* reveals they're also missing about 30% of the genes researchers expected them to have. The missing genes are responsible for the development of cilia, hair-like structures that are present in some cells of every animal. The study, led by **Tauana Cunha (PhD '19)**, collected DNA samples from two hairworm species (one freshwater and one saltwater) and sequenced them. The majority of the missing genes were the same between the two hairworm species. Genomic work by Tauana and co-authors', **Bruno de Medeiros (PhD '19)**, **PhD candidate Arianna Lord**, and **Professor Gonzalo Giribet**, confirms that hairworms lack the genes to produce cilia. The connection between freshwater and marine hairworm species loss of cilia genes suggests this evolutionary change occurred deep in the past to a common ancestor. While it's unclear if the lack of cilia could have an effect on hairworms' parasitic behavior the researchers hypothesize that parasites may come to rely on their hosts, therefore losing the need

Commencement 2023



The 2023 Commencement ceremonies were held on May 25th. We were all very excited to witness our fourteen amazing graduating PhDs walk and celebrate with their mentors, peers, family, and the community. Congratulations graduates! We are so very proud of you!



Welcome 2023 G1s!

- Evgenilia Belousova (Michael Desai, Advisor)
- Gaurav Bhardwaj (Mansi Srivastava, Advisor)
- Taylor Brock-Fisher (Pardis Sabeti, Advisor)
- James Dougherty (N. Michele Holbrook, Advisor)
- Jordan Johnson (Brian Farrell, Advisor)
- Duyi Kuang (Stephanie Pierce, Advisor)
- Sebastian Martinez-Salazar (Elena Kramer, Advisor)
- Edna Rodríguez Sánchez (Javier Ortega-Hernández, Advisor)
- Ryan Schmidt (Charles Davis, Advisor)
- Mahdiyeh Shahbazi (Bence Olveczky, Advisor)
- Lily Shapiro (Gonzalo Giribet, Advisor)
- Wenjing Yang (Yun Zhang, Advisor)

for these genes. The study could aid in finding common threads for parasitic behavior across organisms.



OEB Diversity, Inclusion & Belonging

2022-2023 Committee Members

- Melissa Aja, Administrative Manager, MCZ
- Katherine Angier, PhD Candidate
- Ognenka (Ogie) Avramovska, Education and Outreach Manager, OEB
- Molly Gabler, Postdoctoral Researcher
- Kanchi Natarajan Gandhi, Senior Nomenclatural Registrar, HUH
- Gonzalo Giribet, Professor
- Meadow Hall, IB Concentrator, Undergraduate
- Aaron Hartmann, Research Associate
- Evan Hockridge, PhD Candidate
- Robin Hopkins, Associate Professor
- Jenna Legault, Senior Research Administrator, OEB
- Sophie MacRae Orzechowski, PhD Candidate
- Ryan Maloney, Postdoctoral Researcher
- Claire Pellegrini, Curatorial Assistant, HUH
- Michelle Kennedy, Collections Information and Database Specialist, Collections Operations, MCZ
- Julius Tabin, PhD Candidate
- Breda Zimkus, Director, Collections Operations, MCZ

Ex Officio Members

- Scott Edwards, Chair of the Department
- Rebecca Chetham, Executive Director
- Sarine Der Kaloustian, Associate Director

OEB DIB Activities

The OEB DIB Committee continued to hold monthly tea hours with the OEB community. Teatime, which initially began in the fall of 2021, provides a casual space for members of the OEB community to listen and discuss ideas and issues in a safe, private manner.

The committee shared the results of the Inclusive Spaces survey, conducted by the OEB DIB Committee in Spring 2022, with the heads of units

within OEB, MCZ, HUH, and the Arboretum. The committee also shared the results with the OEB community during a special teatime to discuss the results.

In February 2023, Ognenka (Ogie) Avramovska joined OEB as its inaugural Education and Outreach Manager. Ogie will manage and coordinate all aspects of OEB's education and outreach programs, which are an integral part of OEB's ongoing efforts to create a more diverse and inclusive scientific community. This includes programs with non-degree students, high school students, visiting undergraduates, graduates, and post-bacs.

Ogie's initial focus was the 2023 REU program, which took place from June to August. With support from members in OEB, MCZ, Harvard Public School Partnerships, Cambridge Rindge and Latin High School, and Society for the Study of Evolution, Evolution Day is planned for October 2023. High school students from four biology classes will participate in six mini-rotations across labs and learn about the research happening in the OEB community.

Ongoing projects include planning the spring 2024 Emerging Scientist program, an expanded Cambridge Rindge Latin School outreach program conceived by the Community Education Subcommittee of the OEB DIB Committee.

The OEB DIB Committee hosted a speaker for the OEB Seminar Series. [Christopher Donahue](#), Historian, National Human Genome Research Institute History of Genomics Program, National Institutes of Health, delivered a talk on December 8, 2022 titled, "The Bare Replacement: Geneticists' Support of Eugenics after the Second World War". For the 2023-2024 OEB seminar series, the OEB DIB Committee will host [Donna Garcia](#), Director of the Diversity, Equity in Promotion, Hiring and Tenure Center and Professor of Psychology, California State University, San Bernardino.



Integrative Biology

IB Awards & Honors



Athena Ye (Ben de Bivort) named First Marshall of the class of 2023.

Talia Blatt (Paul Moorcroft) awarded the Michael C. Rockefeller Fellowship.



Jocelyn Wang (Naomi Pierce) awarded the Hoopes Prize for her senior thesis, "The role of soil micronutrients in the symbiosis between the African ant plant, *Vachellia drepanolobium*, and its resident ant species."

Naomi Hegwood (Paul Moorcroft) awarded the Hoopes Prize for her senior thesis, "Tall trees and where to find them: An exploration of the effects of soil characteristics, climate, topography, and neighbors on maximum canopy height."



Congratulations 2023 IB Graduates!

- Katie Alerte (Elena Kramer)
- Talia Blatt (Paul Moorcroft)
- Nina Chung (Naomi Pierce)
- Nicholas Daley (Benton Taylor)
- Leyla Ewald (Aaron Hartmann)
- Naomi Hegwood (Paul Moorcroft)
- Peyton Jones (Robin Hopkins)
- Magda Mercado (Stephanie Pierce)
- Anai Morales (Benton Taylor)
- Logan Qualls (Javier Ortega-Hernández)
- Maya Rayle (James Hanken)
- Dylan Roy (Benjamin de Bivort)
- Ashley Schreiber (George Lauder)
- Jocelyn Wang (Naomi Pierce)
- Maddi Waskom (Javier Ortega-Hernández)
- Ashley Watts (Casandra Extavour)
- Athena Ye (Benjamin de Bivort)

IB POSTER SESSION

The 2023 Senior Thesis Poster Session took place April 5th in the Northwest Building. Attendees enjoyed discussing 24 posters covering a wide range of topics with the graduating students.



REU: Genes, Ecosystems & Organisms (GEO)

The 2023 REU session hosted ten undergraduates from around the world. Students engaged in field work, collections and molecular techniques, and participated in the REU exchange with the Harvard Forest and Arnold Arboretum. Students connected with OEB faculty and graduate students to learn more about their career journeys and the lessons they've learned along the way. OEB thanks all the participating labs, faculty, and peer mentors for their time and dedication to our exceptional summer students!

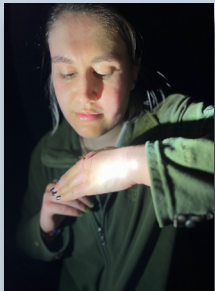


2023 REU Participants:

- Isabel Carino-Bazan, Lehigh University (Hopi Hoekstra)
- Teo Cooper, Pitzer College (Elena Kramer)
- Martin Fernandez, Syracuse University (Javier Ortega-Hernández)
- Mataeus Funderburk, Smith College (Naomi Pierce)
- Dakota Law, Smith College (George Lauder)
- Traysea Nycole Malama-Auger, Florida State University (Scott Edwards)
- Ivanellys Medina Tirado, University of Puerto Rico, Humacao (Charles Davis)
- Lauren Merrill, Belmont University (James Mallet)
- Jonathan Sarasa, University of Michigan, Ann Arbor (Terry Capellini, HEB)
- Grant Wass, Palomar College (Gonzalo Giribet)

OEB Field Trips!

OEB 51: Biology and Evolution of Invertebrate Animals, Instructor: Gonzalo Giribet



OEB 51 was excited to return after a long covid related pause. TF Arianna Lord (PhD candidate) ran a tight ship with a wonderful weekly lab. Students were also able to return to the Smithsonian Tropical Research Institute (STRI) in Bocas del Toro, Panama, along with a few additional assistants from the MCZ. At STRI, students studied the shallow invertebrate fauna across different environments (mangroves, reefs, sandy beaches, etc.) and were able to visualize many of the things they'd studied in the classroom and weekly labs. Everyone was happy to be back in person and, once again, the invertebrates field trip to Bocas was a favorite academic experience at Harvard!



OEB Field Trips!

OEB 56: Geobiology and the History of Life

Instructor: Javier Ortega-Hernández



OEB/EPS 56 spring break trip to Central Spain gave students an opportunity to explore several Paleozoic and Mesozoic fossiliferous localities, including: jaw-dropping Cambrian trace fossils produced by marine arthropods in Navas de Estena, diverse flora from the Carboniferous of Puertollano, and the world-class



collection of exceptionally preserved Cretaceous fossils from las Hoyas in Cuenca. The class's visit also drew considerable



local interest, including a radio interview and meeting with the Mayor of Puertollano, which gave everyone an opportunity to highlight the geological richness of these spectacular sites.



OEB 167: Herpetology, Instructor: James Hanken



OEB 167 took a weeklong field trip to Costa Rica during spring break to study the biology of amphibians and reptiles. Students visited two localities near the Caribbean coast: Veragua Ecotourism Park and La Selva Biological Station. Highlights of the trip included breeding aggregations of red-eyed treefrogs and other frogs, an early morning boat ride on the Rio Sarapiquí, numerous fer-de-lence, boas and eyelash vipers, and zip lining through the rainforest canopy!



Event Highlights

OEB Seminar Series

The 2022-2023 seminar season had a successful fall and spring with an incredible lineup of speakers from all over the world. And, for the first time since 2020, were held in-person.

Fall 2022

- Brad Seibel, Professor, University of South Florida, College of Marine Science
- Leslie Babonis, Assistant Professor, Cornell University
- Richard Phillips, Professor, Science Director Research and Teaching Preserve, Indiana University, Bloomington
- Christopher Lowe, Associate Professor, Biology, Hopkins Marine Station, Stanford University
- Todd Adam Castoe, Professor, University of Texas, Arlington
- Christopher Donohue, Historian, National Human Genome Research Institute History of Genomics, National Institutes of Health

Spring 2023

- Mansi Srivastava, John L. Loeb Associate Professor of the Natural Sciences (OEB), Curator of Invertebrate Zoology in the Museum of Comparative Zoology, Harvard University
- David Reich, Professor of Genetics, Harvard Medical School, Professor of Human Evolutionary Biology, Harvard University
- Yaniv Brandvain, Associate Professor, University of Minnesota
- Catherine Linnen, Associate Professor, University of Kentucky
- Iliana Baums, Professor of Marine Conservation, Institute for Chemistry and Biology of Marine Environments, Carl-von-Ossietzky University, Oldenburg, Germany
- Molly Womack, Assistant Professor, Utah State University.

2023-2024 Seminar Series

- September 7: Robin Hopkins, Harvard University, OEB
- September 21: Javier Ortega-Hernández, Harvard University, OEB
- October 5: Edwige Moyroud, Research Group Leader, Sainsbury Laboratory, University of Cambridge
- November 16: Lauren A. O'Connell, Stanford University
- December 7: Ricardo Mallarino, Princeton University
- January 25: Joana Meier, Royal Society University Research Fellow and Group Leader, Wellcome Sanger Institute, Cambridge, UK
- February 22: Jannice Friedman, Queen's University, Kingston, Ontario, Canada
- March 21: Lawrence Reeves, Institute of Food and Agriculture Sciences, University of Florida
- April 4: Donna Garcia, California State University, San Bernardino
- April 18: Nadia Fröbisch, Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung

Visit [OEB Seminars](#) for updates

PBI Symposium

The Plant Biology Initiative took a brief hiatus for the 2022-2023 year. The annual symposium will return in the 2023-2024 academic year. For updates please visit the [PBI website](#).



OEB Staff News

Welcome New Staff!

- Jumana Akoad, Laboratory Technician, Öveczky Lab
- Ognenka "Ogie" Avramovska, Education and Outreach Manager, OEB Admin
- Alaina Bisson, Research Assistant, Taylor Lab
- Andrew Cameron, Laboratory Technician, Hopkins Lab
- Amarilis Castro, Faculty Coordinator, Extavour, Holbrook and Friedman Labs
- Juan Chen, Laboratory Technician, Zhang Lab
- Chaolyn Clay, Financial Associate, OEB Admin
- Robert Higgins, Research Assistant, S. Pierce Lab
- Jasmine Khlieng, Financial Associate, OEB Admin
- Nicole Mejia, Laboratory Technician, Edwards Lab
- Bridget Power, Faculty Coordinator, Hartl, Hanken, Giribet, and Davis Labs
- Noah Rodman, Laboratory Technician, de Bivort Lab

Community Outreach

OEB Administrative offices participated in the School-to-Work (STW) program, a collaboration among the HUCTW, the Cambridge Office of Workforce Development, Harvard University, and Cambridge Rindge and Latin High School (CRLS). OEB hosted CRLS senior, Maimouna Yansane, for the 2022-2023 STW session.



Milestones In Service

15 Years of Service:

- Tracy Barbaro, Faculty Support
- Shuli Bigelow, Faculty Support
- Nikki Hughes, Faculty Support
- Margaret Richards, Financial Associate
- Jennifer Thomson, Faculty Support

10 Years of Service:

- Michael Butts, Faculty Support
- Christian Flynn, Senior Administrative Coordinator
- Melinda Peterson, Faculty Support

5 Years of Service:

- Feven Girmay, Assistant Director, Graduate Program
- Diana Gjino, Senior Research Administrator

Promotions

- Janelle Batista promoted to Financial Analyst

Retirements

- Kathleen Horton, Faculty Assistant, E.O. Wilson
- Janet Sherwood, Greenhouse Coordinator for Plant Sciences

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OEBnews

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