

IN THIS ISSUE

From the Directors	1
In Memoriam	2
Outgoing Hutchinson Cohorts	3
Faculty Features	4
Postdoc Features	5
2021 Small Grants Program	6-7
Calendar	8

A newsletter by the Yale Institute for Biospheric Studies.

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Printed on recycled paper and distributed electronically



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Yale

YALE INSTITUTE FOR BIOSPHERIC STUDIES

NEWSLETTER

FROM THE DIRECTORS

Happy New Year and welcome back! We wanted to share news from the fall. We funded two new Hutchinson cluster projects – focusing on highthroughput phenotyping and African ecosystems, and spanning 5 units – which will bring five new postdocs to YIBS. We look forward to welcoming them and a new cohort of Donnelley fellows to YIBS next fall!

We are pleased to welcome two new members to our external advisory board. Dame Alison Richard, former Director of the Yale Peabody Museum and Provost of Yale, has been involved

Director Eric Sargis at Triangle Peak in Alaska

with YIBS since its inception. Joe Andrew, global chair of Dentons and former chair of the Democratic National Committee from 1999-2001, is an alumnus of Yale College and Yale Law School.

SPRING 2022

Finally, our community mourns the loss, on December 25, 2021, of Tom Lovejoy, longtime member and sometime chair of YIBS's board. One of our Donnelley fellows, Advait Jukar, reflects on Tom's influence and legacy on Page 2.

Eric Sargis and Carla Staver



Associate Director Carla Staver and root in Kruger National Park, South Africa

YIBS NEWSLETTER

Yale Institute for Biospheric Studies

IN MEMORIAM

THOMAS LOVEJOY

1941-2021

Tom Lovejoy was a dedicated Yale alumnus and a pioneer of biodiversity science. He was a member of YIBS's board for the entirety of YIBS' existence, and eight directors have relied on his thoughtful and nuanced contributions through the years. He will be sorely missed by our community. Donnelley fellow Advait Jukar reflects.

On the 25th of December 2021, Thomas Lovejoy died at his home in McLean, Virginia. In his long career, Tom coined the phrase biological diversity, pioneered the Debt-for-Nature Swap program, and seamlessly maneuvered between the rainforest, boardrooms, and high government offices. Tom's Biological Dynamics of Forest Fragments Project is the longest running forest fragmentation experiment in the Amazon, and helped us understand extinction debt, and the value of preserving continuous tracts of land. In his various avatars, Tom wielded the power and influence of institutions like the World Bank, the Smithsonian, and the White House to push for large scale environmental protection and sustainable development.

Tom had a long history with Yale, earning both his B.S., and Ph.D. here. He worked with G. Evelyn Hutchinson for his PhD, and as an undergraduate, collected zoological specimens in Egypt as part of the Charles A. Reed led Yale University Prehistoric Expedition to Nubia. His collections are housed at the Peabody. Tom served on the external advisory board for YIBS ever since its inception and was also on the Peabody's leadership council. Tom had long recognized the power of museums to bring people closer to nature, and as avenues to tell the story of life on earth. He believed that the more people understood and valued biodiversity, the more they would do to protect it. YIBS was very special to Tom. He understood its value in bringing talented and creative people together in the scientific enterprise for a better understanding of life on earth, and letting the scholarship lead the way to better solutions. Much of what he accomplished in his life was by bringing the right people together.



Tom Lovejoy and Advait Jukar at Tom's home "Drover's Rest" in McLean Virginia during a celebration for Advait after he received his PhD in May 2018

I was lucky enough to be one of Tom's graduate students at George Mason University. In true Hutchinsonian fashion, he didn't want to create a copy of himself, but encouraged me to follow my passion for paleobiology. Despite his busy schedule, he would make time to indulge me by inviting me to paleontology lectures in Washington D.C. and connected me with his friends and colleagues in museums around the world. He once told me that as a custodian of deep time, it was my responsibility to use my knowledge of the past environment to communicate the long-term consequences of climate change and extinction on the biosphere. He was always humble, and kind, and relished conversations about adventures in the Amazon, the gorillas of Virunga, or the voyages of Alfred Russell Wallace. With his passing, ecology and conservation biology has lost one of its foremost champions, and for me, a dear friend.

Advait Jukar

Gaylord Donnelley Postdoctoral Associate, Department of Anthropology

OUTGOING HUTCHINSON COHORTS

The Hutchinson Environmental Program, named in honor of G. Evelyn Hutchinson, the father of modern ecology, aims to enable creative collaborative research in the environmental sciences at Yale by facilitating the development of diverse academic excellence at the postdoctoral level. The first two themes were chosen to support the environmental priorities identified in Yale's strategy to advance the sciences. To learn more about this program please visit: yibs.yale.edu/hutchinson-fellows

THEME I

Ecology and Evolution

The Hutchinson postdoctoral fellows (Joanna Bernhardt, Nathaniel Edelman, Sarah Friedman, Elizabeth Sibert, Jason Vleminckx) grouped under the broad theme of "Ecology and Evolution" have been working collectively to understand and categorize the diversity of information, or cues, that organisms use to anticipate future conditions. Organisms use cues to trigger a wide variety of behavioral and life-history transitions (e.g., trees use information about the photoperiod to trigger leaf-out); yet, it remains unclear how global change might disrupt the reliability of such cues. With the assistance of Yale undergraduate students Lisa Younes '23 (EVST major) and Tina Wu '23 (EEB major), the group has been amassing a large dataset describing the types of cues used by different taxa and the responses they elicit in a variety of ecosystems from across the globe. Using this database, the group plans to write a review paper entitled 'Cues in a changing world', identifying the fundamental properties of cue-based processes and examining the potential for a breakdown in the reliability of cues under global change. The group also plans to make the database publicly available to spur future work in this critical area.

THEME II

Climate and Greenhouse Gases

As a cohort, the 'climate and greenhouse gas' Hutchinson fellows (Lewis Alcott, Taylor Maavara, Judith Rosentreter, Xin Sun, and Yong Zhou) have been working together to produce an expert opinion style paper focused on the uncertainties in the global methane budget. In addition to each of their own projects, they spent much of their first year as a cohort learning about the different types of errors and uncertainties associated with ecological systems and modeling, as well as how to develop a quantitative survey to elucidate expert methane researchers' opinions on the current state of the global methane cycle and on the most pressing questions related to the renewed increase of atmospheric methane. They presented their results at the American Geophysical Union (AGU) Fall Meeting in New Orleans in mid-December to the scientific community, notably authors involved in the Global Carbon Project and the Intergovernmental Panel on Climate Change, many of whom were polled in the survey.



Hutchinson Theme I (Elizabeth Sibert not pictured)



Hutchinson Theme II (Taylor Maavara not pictured) $_{\scriptscriptstyle XIN\,SUN}$

YIBS NEWSLETTER

FACULTY FEATURES

ENVIRONMENTAL SCIENCES IN AFRICAN ECOSYSTEMS

YIBS supports research in the environmental sciences, both in labs and offices at Yale and at field sites across the globe. Over the next few issues of this newsletter, we'll be spotlighting research from different regions by YIBS affiliates, starting with ecosystems in Africa, research on which is richly represented at Yale.



Jess Thompson at completion of excavation of a 16,000-year-old infant burial at the site of Hora 1, Malawi

Jessica Thompson

Assistant Professor, Department of Anthropology

Jessica Thompson is a paleoarchaeologist who studies the evolution of humans, human ancestors, and their behavior in their ancient environmental contexts. Her first experience at Olduvai Gorge, Tanzania, exposed her to the time depth of our genus Homo in Africa, and the richness of the archaeological and fossil record after ca. 2 million years ago (Ma). In the Afar Region of Ethiopia she has examined the behavior of earlier Homo, ca. 2.6 Ma, and Australopithecus, 3.4 Ma, who lived in cohort with other extinct taxa along lakeshores and rivers in what is now an arid environment. The bulk of her work has centered on changes in human subsistence behavior in the Late Pleistocene, using evidence from archaeological sites in the Serengeti to coastal caves in southern Africa. For the last twelve years, she has led archaeological and paleoenvironmental fieldwork in northern Malawi, where her team has recovered the earliest evidence for substantive ecosystem change by humans using fire. Because early hunter-gatherers likely had a keystone role in them for millennia, African environments we see today are a product of long-term coevolution between our ancestors and other organisms.



Vanessa Ezenwa

Vanessa Ezenwa Professor, Department of Ecology & Evolutionary Biology

Vanessa Ezenwa's research exploits the unparalleled diversity of African savanna ungulates to help unravel the complexities of host-parasite interactions in nature. As a PhD student working at the Mpala Research Centre, Kenya, she studied how differences in social behavior across 11 sympatric ungulate species translated into variation in parasite infection. Currently, her lab is using one of these species, Grant's gazelle, to investigate potentially opposing effects of social behavior on the risk of parasitism versus the negative impacts of infection. Across the border in Tanzania, Vanessa is working with collaborators to understand how the iconic wildebeest migration in the Serengeti affects infection dynamics in non-migratory species like buffalo, Grant's gazelle, and topi. Because wildebeest transport 'tonnes' of parasitecontaminated feces into non-migratory species' habitats, they have the potential to serve as key sources of fecal-oral transmitted infections for other wildlife. Finally, moving south, Vanessa's research in Kruger National Park, South Africa explores the widespread phenomenon of parasite coinfection. Her group uses African buffalo as a wild model to understand how pervasive gastrointestinal worm infections affect the severity, transmission dynamics, and evolution of tuberculosis.

POSTDOC FEATURES

Several YIBS postdoctoral associates receive job offers every year, and here we highlight two of them. Congratulations to these Hutchinson fellows on their next positions!



Sarah with trout in hand

Sarah Friedman

G. Evelyn Hutchinson Postdoctoral Associate (Theme I), Department of Ecology & Evolutionary Biology

Sarah Friedman joined the YIBS community in 2020 as a Hutchinson Postdoctoral Fellow with Martha Muñoz's lab. Her research at YIBS focused on the mechanistic underpinnings of diversity across macroevolutionary scales, ranging from speciation in deep-sea fishes to thermal evolution in salamanders. Sarah's current position as a Research Fish Biologist at the National Oceanic and Atmospheric Administration (NOAA) Alaska Fisheries Science Center leverages her experience studying evolutionary biology and broad scale diversity trends to understand how fishes are adapting to changing environments. Sarah's research program at NOAA currently focuses on characterizing the evolution of functional diversity to better predict how future changes may alter ecosystem dynamics. She also supports annual NOAA surveys, which monitor commercially targeted Alaskan fish species to inform sustainable fisheries management. Sarah is one of the few taxonomy and systematics experts associated with the center and some of her primary responsibilities are to ensure the accuracy of species identification on the surveys and describe new species. Overall, Sarah's position with NOAA allows her to conduct evolutionary biology research with direct management applications and collaborate with some of the most talented researchers in her field.



Taylor Maavara collects groundwater adjacent to a frozen creek in southern Ontario

Taylor Maavara

G. Evelyn Hutchinson Postdoctoral Associate (Theme II), Yale School of the Environment

Taylor Maavara is leaving Yale and her YIBS position as a Hutchinson postdoctoral fellow to move to the University of Leeds' School of Geography in the UK in September 2022. She received the prestigious fiveyear Independent Research Fellow grant from the UK government's Natural Environment Research Council (NERC) to begin a tenure-track assistant professorlevel position. Her research at Leeds will focus primarily on building global-scale nutrient and greenhouse gas models for inland waters, with the goal of understanding how climate impacts interact with river-level impacts like damming and enhanced nutrient loading. Her work will also support watershed managers in the Yorkshire-Ouse River basin to mitigate water quality impacts in Northern England. At Yale, her work in the School of the Environment dealt with modeling organic carbon and nitrogen cycling in large river systems, including the Connecticut River watershed. Through YIBS, she also worked with the other theme 2 Hutchinson postdocs to produce an expert opinion style paper on the uncertainties associated with the global methane cycle.

2021 SMALL GRANTS PROGRAM



JAMES BUONFIGLIC

Jacqueline Buonfiglio, Master's Awardee, YSE, MESc '22.

"My YIBS grant helped me secure the data and on-the-ground support I need to assess the movement patterns of a highly endangered species in Africa. Through this project I discovered the benefits of methodological data collection and the drawbacks of utilizing data that were not recorded carefully. I also learned how to work with multiple international NGOs and regional wildlife management to accomplish mutual goals."



Uthara Vengrai, Master's Awardee, YSE, MESc '22.

"This funding was very helpful during my summer research. The project yielded really interesting results which comprise the second chapter of my Master's thesis [...] looking at the effect of landscape-scale variability on regional soil trace gas fluxes and carbon and nitrogen dynamics." Each year, YIBS solicits and evaluates grant proposals from Master's and PhD students from across the University who are engaged in research related to the biosphere. For more information about the YIBS Small Grants Program, including the schedule for 2022, visit yibs.yale.edu/research/yibs-small-grant-program.

The following are the recipients and projects awarded grants in 2021 in the Departments of Anthropology (ANTH), Ecology & Evolutionary Biology (EEB), and Earth & Planetary Sciences (EPS) within the Graduate School of Arts and Sciences (GSAS), the Yale School of Engineering & Applied Science (SEAS), and the Yale School of the Environment (YSE), which also awards Master's degrees in Environmental Management (MEM) and Environmental Science (MESc).

2021 Small Grants Recipients

Master's Research Grants

RECIPIENT	PROJECT TITLE
Vivian Bi, YSE	Mitigation, migration, and modernization: Accumulating difference in household energy transitions in peri-urban Beijing
Jacqueline Buonfiglio, YSE	Movement of African wild dogs (Lycaon pictus) across borders of protected areas in KwaZulu-Natal, South Africa
Francis Commercon, YSE	Collaborative networks for Chinese migratory shorebird conservation
Ben Girgenti, YSE	Plugging holes in natural climate solutions: The effects of iron soil amendments on methane emissions through Pontederia cordata and Acorus americanus
Lloyd Farley, YSE	Prickly pear paradigms: scientific knowledge production in North Africa
Aarthi Kannan, YSE	Estimating the population and density of Indian wolves in Koppal district, India using non-invasive genetic sampling and a spatially explicit capture recapture framework
Carolyn Savoldelli, YSE	Upland marsh migration: Quantifying ecotone response to sea-level rise and large storm events
Uthara Vengrai, YSE	Soil carbon and nitrogen dynamics across grazing intensities and variable precipitation

YIBS NEWSLETTER

2021 SMALL GRANTS PROGRAM

Doctoral Pilot Grants

RECIPIENT	PROJECT TITLE
Roxanne Armfield, EPS	Exploring the evolution of alethinophidian snake cranial anatomy from a musculoskeletal perspective
Logan Billet, YSE	Exploring the causes and consequences of rana virus epidemics in a wood frog metapopulation experiencing recurring mass mortality events
Scott Carpenter, YSE	Plant community response to a large-scale mortality event in big sage brush systems
Hayon Michelle Choi, YSE	Effect modification of greenness on temperature-mortality relationship, using a Multi-Country, Multi-City dataset
Alexander Polussa, YSE	Fine spatial resolution of Saprotrophic fungal functional traits
Alex Ruebenstahl, EPS	Using skeletal correlates in the skull and palate to investigate major shifts in archosaur respiration
Christian Espinosa Schatz, YSE	Climate knowledge and agrarian practice: Mayan highlanders' responses to climate change
Akshay Surendra, YSE	Soil or soil microbes? Experimentally disentangling below-ground biotic and abiotic drivers of tree-habitat associations in a mixed- dipterocarp forest

Doctoral Dissertation Improvement Awards

RECIPIENT	PROJECT TITLE
Wyatt Arnold, SEAS	Development of a bio-based tool for quantifying wetland methane emissions
Arielle Biro, EEB	Quantifying nitrogen fixation rates in savanna systems
Matthew Dougherty, EEB	Environmental DNA monitors Alewives (Alosa pseudoharengus) as invaders and species of conservation concern
Kristy Ferraro, YSE	Experimentally exploring the role of ungulate calving sites on nutrient cycling
Elyse Parker, EEB	Integrating genetics, morphology, and ecology to investigate species boundaries and infer the evolutionary history of a non-Antarctic notothenioid radiation (Notothenioidei: Patagonotothen)
Jack Shaw, EPS	Disentanoling deen-time food webs



NICHOLAS T

Alexander Polussa, Doctoral Pilot Grantee, YSE, PhD '24.

"Part of the [YIBS grant] funding has been spent in method development for culturing basidiomycete and ascomycete fungi from leaves and soils. The trial and error with different substrates and antibacterial reagents has been invaluable for building up a library of isolates from the different plots I am working at in the Harvard Forest in Massachusetts."



IAN MORSE

Jack Shaw, Doctoral Dissertation Improvement Grantee, EPS, PhD '22.

"Through speaking with social scientists and humanists at the Santa Fe Institute [during my YIBS grant], I've been exposed to novel methods that are rarely applied within STEM fields."

CALENDAR



Tagged Male Gazelle



Mud Pond



Aepyornis Island

YIBS FRIDAY SEMINAR SERIES SPRING 2022, 3 PM (EASTERN)

For room locations and/or virtual links to our seminars and events, please join our mailing list: yibs.yale.edu/seminars-lectures

February

- **4** Euan Nisbet, Professor of Earth Sciences, Royal Holloway, University of London *Rising methane: Observational insights into methane growth, and practical ways to meet the challenge*
- **11** Virginia Pitzer, Associate Professor of Epidemiology (Microbial Diseases), Yale School of Public Health *Environmental drivers of infectious disease dynamics: How do we distinguish causation*

from correlation?

18 Luke Sanford, Assistant Professor of Environmental Policy and Governance, Yale School of the Environment Impact evaluation using remote sensing and landscape counterfactual

March

- **4** Vanessa Ezenwa, Professor of Ecology and Evolutionary Biology, Yale University *Social behavior and parasite infection: The bad, the good, and the utilitarian*
- José Paruelo, Professor, Faculty of Agronomy, University of Buenos Aires & YIBS Bass Scholar
 Assessing functional diversity of ecosystems and socio-ecosystems

18 Jennifer Marlon, Research Scientist and Lecturer, Yale School of the Environment How climate change experience and knowledge influence public understanding, concern,

and policy support

April

1 Caroline Strömberg, Estella B. Leopold Professor in Biology, University of Washington & YIBS Bass Scholar

Revealing the complex Cenozoic evolution of grassland ecosystems

8 Scott Yanco, Postdoctoral Associate in Ecology and Evolutionary Biology, Yale University

Dynamic environments, migration, and the pace of life: exploring the causes and consequences of animal movement

15 Meredith Holgerson, Assistant Professor of Ecology and Evolutionary Biology, Cornell University

Limnology underdogs: The ecological importance of pond ecosystems

- **22** Rees Kassen, Professor of Biology, University of Ottawa & YIBS Bass Scholar *From so simple a beginning: adaptation and diversification in microbial populations*
- **29** Alison Richard, Franklin Muzzy Crosby Professor Emerita of the Human Environment, Department of Anthropology, Yale University *Elephant bird enigmas*

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