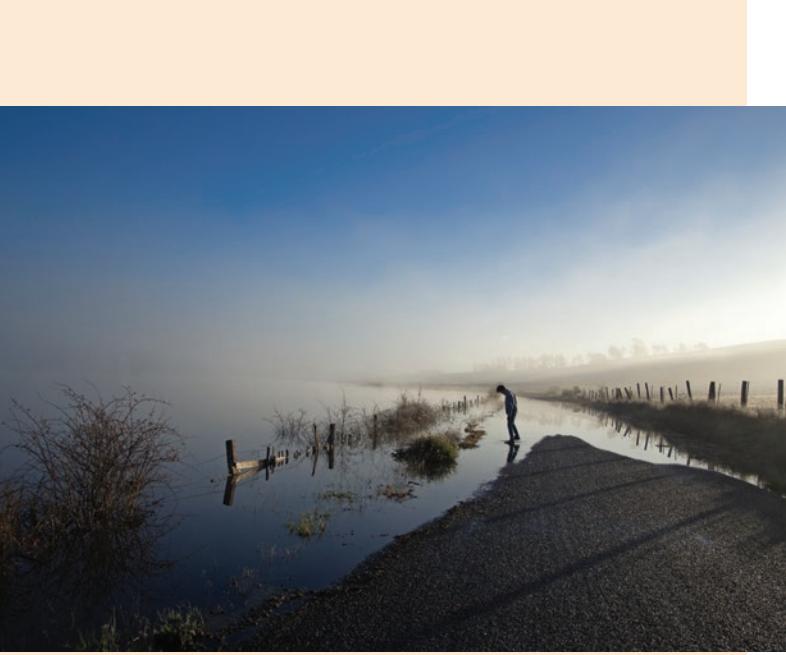


UC DAVIS EXPLORATIONS

2017 • VOLUME 19



UNIVERSITY OF CALIFORNIA, DAVIS
**THE UC DAVIS UNDERGRADUATE
RESEARCH JOURNAL**



Front Cover Image:

pondering/wandering (photograph)

Simon Harris

Artist's Statement: Exploration is about pushing your limits and going further in the pursuit of seeing more and expanding your horizons. My friends and I took a trip before sunrise along the creeks, hills, and estuaries of Valley Ford, in Sonoma County, finding this flooded road alongside a marsh. We found it amazing how well nature was adapted to the volatile landscape, able to survive months underwater. Finding a rewarding end point like this always makes exploring worth while, not just in travelling but also in life. For the last few years, this desire to try more has helped my growth as a photographer greatly.

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EDITOR'S NOTE

In the past three years, *Explorations* has drastically altered its institutional organization and manuscript processing procedures. At present, we are entirely student-run journal, with graduate students serving as managing editors and undergraduates as editors. All submitted manuscripts are reviewed by UC Davis faculty and/or graduate students and returned to our undergraduate authors for revisions. While this process is often tedious for our undergraduate authors, we feel that exposing UC Davis undergraduates to this model of peer review and revision will aid them in their future academic publishing. Further, allowing our graduate students to run an academic journal and partake in the process of manuscript management and author/reviewer communication enhances their insight into how best to navigate their own publishing process and potential opportunities as reviewers or editors.

Our editorial board continues to be impressed with the quality of undergraduate work submitted to *Explorations* and the thoughtful responses our authors provide to reviewer requests. This year's folio spans topics from economics to evolution, with a few emergent themes. Relating to optimization of human health and prosperity, **Ng** analyzes the medical chart to start a discussion around clinical discourse and patient care, **Smith** proposes that environmental pollutants epigenetically increase rates of obesity, **Rogness** illustrates potential causes of age-based wage inequality, and **Rahim** outlines the neuroevolutionary roots of xenophobia, with some suggestions for how best

to move forwards as a species. Switching focus towards animals and the environment, **Brande** writes about recovery strategies for endangered mammals in California, offering suggestions for policy and funding allocation, **Steinberg** analyzes differences in play behavior between different species and sexes of Rwandan monkeys, **Lim** analyzes factors leading to excess soil and atmospheric ammonia, with insights for agriculture and industry, while **Yim** and **Bersin** conduct an experiment to test whether changes in turbidity, which are often produced by human activities such as boating, affect predator-prey relationships among species in aquatic environments.

This folio was truly a group effort and would not have been possible without our managing editors: Griselda Jarquin, Jaime Napan, Abbie Popa, and Ashley Roysten, as well as our editors: Marissa Ayala, Amanda Ryan, Joshua Wild, David Williamson. We would also like to thank Annaliese Franz, Tammy Hoyer and Denea Clark of the Undergraduate Research Center who were pivotal in guiding our work and maintaining our website content, as well as Steven Morse for his visual design work and Marianne McClelland for her help with the copyright process.

Though our printed folio only contains abstracts of the accepted articles, the full articles, as well as information on how to publish in *Explorations*, can all be found online at: explorations.ucdavis.edu.

Lauren Fink

Editor-in-Chief

Threats to Survival and Recovery Strategies in Endangered Species Act Recovery Plans for California Birds and Mammals

Kaili Brande

While several studies have evaluated the efficacy of various conservation techniques in aiding imperiled species, less research has focused on habitat restoration, in particular, as a conservation strategy in Endangered Species Act (ESA) recovery plans. Equally important is assessing the relationship between the threats to survival and the recovery strategies (including restoration). I evaluated the above, focusing on recovery plans of bird and mammals from California to create a uniformity of geographic scope. All but three of 20 species included habitat restoration as a strategy to aid recovery. I also found a difference in the number of strategies listed for multi-versus single-species plans, and a lack of correlation between threats and strategies. My results help highlight trends of ESA Plan implementation, and subsequently, offer guidance for policy and funding allocation.



Sanctuary

Danielle Macedo

Artist's Statement: I went exploring the city of Davis to find interesting things to photograph for a design photography course and came across this unique structure. It is a community-built bird sanctuary that has this opening in the center, what seems to have been built to let in this warm and hopeful sunshine. Exploration is about going out into the world with the hope that you'll find something unexpectedly extraordinary.

The Effects of Surface Covers and Environmental Factors on Ammoniacal Mass Transfer: A Review

Kahui Lim

Ammonia volatilization in aqueous solutions is reviewed in this report due to its relevance in agricultural and industrial processes. Ammonia loss to the atmosphere is apparent in the application or storage of fertilizer where excessive NH₃ loss can lead to soil acidification and eutrophication problems, as ammonia can also sorb to nitrate and sulfate ions in acid rain (Sommer et al., 2001). Ammonia emissions can be minimized through an understanding of ammonia chemistry in the environment. Whether the end goal is to develop a fertilizer that retains its ammonia content or to prevent atmospheric loading of ammonia, an understanding of different factors that impact ammonia mass transfer is necessary. The purpose of this review is to 1) characterize the effects of several variables such as temperature, wind velocity, pH, and total nitrogen concentration on ammonia volatilization, and 2) provide insight on the minimization of ammonia volatilization from slurry through the application of surface covers such as oil layers.

An Analysis of The Medical Chart: Communication in the Clinical Setting

Tammy Ng

Medical charts serve as one of the primary means of patient information documentation across different fields of medicine. In the clinical setting, physicians typically write medical charts after conducting in-person, verbal interviews with patients. Medical charts organize information from patient interviews in a structured, standardized format. However, the roles of medical charts expand beyond documentation of the patient interview. Health care practitioners must recognize the various roles of medical charts and examine the nuances of medical discourse in order to deliver effective patient care.

The Neuroevolutionary Roots of Xenophobia

Raisa Rahim

Xenophobic tendencies can be observed throughout the animal kingdom, making it likely that this anti-social bias has been evolutionarily inherited. Converging evidence from comparative behavioral, prophylactic behavioral, lesion, neuropsychological, and functional neuroimaging studies elucidate the biological and neurological underpinnings of this adaptive attitude, specifically the basis of racial bias that is promoted through the expression of prejudice and stereotype in humans. Perception of faces contributes heavily

to this social categorization, such that neuropsychological damage that impairs this perceptive ability may dampen these discriminations. Though natural selection does not promote “for the good of the group” altruistic behavior in all cases, the development and utilization of empathic attitudes would allow our species to overcome our evolutionary past and move towards a more harmonious future.

The Economics Of Recent Generational Conflict in the U.S.: Analyzing Trends in Age-Based Wage Inequality, 1976-2015

Nicholas Rogness

Ballooning student debt and a tepid job market have fueled a heightened sense of economic anxiety among younger Americans. Meanwhile, older generations—most of which now form the baby-boomer generation—have aroused disdain for the greater volume of economic opportunities they seem to have enjoyed throughout their life-cycle. Indeed, a likely consequence of these disparities in opportunity has been an observed increase in economic inequality between older and younger age groups. Specifically, this paper focuses on the growth in wage inequality between age groups—in other words, a phenomenon I define as “age-based wage inequality.” In 1976, according to Current Population Survey data from the Bureau of Labor Statistics, the average worker aged 55-64 earned approximately the same hourly wage as the average younger worker aged 25-34—but by 2015, the older worker earned more than 25% in hourly wages than his/her younger counterpart. I then attempt to examine the cause of



Glass Sunset

Radhika Iyer

Artist's Statement: Exploration is discovering something new in the now. If you look close enough at your surroundings, the daily route you take, the people you see, you can discover beauty in the most unexpected places—like finding this sunset captured in glass. [Photo taken at the UC Davis Plant Breeding Center]



Innsbruck

Hedda Nguyen

Artist's Statement:

This photo was taken in Innsbruck, Austria, a city on the trail that once was the exclusive passageway between Germany and Italy. The alps in the background surround the small community, reminding us of the greatness in the future that lies ahead of us and the possibilities of the research yet to be done



Water Goddess

(36x36 oil and acrylics on canvas)

Sarah Blythe

Artist's Statement: Exploration is searching and experimenting with different parts of yourself. We do not know what we are capable of unless we explore the parts of ourselves we are too nervous to open. When those doors open, we learn, grow, and understand our self-fulfilled purpose. The water goddess is in unity with the elements. She moves with the water, the sea creatures, and vegetation. She follows their movements and begins to understand their purpose. The water goddess becomes a part of the water, and she has purpose.

this growth in age-based wage inequality through a relative labor supply and relative labor demand framework based on the analysis of prominent education economists Claudia Goldin and Lawrence Katz. This adapted framework reveals that labor supply for older workers relative to younger workers exhibited a steady growing trend beginning in the 1990s after contracting across the 1970s and 80s. This trend is consistent with the unexpected turn-around in labor-force participation rates among older Americans observed in the 1990s (Harvard School of Public Health, 2004). The growth

in relative old-young labor supply also appears to have gone in tandem with an even greater increase in old-young relative labor demand. After all, this conclusion, as reflected in my own calculations, is the only one that accounts for the relative growth in older worker wages and age-based wage inequality in accordance with the laws of supply and demand as found in introductory economic textbooks. Thus the last part of my analysis focuses on the plausible contributors to the growth in relative demand for older workers. I test the effects of differences in college completion rates across generations (specifically comparing groups born between selected years, known formally as "birth cohorts"), improving technological productivity in the workforce (a phenomenon known by economists as "skills-biased technological change"), and differences in unionization rates across generations. The rapidly increasing college completion rate of birth cohorts from the late 1930s to the early 1940s appear to play a crucial role in the growth of age-based wage inequality. Drawing from other economics literature on higher education, the growing size of the birth cohort observed at age 30 over time also appears to have some empirical link with age-based wage inequality.

Environmental Chemicals Increasing Risk of Obesity through Epigenetic Mechanisms

Anna Smith

The obesity epidemic in the United States is often blamed on individuals for living sedentary, high-caloric lifestyles. However, people today who exercise and eat the same amount as those twenty years ago are still heavier. Furthermore, the epidemic has spread to pets, wild animals, and laboratory animals living near humans. These trends suggest that environmental factors may be contributing to the epidemic, and evidence has emerged that environmental pollutants can epigenetically reprogram metabolic processes and contribute to the development of obesity. Thus, this essay will first suggest that external factors are driving the obesity epidemic and provide emerging epidemiological and experimental evidence linking environmental pollution to obesity via epigenetic mechanisms. It will then analyze the socioeconomic and political implications of these findings. Due to the cumulative evidence presented in this paper, I argue that a One Health approach is needed to address obesity in the United States.

Monkeying Around: Comparing Play Behavior In Relation To Predation Risk In Sympatric Olive Baboons (*Papio Anubis*) And Vervet Monkeys (*Chlorocebus Pygerythrus*)

Danielle Steinberg

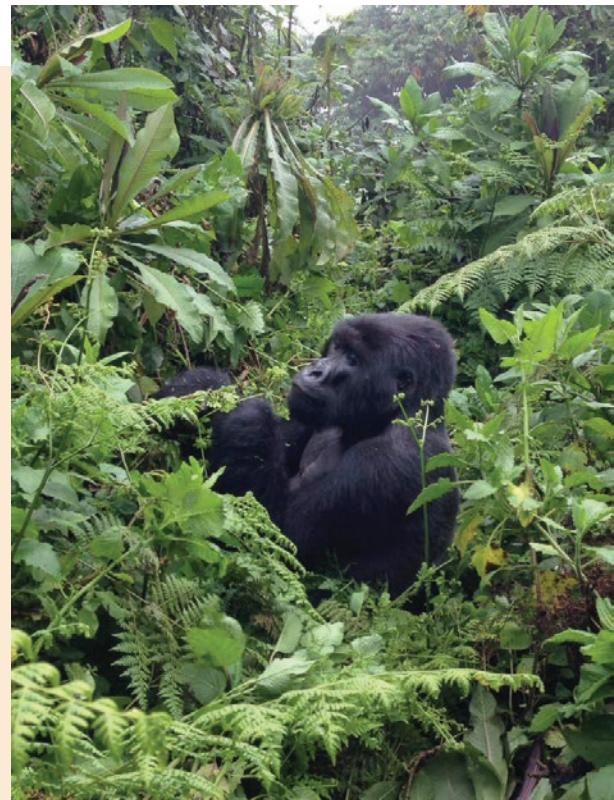
Predation has long been considered a strong selective pressure on primate behavior, including foraging and feeding. However, its effects on play behavior, a crucial aspect of primate life, are unknown. Feeding is necessary for survival, but play is imperative for later reproductive success. Olive baboons (*Papio anubis*) and vervet monkeys (*Chlorocebus pygerythrus*) are often sympatric but baboons are larger and more aggressive, suggesting that they may be less vulnerable to predation and thus may have longer or more frequent play bouts. Similarly, within species, male primates, being more aggressive than female primates, may be less vulnerable to predation and so may play more than females. I observed play behavior of baboons and vervets in Nyungwe and Akagera National Parks, Rwanda, to test these predictions. I used all-occurrence sampling to record frequencies and durations of play bouts and analyzed the data with nonparametric statistical tests. There were significant differences in play bout frequencies but not durations both between the species and between males and females within species. Future research should explore whether life history differences also contribute to differences in play behavior.

The Effect Of Turbidity On The Foraging Behavior Of Two Nearshore Crabs

Daniel Yim and Theresa Bersin

Multiple studies have shown that increased turbidity can result from both natural and anthropogenic activities. These spikes in turbidity can significantly affect predator-prey interactions and foraging behavior. To test how increased turbidity affects the foraging behavior of the crabs *Pachygrapsus crassipes* and *Pugettia producta*, we performed a choice experiment between chemically versus visually appealing prey in ambient versus turbid conditions. We determined that turbidity did not hamper the crabs' ability to forage or how long it took to choose a stimulus in general. However, when examining the crab's decision speed by stimulus type, turbidity did cause the crabs to take longer choosing the chemical stimulus and to move quickly

choose the visual stimulus. We did not observe a decrease in visual foraging under turbid conditions as other studies have documented. This indicates that increased turbidity does not have a strong effect on the foraging behavior of these nearshore crabs.



Ingagi

Danielle Steinberg

Artist's Statement: I am a fourth year Evolutionary Anthropology student here at UC Davis. This past summer I traveled to Rwanda to take part in a primate studies field school where I had the opportunity to study over ten species of primates including mountain gorillas, *Gorilla beringei beringei*. This image is the first up close encounter I had with a gorilla—it was life-changing. The animal pictured is a silverback male feeding on nettles and various other leaves.

Funding for Explorations was generously provided by the Undergraduate Research Fund of the UC Davis "Students First" campaign of 1993.



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in the scheme of things

Simon Harris

Artist's Statement: The cabin you see is actually the Washington Hotel, built alongside the Yuba river during the Gold Rush. I was camping across the river when I noticed that the milky way was visible against the dark sky. For me, exploring is getting out and seeing incredible things like this that we don't otherwise encounter in our daily lives, which we are lucky to have in our beautiful state. Working in the dark can be incredibly challenging but also very rewarding as a photographer, because as you push the limits further, you can start to see things that are less obvious to the human eye.