



ANTHROPOGENY FIELD COURSE

2025 SUMMARY REPORT



CENTER FOR ACADEMIC RESEARCH AND TRAINING IN ANTHROPOGENY
UNIVERSITY OF CALIFORNIA SAN DIEGO & SALK INSTITUTE FOR BIOLOGICAL STUDIES

CARTA
The Center for Academic Research and Training in Anthropogeny (CARTA) is a virtual organization formed to promote transdisciplinary research on human origins by drawing on methods from a number of traditional disciplines spanning the social, biomedical, biological, computational and engineering, physical and chemical sciences, and the humanities. CARTA is a collaboration between faculty at UC San Diego and the Salk Institute for Biological Studies, along with interested scientists at other institutions.

Center for Academic Research
and Training in Anthropogeny (CARTA)
University of California San Diego
9500 Gilman Drive # 0060
La Jolla, CA 92093-0060
Phone: 858-246-0846

- 🌐 carta.anthropogeny.org
- ✉ carta-info@anthropogeny.org
- 📘 [ucsdcarta](#)
- 📷 [carta_ucsd](#)
- 🌐 [ucsdcarta](#)
- 🐦 [anthropogeny.org](#)
- 📺 [cartaucsd](#)

Creative Lead and Editor
Jesse Robie

Contributors
Pascal Gagneux
Kate Kaya
Linda Nelson
Ben Tolo

Cover image
At Gideru Ridge, Tanzania, with our Hadza hosts.
Photo courtesy of Douglas Duncan Simbeye

© 2025 The Center for Academic Research and Training in Anthropogeny

Anthropogeny Field Course Overview

- 2 Faculty Message
- 3 What is CARTA?
- 3 What is Anthropogeny?
- 4 What is the Field Course?
- 6 From Classroom to the Roots of Humanity: Origins of CARTA's Anthropogeny Field Course
- 9 The Field Course Today

The 2025 Anthropogeny Field Course

- 10 Introducing the 2025 Field Course: CARTA's Perspective
- 12 Biographies: 2025 Faculty and Staff
- 13 Biographies: 2025 Student Cohort
- 14 Biographies: 2025 Dorobo Safari Guides

Student Reflections

- 16 Student Write-Up Excerpts

Travel Map Narrations

- 26 CARTA's 2025 Travel Map Posts

Partners

- 45 Partners
- 45 Partnership with GMERC

Future Outlook

- 46 Future outlook
- 47 Funding the Field Course

ANTHROPOGENY FIELD COURSE OVERVIEW



FACULTY MESSAGE

Dear Friends,

Since 2011, the Anthropogeny Field Course has brought 58 UC San Diego graduate students to East Africa where they gain firsthand exposure to the primary approaches for studying human origins and direct access to leading experts. These students—and faculty administering the Field Course—share a curiosity about what it means to be human and a recognition of the unique value of combining interdisciplinary scholarship with field-based learning. I am thrilled to share, through this report, the success of the 2025 Anthropogeny Field Course and the high caliber of the scientific explorations we undertook, the sense of community we experienced, the discoveries made, and the intellectual adventure that defined our time together.

For me, this course embodies the very best of UC San Diego graduate education. It is a program that asks deep questions that hit at the heart of all human activity, behavior, health, and disease. It nurtures interdisciplinary collaboration, encouraging students to connect ideas across anthropology, biology, biomedical sciences, cognitive science, linguistics, management, neurosciences, psychology, and visual arts. It trains students to expand their research perspectives, to examine evidence in the field, to engage with primary data drawn from numerous disciplines, and to learn directly from experts from around the world. It is the culmination of CARTA's conviction that anthropogeny, the study of human origins and the evolutionary processes that shaped our species, cannot

be understood from any single perspective. Above all, it is transformative: Students return with new insights, a deeper appreciation of the world, and renewed energy to pursue new ideas within their own fields of study.

This year, I was particularly struck by the way our students embraced each aspect of the course with vigor, engagement, positivity, and curiosity. The itinerary included paleontology, fossil preservation, and analysis at the National Museum of Ethiopia in Addis Ababa and Olduvai Gorge in Tanzania, hands-on ethnography of the Hadza in Tanzania, one of the few remaining foraging cultures that still exists, and finally, the arduous landscape of Issa Valley, Tanzania, for immensely rewarding comparative primatology of wild chimpanzees and red-tailed monkeys. (In the following pages, you will learn in full detail the itinerary and goals for each section of the Anthropogeny Field Course.)

Throughout these experiences, the students assimilated evidence from genetics, primatology, paleontology, biological and cultural anthropology, linguistics, and other related fields. Rather than seeing the inevitable gaps in knowledge as obstacles, they treated them as opportunities for creativity, debate, and collaboration. In doing so, they embodied the true spirit of CARTA, that the human story is not a puzzle to be solved by lone discovery, but a shared endeavor that requires the full range of human scholarship, collaboration,

and imagination. Adding to the challenge was immersion in unfamiliar landscapes and cultures, yet our students met these challenges with openness, dedication, and humility.

For UC San Diego, the Anthropogeny Field Course represents more than an academic exercise; it is a distinctive contribution to the University's mission. Our students return to campus transformed by their experience and equipped with enhanced capacities for critical analysis, interdisciplinary collaboration, and evidence-based reasoning. When students are able to engage productively across disciplines and cultures, the intellectual fabric of the university community is strengthened. In this sense, the course does more than educate: It cultivates ambassadors who carry forward UC San Diego's mission of crossing boundaries and seeking answers to humanity's most profound questions. The Anthropogeny Field Course affirms UC San Diego's position as a leader in innovative, cross-disciplinary education and reflects the University's enduring commitment to addressing fundamental questions about the human condition.

As Executive Co-Director of CARTA and lead faculty for the Field Course, I am deeply gratified by the achievements of the 2025 cohort and by the course's ongoing role in preparing the next generation of scholars. I take great pride in the program we've built and honed over the years, and in the students who have met each challenge with grace, humility, and often with humor. I am equally grateful to my colleagues and Field Course

co-faculty, Alex Piel and Fiona Stewart, whose primatology expertise and deep knowledge of Tanzania provide students with unparalleled opportunities for learning and discovery.

More than ever, I am convinced that this course is among the most meaningful ways we can prepare future scholars. It is not simply a course about the past; it is an investment in the students' future and ensures that UC San Diego remains a place where transdisciplinary education thrives, where curiosity about our origins is valued as an approach for addressing contemporary challenges, and where students learn to navigate the complexity of being human with both rigor and wonder.

Finally, I must thank Jesse Robie, CARTA Program Manager, and Linda Nelson, CARTA Management Services Officer, whose tireless work made the 2025 Anthropogeny Field Course possible.

Happy reading and best wishes.

Pascal Gagneux, CARTA Executive Co-Director, Anthropogeny Field Course Lead Faculty

WHAT IS CARTA?

The Center for Academic Research and Training in Anthropogeny (CARTA) is a collaboration between UC San Diego and the Salk Institute for Biological Studies faculty, along with a global panel of prominent experts, to promote transdisciplinary research on human origins. Our core programs include symposia to share and stimulate research on what makes us human, and the Graduate Specialization in Anthropogeny available to UC San Diego PhD students in participating departments.

WHAT IS ANTHROPOGENY?

Anthropogeny is the scientific investigation of the origins of our species. Anthropogeny utilizes fossil, archaeological, and genomic evidence. It includes the comparison of genomes, development, life histories, and behavior across humans and our closest living relatives (and other species). Anthropogeny explores the impact of genetic changes in model systems and studies the roles of biological and cultural environments.

ANTHROPOGENY FIELD COURSE OVERVIEW



"I will remember this trip for the rest of my life, and I will remember things about the science and philosophy of human origins better than I ever could from a presentation or paper. I got to learn by doing. Doing with field experts. Doing with hunter gatherers. Doing with chimpanzees in their own habitat."
- Nicholas Nelson, PhD Candidate, Biological Sciences, UC San Diego

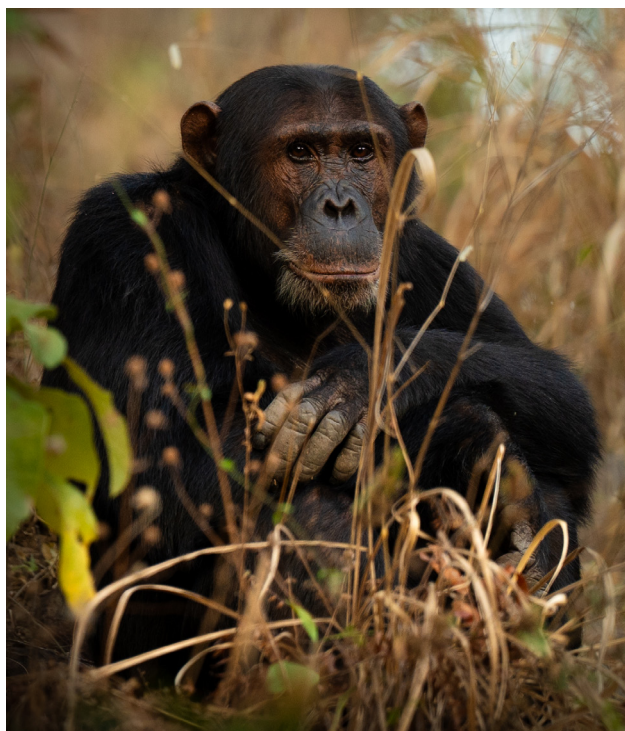
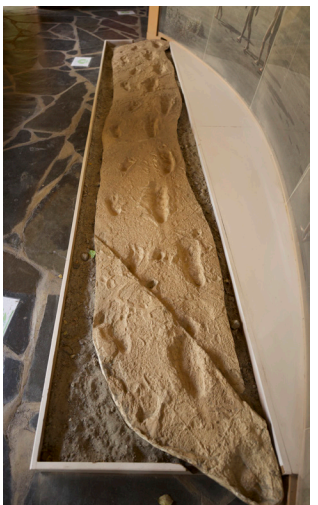
What is the Anthropogeny Field Course?

The Anthropogeny Field Course is a unique graduate-level elective developed and run by CARTA. Participation is open only to UC San Diego students enrolled in the Graduate Specialization in Anthropogeny. This optional three-week "Summer Session" course immerses students in field research, the ecological context of human adaptation, and the four major approaches to studying the origins of our species: fossil evidence, paleontology, comparative biology, and ethnography of human foragers.

Primary study is held at key locations across Tanzania, though depending on the year, additional sessions may take place at the National Museum in Addis Ababa, Ethiopia, or the Atapuerca cave system near Burgos, Spain. Site visits are complemented by lectures, discussions, and, whenever possible, hands-on training in relevant field research.

CARTA's partnership with the Greater Mahale Ecosystem Research and Conservation (GMERC) in Issa Valley, Tanzania, has greatly benefited the Anthropogeny Field Course by improving in-country logistics, providing primatological expertise, and granting full access to the GMERC research site.

Because the Graduate Specialization in Anthropogeny draws students from nine PhD programs across the UC San Diego campus, the Anthropogeny Field Course is designed to be accessible across disciplines. Participating students return to campus with broadened perspectives on the evolution of our species in East Africa, the geology and geography of key sites, enhanced cultural awareness, and strengthened capacities for critical analysis, interdisciplinary collaboration, and evidence-based reasoning.



Opposite page: The participants of the 2023 Anthropogeny Field Course at Ngorongoro Crater, Tanzania. This page: A small sampling of the locations and subjects visited and studied during the Anthropogeny Field Course. Photos courtesy of Jesse Robie

ANTHROPOGENY FIELD COURSE OVERVIEW

From Classroom to the Roots of Humanity: Origins of CARTA's Anthropogeny Field Course

The idea for CARTA's Anthropogeny Field Course germinated from a simple observation: most graduate training happens inside classrooms and laboratories. In 2010, then-CARTA Executive Co-Director Ajit Varki, Associate Director Pascal Gagneux, graduate student employee Alyssa Crittenden, and Associate Professor of Anthropology Jim Moore recognized that students in the Anthropogeny Graduate Specialization would benefit enormously from direct, hands-on experience with the methods used to study human origins: fossil evidence,

paleontology, comparative biology, and the ethnography of human foragers. To provide this education, they developed an entirely unique summer field course to bring Anthropogeny graduate students out of the classroom and into the very landscapes and research sites that have shaped our understanding of human evolution. With this vision in place, Pascal and Alyssa began planning the inaugural itinerary in 2011.

Tanzania: The Perfect Learning Grounds

In designing the inaugural course, Pascal and Alyssa chose Tanzania's Eastern Rift Valley for compelling reasons. The region offered unparalleled access to the ecological contexts in which numerous species of now-extinct hominins lived, and Alyssa's years of dissertation fieldwork with Tanzania's Hadza foragers provided invaluable local knowledge and connections. Through her, CARTA partnered with Dorobo Safaris, a Tanzanian company deeply committed to supporting Hadza land rights and well equipped to provide logistical support and ethical access to key sites and the Hadza community.



Above: The Eastern Rift Valley stretches from Tanzania to Ethiopia and is just one part of a much larger rift system that goes from Mozambique to the Red Sea.

Left: The participants of the first Anthropogeny Field Course in 2011 at Olduvai Gorge, Tanzania. Left to right: Leela Davies (biomedical sciences graduate student), Hope Morgan (linguistics graduate student), Douglas Duncan Simbeye (Dorobo Safari guide), Jim Moore (anthropology faculty), Pascal Gagneux (CARTA faculty), Alyssa Crittenden (CARTA graduate student employee), and Ben Cipollini (cognitive science graduate student). Photos courtesy of Pascal Gagneux

An Extraordinary Inaugural Itinerary

Location 1: The Eastern Rift

The first stop for the students was the outdoor classroom of the Eastern Rift, a dramatic geological feature that stretches through East Africa, including Tanzania. Formed by tectonic activity, it is marked by steep escarpments, volcanic peaks, vast savannas, and numerous lakes. Rich in biodiversity, it offers crucial insights into the environments where our ancestors lived and adapted. It also provided the students with ample opportunity to witness the array of animals humans evolved alongside at the Ngorongoro Crater, a natural "living zoo."



Leela Davies and Alyssa Crittenden at the Ngorongoro Crater, Tanzania, with a herd of wildebeest blocking the way. Photo courtesy of Pascal Gagneux.



Leela Davies, Hope Morgan, Alyssa Crittenden, and Ben Cipollini at the Ngorongoro Crater, Tanzania. Photo courtesy of Pascal Gagneux.

Location 2: Olduvai Gorge

Thanks to Tanzanian paleontologist Jackson Njau, then at Indiana University, students gained access to Olduvai Gorge and the historic Camp Leakey. This is where Louis and Mary Leakey discovered *Paranthropus boisei* and *Homo habilis*, alongside some of humanity's earliest stone tools—a profound experience for any student of human origins.



Jim Moore, Alyssa Crittenden, Jackson Njau, Hope Morgan, and Ben Cipollini at Camp Leakey, Olduvai Gorge, Tanzania, examine a variety of fossils on display for visitors. The fossils are laid out on a large block of petrified ash from the nearby and famous Laetoli, the site where *Australopithecus afarensis* left footprints 3.7 million years ago. Both the fossils and block are left exposed to the elements to study weathering patterns. Photo courtesy of Pascal Gagneux

ANTHROPOGENY FIELD COURSE OVERVIEW

Location 3: The Hadza: Modern People Providing a Window to the Past

The partnership with Dorobo Safari enabled students to meet members of the Hadza community and gain first-hand insight into the lives of modern human foragers. This ethnographic component provided a vivid picture of how humans lived and adapted to the Tanzanian landscape prior to the rise of agriculture and pastoralism.



Meeting a group of Hadza for the first time, Yaeda Valley, Tanzania. Photo courtesy of Pascal Gagneux.



Arrow making with the Hadza, Yaeda Valley, Tanzania. Photo courtesy of Pascal Gagneux.

Location 4 & 5: Two Chimpanzee Worlds

Jim arranged for a visit to Gombe National Park—where Jane Goodall began her groundbreaking research on chimpanzee in the 1960s—through his long-time colleague, Anthony Collins. Anthony hosted the students at Gombe, where they observed habituated chimpanzees in their natural habitat. Additionally, Jim’s graduate student, Alex Piel, and his primatologist spouse, Fiona Stewart, invited the Field Course to visit their recently established chimpanzee field site in Issa Valley, six hours Southeast of Gombe. Issa Valley is a woodland savanna habitat, vastly different from Gombe, and remarkably similar to the reconstructed landscape in which *Ardipithecus ramidus* lived in Ethiopia over 4 million years ago! By visiting both locations, the students gained deep appreciation for the diversity of great ape adaptation.



Observing chimpanzees at Gombe National Park, Tanzania. Photo courtesy of Pascal Gagneux.



At Gombe National Park, Tanzania. Photo courtesy of Pascal Gagneux.



The camp of what is now GMERC in 2011, Issa Valley, Tanzania. Photo courtesy of Pascal Gagneux.

Location 6: An Unexpected Ethiopian Bonus

A fortunate 15-hour layover in Addis Ababa, Ethiopia, became an extraordinary opportunity. Pascal arranged for CARTA members, Tim White and Berhane Asfaw, to host a visit to the labs at the National Museum of Ethiopia. There, the students encountered world-famous hominin fossils, including *Ardipithecus ramidus* (4.4 million years old) and *Australopithecus afarensis* (“Lucy,” 3.2 million years old).



Entrance to the National Museum of Ethiopia. Photo courtesy of Pascal Gagneux.



Examining fossils with CARTA members Tim White and Yohannes Haile-Selassie, National Museum of Ethiopia. Photo courtesy of Pascal Gagneux.

The Field Course Today

Since the 2011 and over 11 iterations, the Anthropogeny Field Course has enriched the education of 58 UC San Diego graduate students and four faculty and staff. While the core itinerary of 2011 has largely remained, the course has adapted thoughtfully:

- **Issa Valley** and its permanent research station—now called the Greater Mahale Ecosystem Research Conservation (GMERC)—has become the primary chimpanzee site, replacing Gombe as the Issa chimpanzees are now habituated and can be observed at close proximity.
- **Spain** was added to the itinerary in 2022 and 2023 during civil unrest in Ethiopia. Students explored Atapuerca and the Cantabrian Coast, witnessing active excavations at renowned paleoanthropological sites.
- **Dorobo Safari** has been our steadfast partner throughout all 11 courses, with the exceptionally talented Douglas Duncan Simbeye serving as guide, mentor, and good friend to the participants.

Our students have had the privilege of studying directly with leading researchers, including CARTA members Yonas Beyene, Sileshi Semaw, Yohannes Haile-Selassie, Zeray Alemseged, Dietrich Stout, and the late Sally McBrearty and Bill Kimbell. These experts have shared their knowledge and

passion for understanding human origins, giving students unparalleled access to their work.

The Anthropogeny Field Course continues to provide a transformative experience that immerses students in the landscapes, methods, and discoveries that illuminate our species’ deep history. From fossil analysis to ecosystem exploration, from observing modern foragers to studying our closest living relatives, students gain insights impossible to achieve in any classroom. We look forward to providing this life-changing experience to many more students, ensuring that future generations of scientists can touch, see, and experience the evidence of human evolution firsthand.

Scan the QR code
to watch the 2023
Field Course video.



THE 2025 ANTHROPOGENY FIELD COURSE

Introducing the 2025 Field Course: CARTA's Perspective

It's remarkable how quickly a rag-tag collection of strangers can become like family. The secret to this social cohesion? Three intense weeks covering thousands of miles by plane, truck, and foot. Or maybe it was the constant awareness of one another's stomach status within the close quarters of jam packed safari trucks and shared tents. Or maybe it was the "theory of mind" realization that no one else in this world—outside of this group—will truly understand what was seen and felt. Whatever the social glue, the faculty and students of the 2025 Field Course forged a bond that felt like kinship. Truly, it was a small miracle of human social engineering.

This 11th edition of the Anthropogeny Field Course was deliberately the largest yet. In past years, enrollment was capped at just 3–6 students, mostly due to cost and the perceived challenges of managing a larger cohort. But with the possibility that this might be the program's last hurrah (see *Funding and Future Outlook* for how to help ensure its survival), we decided to take as many as we could. Ten of the most senior and accomplished Graduate Specialization in Anthropogeny students joined us, and we quickly discovered that a larger group enhanced the experience. With more personalities came more energy, levity, and learning opportunities.

The photo shown on the opposite page was taken on our final morning of the of the Field Course proper at Issa Valley, Tanzania, and captures this spirit. This farewell moment represents the culmination of months of planning, considerable stress, abundant fun, deep learning, and awe-inspiring sights and sounds. There was relief that we made it through the gauntlet, but there was also real sadness that our time together was quickly drawing to an end. The family we developed would split apart as we each headed off in different directions. We all longed for a little more time together.

This family first came together around 10pm local time in Addis Ababa, Ethiopia, on June 29th, when the jet -agged students arrived from the US to meet Fiona, Pascal, and Jesse, who were already in-country. Some were seasoned international travelers, while others were less so. But none had ever done

anything like this before. They were about to experience a multitude of challenges and extraordinary opportunities that would test their mental and physical stamina. Exhaustion, altitude, rushes of activity followed by lengths of stasis, social and cultural differences, extreme poverty, heat, relentless dust, tight quarters, no internet, sometimes no bathrooms, early mornings, upset stomachs, and everyone's favorite meals of rice and beans were served in equal measure with breathtaking animals, magical landscapes, wonderful people, unique ways of life, extreme kindness, and the most fantastic sunrises and sunsets.

All of this unfolded while the students immersed themselves in the science of human origins. They learned about the geology and fossil history of Ethiopia and Tanzania. They discovered how the ancient and present ecology and ecosystems of the East African Rift shaped and continue to shape the lives of those who live there. They were tasked with recording their observations, participating in lectures, and contributing to discussions.

Learning in the relative calm of a classroom or lab is one thing, but to learn in the very landscape that shaped our species millions of years ago is something entirely different. That is the heart of the Anthropogeny Field Course: to take students out

of the classroom and lab and drop them into key locations essential for understanding the origin of humanity. Sometimes the proverbial frying pan is the best place to learn.

While each of the previous Anthropogeny Field Courses have been wonderful, this edition was particularly exemplary. We believe this can be attributed to the amazing students and their positive energy that elevated the entire experience for all involved.

Their attention among the fossils at the National Museum of Ethiopia, despite almost no sleep after 24 hours of travel, was inspiring. Their pure wonder and joy while at Ngorongoro Crater, Olduvai Gorge, and Tarangire National Park affirmed how deeply they valued discovery. Their

Want to see more of CARTA's photos? Scan the QR code to visit our image galleries for CARTA calendars and Zoom backgrounds featuring photos from the Anthropogeny Field Courses.



Our last morning at the Greater Mahale Ecosystem Research Conservation (GMERC) field site in Issa Valley, Tanzania. For the 2025 Anthropogeny Field Course participants, it was an honor and a privilege to be so welcomed by the GMERC team who are, in their own right, primatology superstars. *Left to right first row:* Michael Solomon Kabura (GMERC) and Burcardi Vyampi (GMERC). *Second row:* Jesse Robie (CARTA), Mecktilda Joseph (GMERC), Ramadhani Mrisho (GMERC), Hussein Mlela (GMERC), Lora Khatib (CARTA), Mika Caplan (CARTA), Chantal Rabay (CARTA), Abbie Hall (UCL), Sheila Steiner (CARTA). *Third row:* Callin Piel-Stewart, Noeli Gotia (GMERC), Alex Piel (GMERC/UCL), Shedrack Lukas (GMERC), Finlay Piel-Stewart, Fiona Stewart (GMERC/UCL), Alana Piel-Stewart. *Fourth row:* Carlos Escalante-Vera (CARTA), Juston Jaco (CARTA), Pascal Gagneux (CARTA), Reid Larsen (CARTA), Liam Conaboy (CARTA), Raihan Alam (CARTA), Julian Chhatrivalia (UCL), Julia Gorman (CARTA), Maisara Abdul (GMERC). *Fifth row:* Lukas Ndoriki (GMERC). Photo courtesy of Jesse Robie.

thoughtful participation during lectures and discussion at Nesera Rock, Shifting Sands, and other locations reflected their hunger to learn and share knowledge. Their respect and appreciation for the Hadza gave them a rare and meaningful encounter with one of the world's last foraging societies. Their determination in the rugged landscape of Issa Valley, trekking after chimpanzees and red-tailed monkeys, proved their commitment to getting the most from their field course experience.

It was truly an opportunity of a lifetime for the students, but it was equally gratifying for the faculty and staff who poured so much care and attention into the Field Course. Seeing the

students thrive and transform from their experiences made every challenge worthwhile. And thankfully, we have each other's memories to reminisce about our shared experiences and words with which to attempt to convey elements of the experience with those who were not there.

And that is the purpose here, to share with the reader the core of the 2025 Anthropogeny Field Course. In the following pages, you will learn about the participants, you will read excerpts from student reflections, and you can join in the day-by-day adventure of the "travel map" narrations. We hope you enjoy them and feel like you were practically there.

Biographies: 2025 Faculty and Staff



Pascal Gagneux, Executive Co-Director, CARTA; Chair, Department of Anthropology; Professor, Departments of Anthropology and Pathology, UC San Diego

Pascal is interested in the evolutionary mechanisms responsible for generating and maintaining primate molecular diversity. His laboratory studies cell-surface molecules in closely primates. His focus is on glycans, the oligosaccharides attached to glycolipids and glycoproteins of the surfaces of every cell and secreted into the extra-cellular matrix. The Gagneux laboratory is exploring the roles of molecular diversity in protecting populations from pathogens as well as potential consequences for reproductive compatibility. Pascal's interest is in how glycan evolution is shaped by constraints from endogenous requirements of development and exogenous, pathogen-mediated natural selection, as well as its potential consequences for reproductive compatibility. Pascal has studied the behavioral ecology of wild chimpanzees in the Taï Forest, Ivory Coast, population genetics of West African chimpanzees, and differences in sialic acid biology between humans and great apes with special consideration of their differing pathogen regimes. In 2011, while Associate Director of CARTA, Dr. Gagneux helped to establish a graduate specialization in Anthropogeny at UC San Diego. This wholly unique graduate specialization is offered through nine participating graduate programs in the social and natural sciences at UC San Diego.



Alex Piel, CARTA Member; Associate Professor of Anthropology, University College London; Primary Investigator, GMERC

Alex's bachelor's degree is in Animal Behavior (Bucknell University) and as an undergraduate he worked with captive, socially housed hamadryas baboons, and in the field surveyed Madagascar teal. He managed a long-term study of blue monkeys in the Kakamega rainforest, western Kenya, before conducting Master's work at Iowa State University with the Fongoli chimpanzees in southeastern Senegal. He has been working in western Tanzania since 2005, initially participating in a regional biodiversity survey. He returned in 2006 to pilot test an acoustic monitoring system (ARUs) before designing a modified version of the ARUs for his dissertation, which he received in 2014 from the University of California, San Diego. His specific interests center on primate vocalization behavior and overall primate adaptations to a savanna-woodland environment. In addition to directing research at Issa, Alex and Fiona coordinate region-wide survey and monitoring of chimpanzees and chimpanzee habitat within the Greater Mahale Ecosystem.



Fiona Stewart, CARTA Member; Senior Research Fellow, University College London; Principal Investigator, GMERC

Fiona is currently a Senior Research Fellow in the Department of Anthropology at University College London and the School of Biological and Environmental Sciences at Liverpool John Moores University (LJMU), and an Associate Researcher in the Department of Human Origins at the Max Planck Institute for Evolutionary Anthropology (MPI-EVA). She was formerly the Wheldale-Onslow Research Fellow at Newnham College, University of Cambridge, from where she also received her PhD in 2011. Her first degree is in Zoology from the University of Glasgow, where she developed initial interests in tropical biology studying dominance interactions of wild hummingbirds in Ecuador. Her M.Sc. research took her to Fongoli, Senegal, where she managed the study site and conducted research into savanna chimpanzee nest-building behavior. She has worked in Tanzania since 2005, initially supporting survey efforts across the Greater Mahale Ecosystem, before establishing the Issa field station and conducting long-term research since 2008. She is interested in the behavioral ecology of chimpanzees and sympatric primate species in Issa's dry, open, savanna-woodland mosaic habitat, with a particular focus on understanding how similar habitats may have influenced early hominin behavior and evolution, including spatial cognition and responses to fire and burned landscapes. She has a particular interest in the selective factors shaping sleep patterns and their influence on the evolution of cognition in primates, following her PhD on the evolution of nest building. In addition to directing research at Issa pursuing these topics, Fiona and Alex regularly coordinate survey efforts across the region, providing essential data to aid protection of human and non-human primate use of these landscapes.



Jesse Robie, Program Manager

Jesse's passions for understanding the origins of humans and biology date back to his formative years on a horse farm in Vermont. He pursued biological anthropology, with a particular focus on the human skeleton, for his bachelor's degree at the University of Vermont, and received a masters in biological anthropology from UC San Diego. He has worked at CARTA since 2011 and helped grow many of it's programs, including the specialization track. He has participated in four iterations of Anthropogeny Field Course, serving as the organizer, overseer of health and safety, and team photographer.



Linda Nelson, Management Services Officer

Linda Nelson joined CARTA as Management Services Officer in 2011. She serves as manager of fiscal, administrative and operational resources for CARTA, and as a key adviser to its leadership. Originally from North Dakota, Linda relocated to San Diego in late 1991 and joined UC San Diego shortly thereafter. Linda previously held executive administrative support and program management positions in the Department of Biology/Cancer Center (1992-1999), the Office of Graduate Studies & Research (1999-2003), Structural Engineering (2003-2007), and in the Department of Medicine/Division of Gastroenterology (2007-2011). She brings a wealth of experience in supporting people and programs, event/conference planning and coordination, and management of educational programs and sponsored projects. Linda helped launch the precursor of CARTA, the La Jolla Group for Explaining the Origin of Humans (LOH) in 1998.

Biographies: 2025 Student Cohort



Raihan Alam, Rady School of Management

Raihan is a PhD student in the Rady School of Management at UC San Diego and is a National Science Foundation Graduate Research Fellow. He studies the causes and consequences of moral disagreement, with applications to criminal justice, violence, and political polarization. In recent work, he has found that incentivizing punishment can destabilize cooperation and that stock trading by members of Congress can reduce ordinary citizens' willingness to comply with the law. Moving forward, he is investigating how moralistic anger drives political action. His interest in CARTA lies in understanding the evolution of large-scale cooperation in *Homo Sapiens*.



Mika Caplan, Biomedical Sciences

Mika is a PhD student in Biomedical Sciences at UC San Diego, and is a member of the JoAnn Trejo Lab in the Pharmacology Department. She is currently working to understand the role of the Src family kinases (SFKs) in G protein-coupled receptor signaling to the Hippo pathway as a regulator of breast cancer progression. In addition, she is interested in understanding the molecular mechanisms that regulate a tumor suppressor known as ARRDC3 in the context of breast carcinoma and to elucidate the networks that control the function and signaling of the G protein-coupled receptor, PAR1. She is using a number of biochemical and cell biology techniques to uncover a mechanism by which this α -arrestin is regulated in invasive breast carcinoma and these studies will help to further understand the complexity of this disease and could potentially contribute to the discovery of new targets susceptible to effective therapeutic treatment. She is also interested in understanding the evolutionary history of humans and the genetic and phenotypic differences between prehistoric hominid species.



Liam Conaboy, Psychology

Liam Conaboy is a PhD student in Psychology at UC San Diego. He studies neuropsychopharmacology in the Molecular Cognition Laboratory with Dr. Stephan Anagnostaras. He is interested in a transdisciplinary approach to understanding complex biopsychological relationships between organisms and the bioactive substances in their environment. Conaboy is currently seeking deeper understanding of sustained alterations to neurocircuitry resulting from psychostimulant and opioid addiction. In addition to studying the neurocircuitry of addiction, he also studies the effects of psychedelic drugs such as LSD, MDMA, and psilocybin on the brain and behavior and conducts preclinical investigation into whether and how they may be efficacious in the treatment of neurobiologically-based symptoms of addiction and its common psychiatric comorbidities such as mood disorders. Liam also has an interest in ancient pharmacology: how drug use comes to be, how it shapes societies, modern minds, and the stories we tell.

PARTICIPANTS



Carlos Escalante Vera, Neurosciences

Carlos Escalante Vera is a Fulbright Scholar and a PhD student in Neurosciences at UC San Diego. Upon being awarded the Chevening Scholarship in 2018, Carlos began his career in neuroscience doing a Master's Degree in University College London, focusing on the anxiolytic action of antidepressant medications. He is currently investigating the computational principles that guide neuronal architecture under the supervision of Dr. Gabriel Silva.



Julia Gorman, Neurosciences

Julia Gorman is a PhD student in Neurosciences at UC San Diego and a member of the Gentner lab. She uses artificial neural networks to understand how populations of neurons efficiently carry information. She studies both how context affects auditory perception and signaling in the auditory cortex of European starlings as well as how networks can create open learning for vocal communication. Her interests in CARTA lie in understanding how language and perception arises from populations of neurons and parallels between communication in the animal kingdom.



Reid Larsen, Neurosciences

Reid is a PhD student in the Biomedical Sciences at UC San Diego. His research in Dr. Richard Daneman's lab focuses on the tight regulation of substances entering and exiting the brain, controlled by the special properties of the brain's blood vessels. This "blood-brain barrier" is critical to maintaining homeostasis and its dysfunction plays a role in the pathology of diseases such as Multiple Sclerosis and Alzheimer's disease. Specifically, Reid is studying the role of the sugar coating on the surface of the brain's blood vessels, termed the glycocalyx, that acts as the first barrier in the blood-brain barrier. In addition to his research, he also believes that learning more about the Anthropocene and where we came from is a crucial component in examining the why behind our goals and for intelligently charting our future directions.



Juston Jaco, Biomedical Sciences

Juston Jaco is a PhD student in Biomedical Sciences at UC San Diego. His academic career began at the University of Michigan, where he graduated with highest honors in environmental science from the College of Literature, Science, and the Arts. Juston then served three years as an AmeriCorps service member, building gardens in outdoor urban school environments and transforming vacant concrete patches into fully functioning "living lab" classrooms across Northern California. It was during this time that he became passionate about the intersection of environment, nutrition, and health—both human and planetary. Believing in the concept of "food as medicine," Juston went on to earn a Master of Science in Human Nutrition and Functional Medicine from the University of Western States and a Master of Public Health from Harvard University, specializing in global health, nutrition innovation, and food law and policy. Complementing his scholastic achievements, he gained one-on-one patient experience through a nutrition residency appointment at the Sandy Hook Clinic in Newtown, Connecticut, under the direct supervision of Kara Fitzgerald, one of the nation's leading naturopathic physicians. At UC San Diego, Juston is now investigating the impact of chronic red meat consumption in otherwise healthy mice in the labs of Pascal Gagneux and Ajit Varki. By linking modern nutrition and chronic disease back to questions of human evolution, his research seeks to uncover why the human lineage is distinctively vulnerable to certain diet-related diseases.



Lora Khatib, Neurosciences

Lora Khatib is a PhD student in Neurosciences at UC San Diego and is mentored by Dr. Rob Knight. Her research focus revolves around employing computational models to explore the intricate relationship between microbial cells in the body and their influence on neurotransmitter regulation and neuroinflammation. Her work aims to uncover the impact of these mechanisms on mental health and the onset of neurodegenerative diseases. Lora is interested in the variations in microbial composition between modern societies and hunter-gatherer communities, and how these differences contribute to the significant rise in modern world-specific diseases like Alzheimer's and various forms of cancer.



Chantal Rabay, Anthropology

Chantal Rabay is a PhD student in Anthropology at UC San Diego and works with Dr. Amy Non. She is investigating associations between maternal perceived stress, anxiety, and depression and microRNA (miRNA) expression in human breast milk. This project explores miRNAs within exosomes, which are vesicles that prevent miRNA degradation and present a potential pathway for maternal miRNA to influence developmental programming in infants. Additionally, Chantal is interested in exploring potential miRNA effects on a baby's growth and development. More broadly, she is interested in understanding how social determinants of health lead to epigenetic changes, and how these may contribute to health disparities.



Sheila Steiner, Neurosciences

Sheila Steiner is a PhD student in Neurosciences at UC San Diego. She is co-advised by Dr. Rusty Gage and Dr. Carol Marchetto. She uses stem cell-derived neurons to understand how energy metabolism changes across neuronal development and neuronal aging in humans as compared to other primate species. She is broadly interested in whether there is a trade-off between both humans' unique level of cognitive functioning and humans' relative longevity compared to other primates and our susceptibility to certain neurodegenerative conditions.

Biographies: 2025 Dorobo Safari Guides



Douglas Duncan Simbeye

Douglas's journey began amidst the vibrant streets of Moshi (Tanzania), where he first delved into the world of graphic art. Yet, destiny had greater plans, steering him towards a lifelong passion for the wilderness. In pursuit of this calling, Douglas embarked on a transformative path. In the heart of Arusha (Tanzania), Douglas earned his diploma in Wildlife Ecology, a testament to his unwavering commitment. Complementing this foundation, he secured a certificate in tour guiding and leadership skills, shaping him into a proficient guide. Douglas's appetite for adventure reached new heights as he earned his Kilimanjaro mountain guide certificate. Guiding parties along various routes, he unlocked the beauty of the majestic Kilimanjaro for those who dared to ascend. Since 2007, Douglas has been a steadfast guiding force, weaving captivating narratives across Tanzania's landscapes. His endeavors span from leading mesmerizing walking safaris in the Serengeti to orchestrating extensive university student trips lasting six weeks. A fervent birder, Douglas' enthusiasm for avifauna led him to the Usambara mountains for an enriching bird intuition course. With a palette of diverse experiences, Douglas is poised to create unforgettable moments, painting each journey with a unique blend of expertise and passion.

Editor's note: Douglas is the most wonderful human you will ever meet. This is not hyperbole, nor is it colored by reverie of the numerous adventures we've had together. You marvel at his joy for life and his love of his country, the land, the animals, the history, and the people. His always beaming smile, his ceaseless humor, his profound kindness, his deep passions, and his amazing talents make you want to be him. I've been lucky to call Douglas my friend since we first met in 2016 but I was even luckier during this Field Course to see his radiant effulgence when he introduced us to his wife, Happy, and daughter, Susan.



Prisca Sumari

Prisca Sumari is a passionate and nature-loving tourist guide who seamlessly blends her background in education with a deep enthusiasm for the natural world. After earning her Bachelor's degree in Science Education in 2022, Prisca pivoted to the tourism industry, driven by her innate love for nature and adventure. As an active member of the Attraction Birds Organization, a group dedicated to promoting bird conservation and wildlife appreciation, Prisca has refined her skills and cultivated a profound appreciation for wildlife, especially birds. Her experience as a porter on Mount Kilimanjaro hikes further adds to her unique perspective and infectious enthusiasm for guiding. When she's not exploring the great outdoors, Prisca seeks new adventures like rock climbing, dancing, and captivating others through storytelling. Her dedication to sharing the beauty of nature and inspiring a love for the outdoors is evident in her every interaction.

Editor's note: It was an absolute joy to watch Prisca's confidence evolve during our time together on safari as this was her first trip as a solo guide (meaning she was the driver and guide for her safari truck). We first witnessed her guiding talent at Ngorongoro Crater when she somehow spotted two honey-mooning lions a half-mile away and hidden by grass. But it was with the Hadza when she absolutely blossomed as our lead. It was an honor to see her in her element.

STUDENT REFLECTIONS

Student Write-Up Excerpts

The participating Anthropogeny Field Course students write essays on their experience. They are given latitude to be creative and to explore the real impact of the course on their life. Compiled here are excerpts from the ten student papers, selected for their poignancy.

Carlos Escalente-Vera (Neurosciences) – Joy

With excitement and the natural timidity induced by a city so dramatically different from our own, we walked as a student group to the National Museum of Ethiopia. Our shy demeanor was quickly extinguished by the staff; with smiles unstoppable and inevitable they showed us the museum and its bounty. I could feel their pride in working in this sanctuary for the stories and treasures of their land, a palace built to preserve and cherish their history. We were incredibly lucky to have renowned paleontologist, Dr. Asfaw, to show us the remains of Lucy and other endemic ancestresses.

I have learned to expect a solemn and serious demeanor in high-ranking people, such as directors, CEOs, or leaders; I usually expect to face a poker face, a stressed scowl, or a frown so busy, so preoccupied with the bigger pictures, they have no time -or find no use- for overt amusement, only for the pragmatic grins that will move them fastest from one meeting to another. Destroying my western-molded expectations, Dr. Asfaw could not help himself and avidly kept picking more fossils, new skulls to tell us about the meaning and stories in them. Giddy with the unmistakable passion of those who are fascinated by their own craft, he shared his pride for Ethiopia, for east Africa, for the institution he represents, and for the hard work of the museum's team who turns scientific puzzles into discoveries.

Excitement was not contained in the upper echelon of the museum's administration. Pride burst out of its seams in one of the paleontology laboratories: My friend Lora and I walked into a restoration lab, and still starstruck after meeting Lucy in the flesh ~bones to be precise~ we wanted more. Shyly but patently, we tried to peek behind a row of formerly-translucent plastic curtains, which made opaque by time, were hiding mammal fossils. A young man working painstakingly on what

seemed was the upper jaw of a hippo, noticed our evident curiosity and presently stopped the buzzing of his Dremel, stood up, and before we could say anything, he was opening one of the curtains and asked if we wanted to see the hidden fossils, to which we said he needed not bother, that we did not intend to disturb, but he replied he was happy to interrupt his work to show us. One might not even realize it—probably due to having been reprimanded as kids every time we interrupted working adults—but being happy about a couple strangers interrupting one's work is an extremely rare event in the West.

Upon looking at what the curtain was hiding he noticed the fossils were not those he had hoped for us to see. He asked us to wait as he swiftly opened more of those yellowed curtains across the wall, until he saw what he—and we—were looking for: the pieces he had worked on. He seemed so proud of his work, but even more proud of the place he worked at, the place he was a part of.

The smiles, glee, and dancing I witnessed in Ethiopia and Tanzania did not seem forced or utilitarian; they always struck me as authentic. In all fairness, these are all my own observations and most importantly, interpretations. In writing this, I try to acknowledge my biases, and how inevitable it is that one's expectations changes one's perception. Nonetheless, a strong indicator for me on the authenticity of joy is that in the California I usually am either indifferent to—and at times repelled—by people's flagrant cheerfulness, but in Ethiopia and Tanzania their joy made me jealous.

I remember being taken aback too by how—no matter the time of day or how long the travel day had been—the Dorobo Safaris' staff was so genuinely kind and helpful, and they always seemed happy to see us. The cooking staff could not hide



Sheila, JC, and Carlos full of joy at the Ngorongoro Crater. Photo courtesy of JC Gorman.

their satisfaction when they saw us coming back for seconds. But I think the most salient and remarkable smiles came from Douglas: a man so comfortable in his skin, so unapologetic and unashamed of his *joie de vivre*, that if you were lucky, he infected you with it.

Personally, his joy made me jealous at times. Sad at others. It was not Douglas himself though; it was just that being around him 24/7 reminded me of what's possible, and highlighted what is missing from the lives of men born and raised in Western societies, including myself. I remember the last day we stayed at the Tumaini cottage. Despite Douglas's work with us being

done after a week of uninterrupted coexistence, he came back to the cottage to introduce us to his wife, and to his pride and joy: Susan. Douglas's first child, a bright-eyed baby girl who radiated smiles and wonder. Her light was only out-shined by her father's, who somehow seemed more happy to be alive than this child. Behind the enchantment this child had cast on all of us, I am ashamed to admit I envied her. She was being raised by a happy man, but most importantly a man who was effortlessly happy. He was so unashamed and so unbothered by showing his joy that I am almost sure he was not even aware of it.

Chantal Rabay (Anthropology) – National Museum Fossil (The real ones!)

On June 30th, we had one of the experiences I had been anticipating most: visiting the National Museum of Ethiopia research facility in Addis Ababa. This facility is iconic to the field of anthropogeny because it houses, maintains, and protects Ethiopia's remarkable fossil record. Ethiopia's importance to paleoanthropology cannot be overstated: the East African Rift System cuts directly through the country, creating geological conditions that not only preserve fossils but also make them easier to date. The Rift has yielded some of the most famous and important hominid remains in history, including Lucy.

Walking into the research facility felt a bit like stepping into a sacred space that possessed secrets spanning millions of years. The rooms we entered were lined with shelves stacked high with trays of hominid remains, fauna, and stone tools. Some were fragments, others more complete. The rooms held evidence for telling a potential story about our evolutionary past, carefully labeled, waiting for future study. We learned how researchers make near-perfect plaster casts of the fossil remains so scientists around the world can study them without risking damage to the originals. I stood watching as a technician painstakingly worked on a new mold, their steady hands a reminder of how much patience and care is required in this work.

Then, we were shown the remains of Lucy (*Australopithecus afarensis*). For me, this was the moment I had been waiting for. As one of the few anthropologists in our student group (and the only one besides Pascal himself), my excitement was almost unbearable. I had studied Lucy in nearly every evolutionary anthropology class I had ever taken, and I had even taught students about her as a graduate teaching assistant. To see the actual bones of Lucy, and not a photograph or model,



Lora, Sheila, Juston, Fiona, Seminew, Carlos, Chantal, Mika, and Reid at the National Museum of Ethiopia examining "Aridi" and "Lucy" with Berhane Asfaw. Photo courtesy of Pascal Gagneux.

was surreal, I tried to keep it together. One of my peers, who came from a different department and academic field, leaned over as he watched me and another student buzzing with anticipation. He asked, "Okay, I know that this is a big deal, but can you explain why? I want to be as excited as you are." Without hesitation, I launched into an impromptu explanation about Lucy's significance and the rarity of seeing the real bones (aside from the controversial exhibit tour of Lucy in 2006). Hopefully, my excitement was contagious.

After viewing Lucy and other hominid remains and models, we moved on to massive rooms where the research facility stored stone tools and animal remains. We were able to hold a stone tool and it was surreal to be in contact with something used by one of our ancestors millions of years ago. The fauna collections were equally overwhelming—rows upon rows of shelves containing bones from elephants, hippos, giraffes, and

STUDENT REFLECTIONS

endless other species. Each specimen represented another puzzle piece in reconstructing the ecosystems our ancestors lived in, and how changing environments may have shaped hominid evolution. These faunal remains help with dating and the research facility stores them anticipating future research opportunities to study the remains of these various animal species.

Raihan Alam (Rady School of Management) – Punishment

One of the things that struck me most during my time with the Hadzabe—and what I think fascinates many people interested in hunter-gatherer societies—was their deep egalitarianism. Food, whether tubers or meat, is typically brought to central locations and shared evenly among all camp members (Hawkes et al., 2001). I experienced this firsthand when we joined a group of Hadza women in digging up tubers. After collecting them, they roasted the tubers over a small fire and then sat

together in the shade of the trees to eat. Material inequality is also actively discouraged (Marlowe, 2010), and for most of their history the Hadza had no concept of land ownership (Woodburn, 1968). Only in recent years have they been able to secure land rights in response to encroachment by pastoralists (Madsen, 2000). Decisions are also made collectively without formal leaders, and neither age nor hunting ability necessarily confers higher status (Marlowe, 2010). Marlowe argues that this lack of male dominance hierarchies stem from the unpredictability of hunting success: acquiring meat is difficult alone and often a matter of chance. In the morning we joined them for hunting, many of the Hadza came back empty handed. I also was able to witness more subtle examples of their egalitarianism. When Jesse and I played football with four Hadzabe, they quickly noticed if someone had not received the ball for a few passes. As soon as this happened, they would call out the excluded person's name to make sure the ball was shared more fairly. Even in casual play, they were attuned to fairness.

We spent time with two different Hadzabe groups in the Yaeda Valley south of Lake Eyasi. At the first camp, we joined the women in gathering tubers, learned arrow-making from

By the end of the day, my brain was buzzing. That night, over local Ethiopian food, our group talked through the experience. But, as is common throughout the trip, words felt inadequate. I knew even then that this trip was going to leave me with memories that would be hard to explain to anyone who hadn't been there. And yet, this was just day two of the course.

the men, and watched as they scaled tall trees to smoke bees out of their hives to collect honey and endured stings along the way (something that they implied was more tolerable via copious amounts of marijuana smoking). From there we trekked about nine miles to a second camp, where we danced, practiced shooting arrows, climbed a massive baobab tree, and even tagged along on a hunt. For me, though, the highlight was the question-and-answer session. For the past two years,



Lora (foreground), Raihan, and Reid are joined by Hadza to take in a spectacular sunset. Photo courtesy of JC Gorman.

I had been studying how human beings sustain cooperation, specifically focusing on third-party punishment, and I was eager to see how a society like the Hadza resolved conflict without formal institutions. I was especially curious about whether their practices might reflect evolved predispositions, and what lessons those might hold for improving our current penal systems. On our final evening, as the sun set

over the valley, our group of ten students gathered on top of a rock, with Prisca, one of our guides, translating our questions.

I was the first to fire away: “What is your most common conflict, and how do you resolve it?” They explained that one of the most frequent sources of conflict is cheating. They told us that when an accusation is made, a group of elders first considers the credibility of the claim. If they determine the accusation is justified, the cheater must fetch honey and give it to the victim as compensation. If the claim is found to be false, the rumor-maker bears that responsibility instead and has to fetch honey and give it to the couple to compensate them. I then followed up, “What happens if someone refuses to pay the honey fine?” They told me that the person is told to leave the camp and they withdraw their interactions from them. They are socially shunned, not physically punished or

locked away. Finally, I asked, “What if that same person later expressed regret and offered to pay the honey fine—could they be reintegrated into the camp?” Their answer was yes.

My time with the Hadzabe, combined with my broader review of the literature, made me wonder whether modern penal systems represent an evolutionary mismatch. An evolutionary mismatch occurs when traits that were adaptive in ancestral

Julia “JC” Gorman (Neurosciences) – Field Primatology

The final leg of this trip took us out to West Tanzania to the most in the middle of nowhere place I have ever been. Just reaching the camp required days of travel. The remoteness itself became part of the lesson: science is not glamorous here; it is exhausting, mosquito-ridden, and can be lonely. Here is where we joined field researchers studying one of the most Eastern chimpanzee populations as well as other primates like baboons and red-tailed monkeys. This research station was run by Fiona and Alex. Fiona was a huge part of the trip as she was with us the whole time. I want to reserve a little time and space to properly appreciate Fiona. It was really important to me that she was there. As one of the main people in charge of the trip, I think she really provided a lot of balance and she was a joy to get to know as well as get to ask her a bunch of questions. I truly couldn't imagine a better addition to the trip alongside Pascal and Jesse, her presence was greatly appreciated and I treasure a lot of the chats that we had. Her ability to balance academic rigor with empathy made a real difference. For me, having a strong female scientist in that leadership role was affirming, and it reminded me how representation matters, even in field science.

The chimpanzee population here was habituated after 6-7 years of being patiently followed around the forest by researchers. I am so impressed by the brute force perseverance one must have to be a chimpanzee researcher. Fiona and Alex use this chimpanzee population as a model for human evolution, observing them in their natural ecology is one of the best models we have for reconstructing aspects of our own evolution, as well as adding to the larger understanding of chimpanzee research we have. The chimpanzees here are different since they have a different habitat that is less dense meaning they must travel a lot more and are more sparse than say Gombe or Tai. This means that there are also less chimpanzee populations in the area to draw direct comparisons to. Their adaptations to this landscape ranging from diet to social grouping may provide analogies for the conditions under

environments become maladaptive in modern ones. Punishment, however, does not fit this model cleanly. It is not obvious that punitive justice was ever adaptive in ancestral groups. The ethnographic evidence suggests that small-scale societies relied more on social ostracism and restorative practices than on systematic third-party punishment. If punitive institutions were never part of our evolutionary past, this may help explain why they perform so poorly today.



JC (foreground) followed by Lora and Carlos while hiking through the miombo of Issa Valley. Photo courtesy of JC Gorman.

which early hominins first experimented with bipedalism. I gained a lot of appreciation for the methodological grind of this kind of field work. I used to romanticize it, but after sitting in the sun for hours being stung by sweat bees, I have gained a new level of respect for these researchers and also a new appreciation for my desk. It truly is so many hours in the forest for a few minutes of observation. However, it really was mesmerizing to watch them and I enjoyed both times I got to go out and just realize how awesome they are and how many secrets they do hold.

We also joined the researchers in botanical surveys, a side of fieldwork I hadn't expected us to be participating. Collecting and identifying plants was tedious, but it has a purpose: reconstructing ancient ecosystems. If you know what plants might have been around certain fossils you found, you can make some kind of claim about what plant species they might have preferred or what environments they thrived in. It's a painstaking puzzle, and it made me realize that every leaf and twig collected has the potential to rewrite parts of our story.

STUDENT REFLECTIONS

Sheila Steiner (Neurosciences) – Evolution

There are a few things you cannot internalize about elephants until you are very close to one; no longer a detached observer, sharing breathing space with an elephant gives you an emotional investment in the situation that is hard to recapitulate when one is not in a bit of danger. Elephants are shockingly colossal. How had biology produced such a majestic monstrosity? How were the same genes and the same metabolic pathways as my own keeping such a large being alive? Such questions should have occurred to me upon first encountering an ant, but again it seems a desire to avoid my demise seemed to be necessary for this kind of realization.

It has been said that most revolutionary scientific inventions have been less of a matter of kind, than of scalability and precision. For instance, we have been able to edit the genome for decades but not with the precision and versatility that CRISPR affords. Yet, nature, the interminable foe of human hubris, has scaled the most complex biological systems up and down with reckless abandon. The elephant and I had begun from something so similar, a singular cell with about 90% of the same DNA (3), and yet had diverged so completely, somehow without cataclysmic system failure on either of our parts. Biological development, once again, never fails to astonish with its robustness and flexibility.

The elephant was however, in its current iteration, not at all similar to me; it was dignified and gorgeous – slate skin with a ledger of wrinkles that, despite an age which likely numbered in the decades, told what seemed to be a story centuries in the making. I was struck by the uniqueness of this elephant's wrinkles compared to its compatriots. The wrinkles belied a stochasticity, both in placement and depth. They looked like hard won battle scars that accumulated with experience, over hard-scrabble years in the African savanna. However, I know of course, that they are neither stochastic nor battle scars; they are practicalities, evolved for parasite prevention and evaporative cooling (4).

Many things in the African landscape seem similarly stochastic, or random, at first glance. Acacia trees appear scattered around the grasslands erratically. In actuality, they are practicing

a kind of spezzatura, tracking with their deep tap roots an underground water source, or a long since dried out riverbed. They are sending out exploratory root tendrils, testing salinity and alkalinity, before making the high-cost decision to forge ahead on one path. Resources are not abundant enough for any kind of haphazardness in the African savanna; everything must be meticulously optimized for any chance of survival.

This apparent indeterminism is deceptive on many axes; so much of what seems mystical, or unexplainably random and complex about elephant skin or the dotting of acacia trees across the plains is the consequence of events with unexpected influence that happened decades before. Forty years ago, a fire

may have ravaged a patch of grassland, breaking the dormancy of the acacia seeds buried underground (5). As a result, a cluster of acacia trees sprouts, which now provides a stark pop of green in a field of muted tans, despite no evidence of a water source to support such abundance.

Elephant skin cracks as skin cells pile on top of each other, causing tension and eventually deep rivulets across the skin. The pattern is intricate, lattice like,

adaptive and coordinated in the elephant's development; it helps elephants maintain five to ten times more water than if they had no such wrinkles and cracks (4). These processes whose patterns seem unexplainably chaotic in nature, it becomes clear, are developmental in origin, and can be explained in the context of time. What is unique, however, about the fourth dimension, is that we cannot visualize a trajectory over it in the same way we can with the other three, nor can we manipulate something that has happened in the past. In history and evolution, our experiments will never be well controlled, and our n will, for all intents and purposes, often be one. We are left, when it comes to studying the past, with only looking at the small traces history leaves behind in the present. This decoding is the domain of evolutionary biologists, historians and anthropologists alike; we are left with the elephant in all its modern complexity and a sparse scattering of fossils, ravaged by time in their own way. From this, we are tasked with figuring out how the creature arose.



JC Gorman (left) and Sheila Steiner (right) with elephants at Tarangire National Park. Photo courtesy of JC Gorman.

Mika Caplan (Biomedical Sciences) – The Hadza

In Hadzaland, we were welcomed by the Hadza people, one of the last remaining hunter-gatherer tribes in the world. Their language, peppered with clicks, was unlike anything I had ever heard. The separation between men and women was immediately noticeable, as was the number of young mothers. Many women had infants on their backs while working or beading.

I was struck by the delicate yet unmistakable facial markings many of the Hadza carried small, precise cuts etched into the skin during infancy. I learned that these were made so that when the baby began to cry, the tears would run into the fresh wounds and sting, teaching them not to cry. The first time I heard this, it landed like a blow. My instinctive reaction was to see it as harsh, even cruel, imagining the confusion and pain of a tiny child experiencing this lesson before they could speak. But as I sat with the thought, my certainty began to soften. In my own Jewish tradition, circumcision is performed on male infants within the first week of life, a ritual so familiar in my community that it rarely registers as unusual. In other cultures, infant girls have their ears pierced long before they can form memories of it, the brief pain quickly absorbed into the flow of life. The more I reflected, the more I understood how easily the boundaries between “normal” and “unthinkable” shift depending on where you stand. These markings, once unsettling to me, became another example of how traditions – no matter how foreign – carry their own internal logic, shaped by history, symbolism, and necessity as defined by that community. That moment reminded me to resist rushing to judgment and instead hold space for cultural complexity, for the truth that what at first feels incomprehensible may, in its own context, be deeply human.

With the Hadza, we dug tubers, learned to make arrows, and walked eleven miles to the next camp – an exhausting journey during which I consumed liter after liter of water, while the Hadza men beside me didn't drink at all. Their bodies were in perfect harmony with the climate, while mine flailed in comparison.

The next day, Chantal and I were paired with Shaqwa, our hunter guide, for the next morning. Despite my digestive system's protest, we set out. Eventually, we heard the cries of a family of hyrax as Shaqwa's arrow struck home. He finished them off with a few thuds on a rock and fashioned a handle from fiber to carry them – a grotesque but practical “purse”. In the beading circle, I sat with the women and asked questions through Prisca, who translated. I learned that Hadza marriages are based on personal choice, and that the colorful beads they make often hold symbolic meaning. One woman gifted me a necklace, tying it gently around my neck and cutting off the

excess with a knife. It felt like a silent gesture of connection.

Later, we tried our hand at archery, standing shoulder to shoulder with the Hadza men as they patiently demonstrated the technique passed down for generations. The bow felt heavy in my hands, the string taut and unyielding, and I quickly realized how much upper body strength – and years of practice – it took to even send an arrow in the right direction. Watching them draw the bow with ease, their movements fluid and instinctive, filled me with admiration for the skill that was so natural to them. That evening, our final night together, the air was alive with the crackle of the fire and the rhythm of song. The Hadza's voices rose and fell in harmonies that seemed to float into the star-pierced sky, accompanied by the beat of feet on packed earth. They laughed and pulled us into the circle, encouraging our clumsy steps until we were moving as one. In that moment, language dissolved entirely; the music became its own form of connection, speaking directly to something essentially human. I couldn't help but think of home, where so many evenings are spent isolated – faces lit not by firelight but by the glow of individual screens. Here, joy was a shared resource, amplified by proximity and movement, reminding me of the deep nourishment that comes from being part of something larger than oneself.



Mika Caplan (left) and Shaqwa with a rock hyrax. Photo courtesy of Mika Caplan.

STUDENT REFLECTIONS

Lora Khatib (Neurosciences) – Differences

Working on a dissertation about the microbiome, I often find myself thinking about cross-cultural differences. Geographical region is one of—if not the most—predictive factors of microbial composition. One of my main research questions has always been: why is this the case? Is it shaped by the environment? By cultural dietary practices? By lifestyle factors?

After spending three weeks in Africa, immersed in striking cultural contrasts standing side by side, I began to see just how dramatic these shifts can be—even within a single country. In Dar es Salaam, people live in a sprawling city filled with cars, high-rises, and fast food. Just two hours away, the Maasai live as herders, subsisting on domesticated cattle and the land. A little farther still, the Hadza continue to live as hunter-gatherers, surviving on game and tubers. These experiences helped me understand more clearly why my models can distinguish Japanese from Mexican microbiomes with nearly perfect accuracy. Our microbiomes reflect us—not only the lifestyle, dietary, and environmental forces surrounding us today, but also the long arcs of evolutionary physiology.

Leading up to my trip to Africa, I was filled with anticipation. I was eager to see the wildlife, the vast and beautiful plains, and to gain the once-in-a-lifetime experience of living with the Hadza and working alongside primate researchers. Interestingly, what fueled my excitement was the knowledge of just how different this experience would be from my own life. I knew I might never again encounter something so vastly unfamiliar. The contrast between my world as a PhD student in San Diego and the worlds of hunter-gatherers and wild primates in Africa felt unparalleled. And while my expectations of stark difference were not misplaced, what surprised me most was realizing how much is not so different between the worlds we inhabit. Just as the microbes within us carry vastly different DNA and characteristics yet share the same drive to persist, so too are we—diverse in form and context, yet united by a common will to survive.

Ultimately, the lesson that tied my trip together was perspective: we are wildly diverse in how we live, yet profoundly similar in what we seek. We may eat different

foods, structure our days differently, and live within different social frameworks. But whether you are a chimpanzee in the Issa Valley forest, a Hadza mother raising eight children, or a PhD student in San Diego, at the end of the day we all want the same essential things: safety, joy, and social connectedness. We are small links in a vast chain, bound to one another and to the natural world in ways we often overlook—but should always strive to remember.

On the flight back, I kept cycling through images: Lucy's delicate bones; elephants moving like weather across the crater; Hadza women calling me "Makaleta!" and laughing; chimpanzees screaming in chorus. Each moment stands alone, but together they form one message: we're not separate from nature or history; we're continuous with both.

From seeing Lucy, I was reminded of the mind-bending long journey our species has taken to get where we are. Our ancestors' bones remind us of shared origins. It reminds us of the millions of years of life that

happened before us, and to not take this lightly. We are who we are today because of them. And although our lifestyles have shifted gravely, it is imperative to keep in mind where we come from. Ngorongoro's wildlife reminds me that the living world is bigger and bolder than our plans. The diversity of species in just one region is magnificent, and it motivates me to do more to preserve it.

The Hadza remind us that community is not a luxury but a nutrient. The social connection they radiate, they were so welcoming and happy for us to be there and showed so many desires to connect even with us, even without speaking our language. They were such happy people filled with laughter and jokes; I am reminded of the life we are supposed to live. The chimpanzees remind us how much of us is ancient and still alive.

This trip was more than a course; it was a mirror. It showed me that human life is fragile, resilient, foolish, and beautiful—often at the same time. And it redirected me toward a quieter, sturdier definition of meaning: not what we own or how "efficient" we are, but what we're connected to—history, land, and each other.



Berhane Asfaw shows the dentition of Herto (*Homo sapiens*, ~160 thousand years old) while Lora looks on. Photo courtesy of Pascal Gagneux.

Juston Jaco (Biomedical Sciences) – Tikeliko (Hadzane for "Honeyguide")

The real magic began when our companion heard the call of a specific bird, the greater honeyguide (*Indicator indicator*). These remarkable birds (hereafter "honeyguides") actually lead humans to wild beehives. Fluttering ahead from branch to branch with its distinctive chatter, it beckoned us toward hidden treasure: honey.

Between craning my neck skyward and trying to keep pace with all the zigzagging guidance, I was thoroughly disoriented by midday. Sweat bees swarmed me for the first (but certainly not the last) time while the sun radiated directly overhead, heating a rather shadeless habitat. I didn't have a compass, only the certainty that we still had a long trek ahead of us, wherever we were. Thankfully, I became re-energized because of the honeyguide. Consuming four seeping morsels of this slightly acidic honey, I was more than ready to hike another five kilometers. After the energy expenditure of the morning's hunt, this must explain, in part, why great quantities of honey are consumed on the spot by Hadza men. They physically earned it.

The Hadzabe's communication with the honeyguide ended the moment we reached the tree and he confirmed the presence of a new beehive. As described above, the bird kept singing during the harvest—its call traveling throughout Hadzaland until the last comb was pulled. The silence was final on behalf of the Hadzabe, but the inner child in me wanted to keep reciprocating. As a kind of offering, I pressed bits of leftover wax onto a fallen branch at the tree's base, exaggeratingly gesturing towards the leftovers. It was all I could do; I couldn't sing "come closer!" in their tongue. I can't even whistle. My scraps were the best "thank-you" gifts I could offer, a promised closing ritual that went unnoticed by an unbothered forager. Glancing back a few times, I hoped to see at least one descend. I don't know if either ever did.

Part of me worried, what if the honeyguides grew angry, cheated out of their reward? I'd once heard, from Pascal no less, a mythical tale that previously deceived honeyguides could lead humans into danger: to a hyena, or worse, a

threatened mother elephant. This is why I performatively spread out the saliva-coated wax for the duo hovering above. I later understood this story was the real mythos of honeyguides that humans tell. The evidence is obviously much stronger for reciprocal signaling, where honeyguides and humans find themselves as transient partners, each enhancing the other's survival in small but extraordinarily mutualistic ways (Marlowe, 2010; Spottiswoode, Begg, & Begg, 2016).

I believe this demonstration was the best showcase of how environment and ecology shape behavior, culture, and, ultimately, hominin adaptation—a co-evolved system of identification, calls, and persistence that both parties learn and share. Unlike domesticated dogs or falcons (trained by human hands), this collaboration emerges between two species in ancestral lands, neither under the explicit control of the other. It is often a vertical negotiation, refined by natural selection and cultural learning. Honeyguides have adapted to recognize local human signals (the Hadza's whistles or the Yao's "brrrr-hm") just as humans have adapted techniques for fire use, resource extraction, and food transport that make the interaction so worthwhile (Spottiswoode, Begg, & Begg, 2016).

For our ancestors, I wonder if relationships like these may have been more common than we

currently imagine. After three years of reflecting on human origins (and completing a comprehensive review centered on just one food source in that story), it would make sense that collaborating with other species may have expanded dietary niches or buffered risk in meaningful ways. What is almost certain is that relationships like these would have reinforced the importance of social memory and communication in various environments. Being with the Hadza was a gentle reminder that adaptation is not solely about individuals or "survival of the fittest," but about dynamic networks of interdependence—ecological relationships that foster novel behaviors of humans and animals alike, which thereby impact survival.



Juston pointing to a bee hive that the Hadza blocked with a stone to prevent baboons from accessing the honey. Photo courtesy of Pascal Gagneux.

STUDENT REFLECTIONS

Liam Conaboy (Psychology) – Pharmacopoeia

Extant hunter-gatherer societies have long been central to anthropological discussions about the origins of human subsistence, cognition, and culture. Among the very few forager groups whose lifeways still resemble the subsistence patterns of deep antiquity, the Hadzabe of northern Tanzania occupy a particularly significant place in anthropogeny (Hawkes et al., 2018; Lee, 2018; Marlowe, 2010; Woodburn, 1959). The Hadza are estimated to number fewer than 1,500 individuals and are known to maintain a foraging (and sometimes trading) economy based on seasonal hunting, honey collection, and the gathering of wild plant foods such as tubers and berries (Marlowe, 2010). In addition to their well-documented subsistence ecology, the Hadzabe maintain a rich but less-studied ethnopharmacological tradition, employing local plants and other natural products for healing, protection, and subsistence-related technologies.

During our field course, we were privileged to spend time with Hadza guides and hosts who generously demonstrated some of their material culture and shared aspects of their ecological knowledge. From my perspective, these interactions showed that Hadza pharmacological practices are not isolated “folk remedies” but rather constitute an integrated set of techniques embedded in subsistence, ritual, and/or daily life. Their uses of plant toxins in hunting technology, as well as plant-based treatments for wounds and other ailments, highlight a continuum between foraging, pharmacology, and alternative or proto-medicine.

The Hadza prepare a potent arrow poison by collecting and processing *Adenium obesum* (desert rose), rich in cardiac glycosides such as ouabaine and strophanthin, and sometimes the sap, body, or seeds of *Strophanthus spp.*, another Apocynaceous plant also containing cardio-active glycosides (Lee & Daly, 1999; Marlowe, 2010; Neuwinger, 1996). They showed how the materials are boiled to concentrate their active components and then mixed into a paste that is applied to metal arrow tips. The pharmacodynamic action of these compounds is to bind and inhibit a crucial enzyme (membrane-bound sodium pump, Na(+)/K(+)-ATPase) in cardiac tissue that maintains ion gradients critical to cardiac function. This inhibition leads to ion gradient allostasis, increasing contractility of the heart and ultimately heart failure. The Hadza use of such substances on their hunting arrows produces an interference with cardiac function leading to incapacitation of game. This demonstrates a sophisticated empirical knowledge of local biochemistry, even if it is not formulated in biochemical terms. Quite as interesting as the poison anointing them are the arrows themselves. The material construction of Hadza arrows includes resource-rich combinatorics featuring shafts of *Grewia spp.* wood

fire-treated, peeled, and whittled, fletching with guinea fowl feathers, and bindings of animal sinew, reflecting a coevolved technical tradition with intimate knowledge of the properties and utility of environmental resources (Marlowe, 2010).

In our time spent with the Hadza, we learned that their pharmacopoeia can also include less dramatic or systematized, but equally ingenious uses of local plants for hygiene and wound care. Soapberries, rich in saponins, produce lather in water and can be used for cleansing, including in the treatment of minor wounds. Ash from burned plant material is sometimes rubbed into cuts to dry them and promote healing. This was one of the non-psychoactive uses of cannabis described by Hadza. Such uses illustrate that medicinal practices are basically continuous with daily ecological interactions for this foraging society: the same environment that supplies food and raw materials also provides remedies and protective agents. This indicates that the evolution of systems of medicine likely relies on everyday, traditional, cultural transmission.



Desert rose (top) is processed into a poison and applied to arrows (bottom) for hunting. Photos courtesy of Pascal Gagneux and Jesse Robie, respectively.

Reid Larsen (Biomedical Sciences) – Informal Economy

This was not a concept I understood at all before this trip, but it was really interesting to experience and talk about with Alex. For the most part, in the United States, you pay the listed price of a good. We don't get much of a say once a store sets the price, but we get the true market price. We get a taste of informal economy with things like Facebook marketplace or buying a car, but in general the concept of an informal economy was pretty opaque to me.

In Tanzania, the informal economy also extracts the true market price of a good, but it does so differently. When a local goes to the market to buy tomatoes, they pay fifty cents for a handful but when a foreigner wants to buy the same tomatoes, it's four dollars. In one sense that's not fair, but in another it is. It's equality, not in price, but in the relative amount each is able to pay. If I wanted to, I could spend 30 minutes of my time haggling to get the price down to the same fifty cents, but now the tomatoes cost fifty cents and thirty minutes of my time. Personally, I am not willing to trade thirty minutes of time for three dollars and fifty cents, but in more economically challenged places, like Kigoma, people will gladly do that.

The poverty in Tanzania and Ethiopia was really hard to see. It was hard to see kids asking for money and the small shacks that people make into homes. It was hard to see the little Maasai boys herding animals and asking for water. It's simultaneously, so hard to see the desperation poverty brings and also dislike my reaction of wanting to push it away literally and in my head. My gut reaction to getting mobbed by people while walking through a market was to feel gross and try to get away, but I wish I took a mindset more like Liam's. He said this is probably the richest he would ever feel so he might as well experience it and overpay for some things he finds interesting to support a few of the local people. But, it makes me uncomfortable and I don't know what to make of all the idle people everywhere. The economy is not strong enough to support the large and rapidly growing population, so many people sit idle. There's people just roaming the streets in the middle of the day. And there seems to be five people working

in any given position where one would do, just because labor is so cheap.

Alex was providing a lot of color to all this in my conversations with him. He was saying though your impulse may rightly be to feel bad and give the begging child money, and you are welcome to do so, you will then be swarmed by a bunch of others and they'll be upset at you for giving to one and not all of them. He said everyone is just doing their best to make it and everyone has to do what's in their best interest. Alex also said that when he gets work done on his Land Cruiser, even buying the replacement parts himself, he knows the mechanic is likely just selling that part and replacing his with a cheap Chinese one. That's got to be infuriating, but what are you to do? The



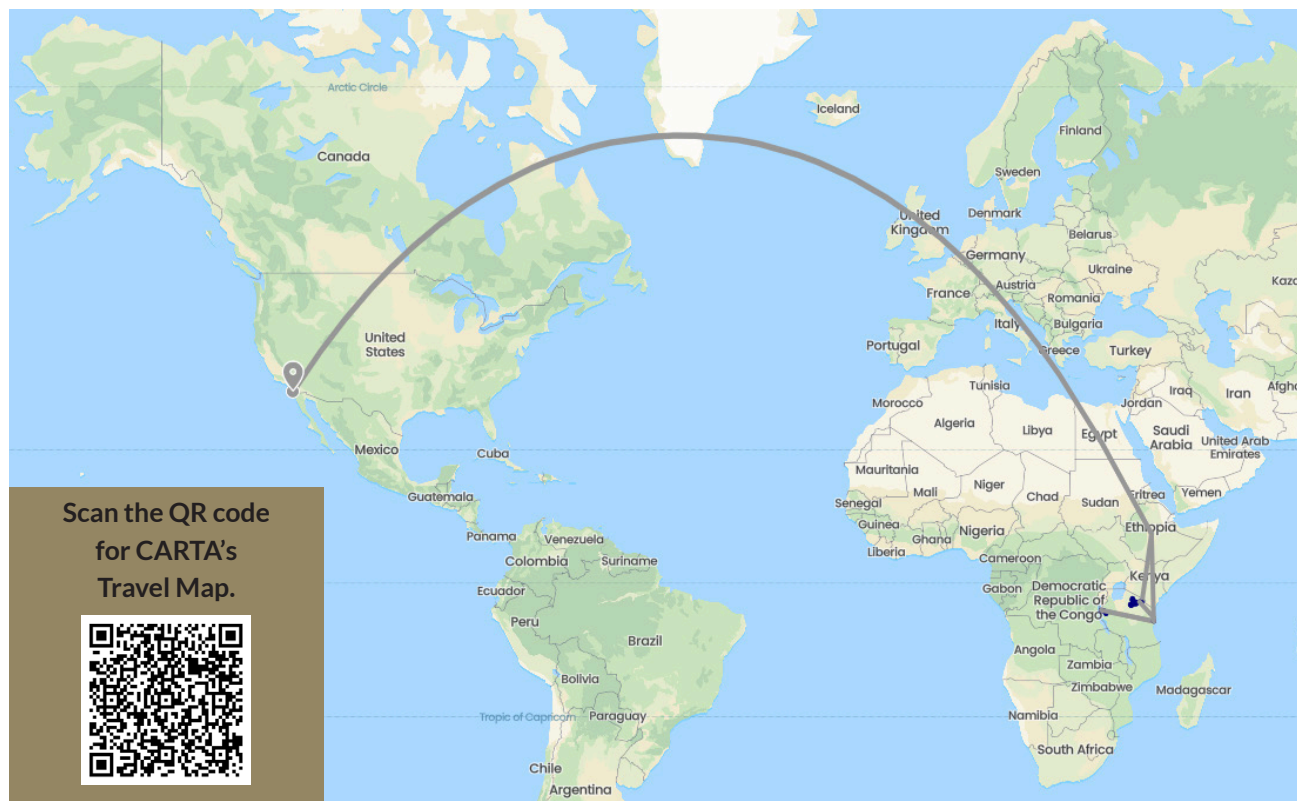
Even at markets, like this one in Kigoma, the informal economy operates on haggling. Photo courtesy of Pascal Gagneux.

cost of doing business in the informal economy is getting ripped off at times and so because of that he just bought a new Landcruiser, rather than used one so he knows it at least started with quality parts. When he gets stopped by police and has to pay them off, they're just doing so to feed their families, and their salary without the bribes isn't enough to do so. You're not going to solve anyone's problems here by giving them a few dollars once, it's a systemic issue and we don't live in an equal or just world.

Everyone is just doing their best, trying to get by. All around the world, that's what we're all trying to do. I have the privilege of also working at things I love and enjoy, but many don't. With the informal economy, folks are able to carve out a living. It still seems so foreign to me, but all the Tanzanians seemed to understand it. And it leads to some pretty beautiful things too. You can get the ripest, most delicious bunch of mangoes on the side of the street for pennies, where back home those same mangoes could be ten bucks. Everyone eats local out of necessity, not because it's trendy. If you ever need someone to do something for you, there will be plenty of help, because everyone is looking for work. And the streets are remarkably clean, because there are so many people out there cleaning them every day. As strange as it is to me, there is a lot to recommend about the informal economy. I give the informal economy three and a half stars.

CARTA's 2025 Travel Map Posts

For the 2025 Anthropogeny Field Course, CARTA created a detailed account of the entire journey, complete with story-like narrations, pictures, and an interactive map. For this report, we selected the primary locations and accounts to provide more context to the student excerpts. The adventure starts in San Diego, CA and jets the reader to Addis Ababa, Ethiopia for a visit to the National Museum, and then to a variety of locations throughout Tanzania. CARTA hopes you enjoy these posts.



The 2025 Anthropogeny Field Course travels are charted here as an overview from San Diego, CA, to Addis Ababa, Ethiopia, to numerous locations in Tanzania. Visit the CARTA "Travel Map" link above to see the detailed paths we took and for more photos!

June 29: A City Evolving

Arriving at night in Addis Ababa revealed the dramatic transformation the city has undergone since the first Anthropogeny Field Course in 2011. What was once a large but comparatively modest city 2,355 meters (7,726 feet) above sea level and nestled between the mountains of the Ethiopian highlands now teems with modern towers illuminated by fancy digital billboards, wide thoroughfares and avenues coursing in every direction, and sleek, contemporary shops and restaurants lining the streets. Yet, amid this modernity lingers poverty, grime, and decay, much of it hidden by tall corrugated metal fences. The heavy military presence, due to ongoing civil war, also marks the streets. These elements remind us that neither the past nor unrest can be erased by technological veneers. As our taxi wove through the quiet late-night streets to deliver us to the hotel, our weary, travel-worn group had its first glimpse of a city undergoing dazzling change but unable to forget its past.

June 30: A Day at the Museum

After a well-deserved but brief night's rest, the day began with an early morning run through the cool, damp streets of the city. We've found that these early morning jaunts are the best way to see an unfamiliar place as we can wake up and cover more ground, discovering what is typically missed when walking or driving. Our run took us past the African Union Building, the Royal Palace, the new Science Museum, and several locals who cheered us on.

By mid-morning, the team assembled for our first official academic adventure: a visit to the world famous National Museum of Ethiopia where experts preserve and study some of the oldest and most important fossils, both of the hominid lineage and of a diverse array of non-human animals. We were honored to meet with CARTA members Yonas Beyene (Director of the Konso Paleoanthropological Research project and project archaeologist for the Middle Awash and Chorora Paleoanthropological projects), Berhane Asfaw (former Director of the National Museum of Ethiopia, Member of the Center for Research and Conservation of Cultural Heritage in Ethiopia, Manager of the Rift Valley Research Service, and Co-Director of the Middle Awash Research Project), and Seminew Asrat (a geochemist and paleoecologist with a PhD from Sapienza University, Rome, Italy) who generously spent hours with us at the museum, including a visit to the casting lab where precision casts of important specimens are produced. They provided the students with important geological, historical, and technical background on Ethiopian paleoanthropology and then treated us with the phenomenally rare opportunity to see the real "Ardi" (*Ardipithecus radius*) and "Lucy" (*Australopithecus afarensis*) fossils.



A partial view of the sprawling modern cityscape of Addis Ababa, Ethiopia. Photo courtesy of Pascal Gagneux.

Later, we explored the vast fossil repository filled with non-human animal specimens, which provided essential context for understanding the ecology in which Ardi and Lucy lived. This repository also contained countless important stone tools that date back millions of years of human evolution. Finally, the team was greeted by CARTA member, Yohannes Haile-Selassie (Director of the Institute of Human Origins, Arizona State University), who was at the Museum conducting his summer research.



The Outside of the National Museum of Ethiopia we were struck by the presence of a Olmec stone head, which was gifted to Ethiopia by Mexico in 2010. Photo courtesy of Seminew Asrat.

TRAVEL MAP NARRATIONS

July 1: Welcome to Tanzania!

We touched down at the Kilimanjaro International Airport (JRO) at 1:30 PM; however cloudy skies prevented us from seeing the famous mountain for which the airport is named (thankfully, Pascal snapped a photo of the peak from his window seat while en route to JRO). JRO sits in the broad flatlands beneath the shadow of Mount Kilimanjaro, which rises 5,895 meters (19,341 feet) above sea level. Kilimanjaro is Africa's tallest mountain and the world's highest free-standing peak, attracting roughly 40,000 climbers from across the globe to attempt the demanding ascent to its glacier-capped summit. Known affectionately as "Kili," the mountain is a stratovolcano composed of three distinct cones: Kibo, Mawenzi, and Shira. JRO is a small but bustling safari hub about ninety minutes east of Arusha, our destination for the night. Waiting for us was our good friend, Malisa, who was hired to provide transport to our lodging, Tumaini Homestay.



The receding glacial capped tip of Mount Kilimanjaro, Tanzania. Photo courtesy of Pascal Gagneux.

July 1: Organized Chaos – Arusha

The first thing one experiences in Arusha—and Tanzania in general—is organized chaos. Things simply work, though the mechanics remain mysterious. It's prudent to just sit back and enjoy the flow of life, traffic, people walking, animals being herded, and the seemingly random shops, shacks, street vendors, and brick and hand-poured concrete skeletons of unfinished houses. The traffic will likely capture your attention first. Sure, there are rules of the road that are mostly followed, but there are also unwritten rules that will amaze. Safari trucks, tuk-tuks, boda-bodas, cars, lorries, people on bicycle or foot, and animals of diverse ilk will cut you off, go around you, nearly hit you, and generally appear as a menace to orderly organization. And yet it makes sense. It's how things work and no one gets mad or suffers from violent road rage. Life flows just as efficiently in this chaotic stream of metal and flesh. It is, oddly enough, relaxing and fun to witness.

The second revelation is the constant change in landscape. One minute you're in a flat plain with crops or grasses, and

seconds later you're in rolling hills with vegetation resembling the Yucatan. This is Tanzania—a land of countless climates and ecosystems.



The team meets Douglas and Prisca, our Dorobo safari guides at Tumaini Homestay, Arusha, Tanzania. Photo courtesy of Pascal Gagneux.

The third discovery is the warmth and friendliness of Tanzanians. As a traveler in this magical country, it is easy to smile ear-to-ear all day long. Not only do you see wonderful sights, but the people eagerly engage you with their brilliant, lively eyes and their vibrant, beaming smiles. You can't help but return their bonhomie with equal warmth and joy.

These were the students' first impressions upon arriving in Tanzania. Sure, some of the bureaucratic proceedings of customs and passport control don't make much sense, but once out in the "real world," you breathe easy in the refreshing air of this spectacular land. You are simply at home, and Tanzanians will ensure you feel every bit the welcomed family member who they haven't seen in ages. Such was our experience at our lodging, the Tumaini Homestay in Arusha. The proprietor, Andy, rolled out the red carpet of

hospitality. His mantra is that you are family and he means it.

With our every need met and our travel-weary bones settled, we eagerly awaited our safari guides, Douglas Duncan Simbeye and Prisca Sumari, who joined us for dinner to brief us on the coming adventure. Pascal and Jesse, veterans of numerous CARTA field courses, have become close friends with Douglas, as does everyone who meets him. Douglas loves his country—the land, the animals, the rhythm of nature, the mundane, the extraordinary—and he especially loves teaching visitors about the place he calls home. The students had heard stories of Douglas and quickly found that they were true to the last word, though he proved even more wonderful in person.

July 2: Prepare to be Awed – Ngorongoro Crater

We departed at 6 AM for the three-hour drive from Arusha to our first safari destination: the Ngorongoro Conservation Area, a UNESCO World Heritage Site celebrated for its spectacular wildlife and vibrant Maasai communities. At its heart lies the famous Ngorongoro Crater, the world's largest intact volcanic caldera. Within its steep walls thrives a "natural zoo"—one of the densest concentrations of large mammals anywhere on Earth—including the "Big Five" (lion, leopard, rhino, elephant, and African buffalo). Beyond its wildlife, the Conservation Area is also remarkable for its sweeping ecosystems: prime agricultural lands, dense jungle-like forests, mountain highlands, grasslands, and arid deserts, as well as archaeological sites that have illuminated early chapters of human evolution. Our purpose this day was to explore the Ngorongoro Crater and come face-to-face with the animals alongside which our species evolved.

Through the pre-dawn darkness of Arusha, our two Toyota Land Cruisers—purpose-built and modified for the demands of safari—carried our team, our luggage, and our individual and collective excitement for what lay ahead. As day took hold, the students witnessed for the first time the constant flow of change that predominates Tanzania. Arusha, damp and lush in the foothills of Mt. Meru soon gave way to the arid grasslands of the Songwe district, which then transformed into the rice fields of Mto Wa Mbu ("Mosquito River") at Lake Manyara.

At Mto Wa Mbu, we stopped to sample red bananas purchased from a roadside vendor before climbing the Eastern Rift escarpment—a dramatic cliff formed by two continental plates pulling apart. At the top of the escarpment we found yet more dramatic change: the deep green, fertile farmlands of the Karatu District, planted with maize and pigeon peas, and the jungle-like forest surrounding the Ngorongoro Conservation Area's main gate where the pavement ends. As our trucks lumbered through the gate and up the narrow, winding dirt road leading out of the forest to the top of the crater, the landscape transformed

Douglas walked us through the particulars of the safari and Hadza-visit portions of the Field Course. With the schedule and rules of conduct in place, Douglas made sure to remind us of the most important lesson: expectation is the bane of satisfaction. Yes, he and Prisca would do their utmost to find the most amazing sites and animals, working tirelessly to maximize our experience. But we must travel without our hearts set on specifics. A desperate desire to see a leopard will diminish countless other delights if the cautious cat decides not to appear. With this, we were released for bed—and for some, very late-night packing. Douglas and Prisca would return at 5:30 AM to shuttle us into the waning night for our first day of safari.



Getting close to wild zebras at Ngorongoro Crater, Tanzania. Photo courtesy of Pascal Gagneux.

once again into highland grasses, wind-swept acacias, and vast, sweeping plains.

From the crater's rim, the sheer scale of the ancient caldera was staggering: vast plateaus, the crater floor with open grasslands, a shallow but expansive salt lake, freshwater pools and streams, and scattered across it all, hundreds of safari trucks that appeared no larger than ants navigating the roads below. From this vantage, it was as if all the colors of the planet were on display. The students' anticipation was palpable as we descended into the caldera, passing a huge collection of weaver bird nests constructed by various species on countless trees. For most, this was their very first safari and their first chance to see Africa's iconic mammals and birds in the wild.

The day delivered in abundance. Herds of zebra, gazelle, wildebeest, and buffalo grazed peacefully. A serval cat darted through tall grass. Ostriches, hippos, elephants, and waterfowl, including flamingos, crowned cranes, sacred ibis, and African pelicans, appeared in impressive numbers. Lions dozed in the

TRAVEL MAP NARRATIONS

grasses, and one pair of “honeymooners” mated in the distance. Even at the crater’s designated picnic site, we spotted a rhino frolicking in a grassy hollow nearby. As we and several other tourist groups observed the rhino, the real surprise of the day was slithering closer.

The surprise was a puff adder (*Bitis arietans*)—a thick-bodied and highly venomous snake—making its way across the gravel drive toward and then beneath one of our safari trucks. As people instinctively clustered to watch and take photos and videos of the snake, its route to the grass on the far side of the truck vanished. Trapped, it did the only thing it could do to escape the encircling humans: it climbed up a wheel, across the suspension, and onto the truck’s fuel tank.

With no safe way to dislodge our uninvited passenger, we had to continue and hope that it would fall off the truck, tired of the bouncing, noise, heat, and dust of traversing the crater roads. Yet through every jolt, it clung tenaciously to its hiding spot

and remained with us as we made our way out of the crater and to our nearby campsite.



Surprise! The puff adder decided to climb the suspension of our safari truck and hide on top of the fuel tank. Ngorongoro Crater, Tanzania. Photo courtesy of Jesse Robie.

July 2: It will be Cold – The First Night of Safari Camping

Back in early June when the students were attending their pre-trip meetings with Pascal and Jesse, they were given stern warnings to pack down jackets and warm layers for this night of the course. “It will be cold,” they heard on repeat. And it was! Simba A Camp is a public campsite perched on the Ngorongoro Crater rim. It consists of a grassy field and several modest buildings with dining areas and bathrooms. Our cluster of heavy canvas two-person tents was pitched a short distance from these structures.

While we explored the caldera, our Dorobo Safari support team proceeded directly to camp. By the time we arrived at 6:30 PM, they had raised our tents, prepared dinner, and coaxed a welcoming fire to life, an essential comfort on the crater rim, which sits at 2,286 meters (7,500 feet) above sea level and experiences dramatic temperature swings between sunlit afternoons and frigid nights.

Darkness descended soon after our arrival, bringing piercingly cold, damp mountain air. We layered on warm clothes and drew close to the campfire, sharing dinner and excitedly recounting the day’s events. Before retiring, we gathered for a formal debriefing led by Douglas and Pascal. Douglas asked each student to recount their “high and low” of the day—a simple yet profound exercise that offered insight into how each person processed the extraordinary experience of inhabiting a landscape so central to human origins.

Fed and weary, we slipped away to our tents one by one for our first night in the Tanzanian wilderness. Sleep came in fragments, punctuated by the distant roar of lions, the eerie

laughter of hyenas, and the steady cropping of zebras, cape buffalo, and water buck just beyond our canvas walls.

Morning arrived cloaked in gray fog and biting cold. We rekindled the fire to thaw our bones and heat water for coffee and tea. A quick check under the Land Cruiser revealed our unexpected serpent companion still curled stubbornly in place. With cautious respect, we left it undisturbed, broke camp, and packed the vehicles. Soon we were rolling again, bound for our next destination: the legendary Olduvai Gorge.



Top: Staying warm at sunset. Bottom: A damp and cold morning. Both photos at the Simba A Public Camp, Ngorongoro Crater, Tanzania. Photos courtesy of Pascal Gagneux.

July 3: Dry as a Bone – Olduvai Gorge

The trek down the western face of the Ngorongoro highlands offered yet another example of Tanzania’s striking environmental diversity. The cool, grassy highlands, dotted with Maasai bomas and herds of cattle and goats, gradually gave way to rocky, whistling thorn acacia-speckled foothills, which then yielded to the parched, dusty flats of the southern Serengeti. Our goal this day was to visit the Olduvai Gorge Museum and the gorge itself, followed by explorations at Nasera Rock and the nearby Magnetic Shifting Sand Dunes.

Olduvai Gorge ranks among the world’s most important paleoanthropological sites. Within the ravine, seasonal torrents of rainwater from the nearby Ngorongoro highlands expose geological layers containing extraordinary evidence of animal and human evolution spanning nearly two million years. It was here, in the mid-20th century, that Louis and Mary Leakey discovered fossils of *Homo habilis* (about 2.0 million years ago), *Paranthropus boisei* (about 1.8 million years ago), and an astonishing array of stone tools belonging to the Oldowan and later Acheulean industries of *Homo erectus* and early *Homo sapiens*. Over the decades, thousands of animal fossils have also been uncovered, documenting the shifting ecosystems in which early humans lived. Even today, Olduvai remains an active research site, its eroded ravines continually revealing new windows into the deep past. When we arrived, no excavations were in progress, but we met with an Olduvai Gorge Museum docent at the very site of the Leakeys’ discoveries and then toured the museum’s exhibits.

July 3: The Isle in the Plain – Nasera Rock

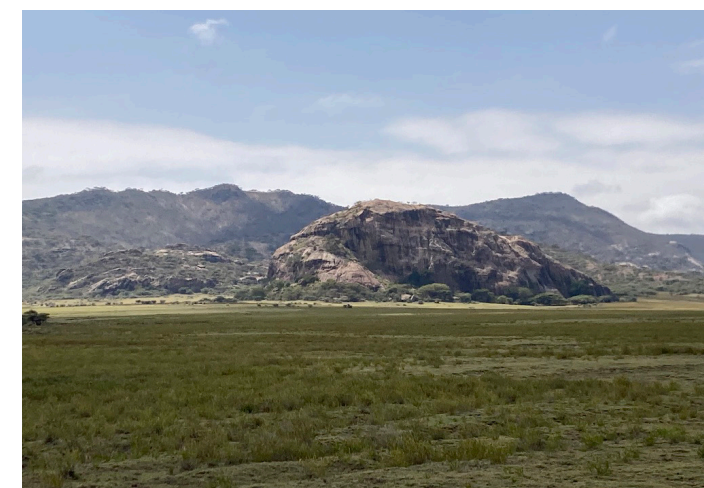
Located 20 kilometers north of Olduvai Gorge is Nasera Rock, a dramatic inselberg (an isolated rock hill, knob, ridge, or small mountain) that rises 50 meters (165 feet) above the surrounding Serengeti plains. The natural striped coloration of the rock, combined with ancient paintings in a prehistoric shelter at its base, are believed to have inspired its name, which was derived from the Maasai, Naasira, meaning “striped, written, or drawn.” Here, we discussed the local history of human occupation of Nasera Rock, and its geologic and Paleolithic significance.



In Olduvai Gorge at the location where the Leakeys discovered the first specimens of *Paranthropus boisei* and *Homo habilis*. Photo courtesy of Pascal Gagneux.



Overlooking the Gorge at the Olduvai Museum. Photo courtesy of Pascal Gagneux.



Nasera Rock. Photo courtesy of Pascal Gagneux.

TRAVEL MAP NARRATIONS

July 3: The Sands of Time – Magnetic Shifting Sands

A short drive from Nasera Rock and just north of Olduvai Gorge, lie the Magnetic Shifting Sands, a rare natural phenomenon formed from iron-rich volcanic ash deposited during eruptions roughly 3,000 years ago. The fine, black sand is magnetized and clumps together, allowing the entire dune to move gradually westward across the plains, pushed by the prevailing winds. The dune creeps at an average rate of 15 to 29 meters per year, leaving a trail that marks time's passage across the Serengeti.

By late afternoon, we were back in our Land Cruisers retracing our path to the crater rim, then down through the jungle slopes to the Ngorongoro Main Gate. We were on a time crunch as we needed to exit the gate by 6 PM – a feat we managed by three minutes. At the gate, Douglas discussed with rangers our stowaway, the stubborn puff adder still lodged under one of the trucks. At first skeptical, the rangers crouched to look, only to leap back in alarm when they realized the story was true. They quickly decided they wanted nothing to do with the snake



The group posing in front of the Magnetic Shifting Sands. Photo courtesy of Pascal Gagneux.

and instructed us to carry on with our unwelcome passenger. And so, with our serpentine companion still hidden aboard, we proceeded to our campsite on the outskirts of Karatu, a bustling town just down the road from the gate.

July 4: How to Haggle – The Karatu Market

Tanzania's economy is primarily centered around tourism and, as such, tourists are seen as vital opportunities for income. On this morning, we visited the lively Karatu Market, a vibrant mix of everyday local trade, such as produce stalls and butcher shops, alongside alcoves aimed squarely at tourists. No matter the goods on offer, buying and selling here is as much performance as transaction, and participation in the art of haggling is expected.

For tourists, the first price quoted is often doubled, so you must calculate in Tanzanian shillings a ridiculously low price and offer it with feigned disinterest. You don't want the seller to see your feverish excitement over the product in question. A good place to start is by offering half, or even less than half, the asking price. The seller will dance with incredulous outrage at such an impossible price, but they will counter with a slightly better offer. What follows is a lively back-and-forth of counteroffers, laughter, and mock protest until, at last, both parties arrive at a "fair" number—one that leaves the seller with a healthy profit and the buyer with the satisfying illusion of victory.

Our visit to the market had two goals: to purchase practical supplies for our upcoming time with the Hadza, and to collect keepsakes of our journey. We split into small groups, each accompanied by a veteran of the field course to help navigate the labyrinth of stalls and the unwritten rules of bargaining. Beyond the thrill of the trade, though, the market offered

something more profound: a glimpse into the daily rhythms of local life and a perfect overview of local crops of fruits, vegetables, grains, and pulses. The market buzzed with constant motion, serving not only as an economic hub but also as a vital social crossroads for both residents and travelers passing through.



Mika Caplan poses in front of one of the entrances to the vegetable section of the Kigoma Market. Photo courtesy of Pascal Gagneux.

July 4: How to become Infamous – Snake Stop (Take 1)

Imagine heading to your job on the coffee plantation and stumbling across a group of tourists depositing a venomous snake right next to the rows of plants you tend. You probably wouldn't feel too great about that situation. Well, that's exactly what happened.

After leaving the Karatu market, we took the T K Eyasi Road out of town as it is the only route from Karatu to Hadzaland. En route, the field course has traditionally stopped at a secluded coffee plantation to discuss geopolitics, land rights, and the situation of the Hadza. The spot is usually serene and disturbance-free. But not this day.

We arrived at the usual pull-off and parked the trucks on the trail under the Australian silver oak (*Grevillea robusta*) trees that shade the coffee plants. We decided this would be the best opportunity we'd get to finally evict our uninvited guest. At the Karatu market, we had purchased a wooden mpekecho, a kitchen implement used to mix uji (finger millet porridge), that we hoped could double as a snake-wrangling stick. Pascal modified our tool into a makeshift pole, and, miraculously, it worked. Within seconds the puff adder was coaxed off the fuel tank and onto the ground. Unfortunately, a plantation worker chose that exact moment to drive by on his motorcycle and saw us wrangling the adder. He stopped, wide-eyed with amazement, made a phone call, and drove off.

We began our meeting about the Hadza and land rights issues and within minutes, more motorcycles began to arrive until the whole of the village council was there to see the serpent. They were not pleased with us and gave us the option of recapturing the snake and taking it with us or they would "dispose" of it (an option we knew the snake would not like). So, we improvised a snake containment unit out of a medium-sized canvas trash bag, and using our snake stick, we carefully guided our snake friend inside. Prisca bravely tied the opening shut and then lashed it to the back of the truck, dangling off the accessory shovel handle. There the snake remained, riding with us for the next four hours until we could find a safe new home.

With our successful recapture, the village council clapped and cheered before departing as quickly as they came. We like to joke that our misadventure has entered the myths of the village and they tell inflated tales of how the council defeated a band of villainous outsiders and their ferocious venom-spitting death serpent.



Pascal, using the improvised mpekecho snake-wrangling stick, fishes for our traveling snake friend. Photo courtesy of Douglas Duncan Simbeye.

July 4: A Picnic Among Deadly Flowers – Maji Moto

We descended the last slope of the Ngorongoro highlands and motored past sprawling onion fields that perfumed the air with that unmistakable onion smell. In the baking sun, laborers tended to the rows of dark green shoots as the tires of our Land Cruisers churned up clouds of reddish dust. On we continued and slowly the fields gave way to the parched, rock-hewn, and scrubby flat lands of Mang'ola, a ward of the Karatu District, that is situated at the north eastern reach of Lake Eyasi. Lake Eyasi, the largest body of water in the in the Arusha Region, is shallow, alkaline, and highly seasonal, swelling with the rains only to contract dramatically during the dry months. Its shores and surrounding lands encompassing the nearby Yaeda Valley are part of the traditional home range of the Hadzabe, one of the last remaining forager societies on earth. Our mission today was to traverse the extensive range and meet a group of Hadza at a region of Yaeda Valley called Yaeda Chini. These Hadza still live mostly traditionally, and over the next two days we were to live with and learn from them. We still had hundreds of kilometers and many hours to go before we would reach our campsite. At

TRAVEL MAP NARRATIONS

this point in our journey we were seeking Maji Moto, an area of the lake with natural hot springs where we planned to have our lunch break. In Swahili, maji means “water” and moto means “hot”—an apt name for this unusual oasis.

Our arrival at Maji Moto was without fanfare as there were but few people about in the midday heat. Maji Moto is situated along the fringe of the lake, which itself had receded, leaving behind a rippling crust of cracked mud that bore witness to the water’s shifting edge. We found shade under a small and twisted acacia tree that managed to eke out life in the inhospitable landscape and quickly set up tables on which we prepared and ate our lunch.

A short walk from our lunch spot was an “island” of beautifully smooth boulders and larger shade trees. Around the island’s base, warm water bubbled up from underground and pooled into shallow basins rich in algae. On the island itself was evidence of a recent refuge - the ash from a campfire was nestled next to a large vertical boulder that provided protection from the elements. One can imagine weary travelers in centuries past, and even our distant ancestors

millennia ago, finding respite on the island.

But it was not the hot spring or the bucolic imagination of weary people seeking shelter on the island that was significant. It is a special flower we found there, *Adenium obesum*, or desert rose. Its squat, swollen trunks and spindly branches, tipped with delicate pink and white blossoms, peppered the rocky island with flashes of color in an otherwise sepia-toned world.

For the Hadza, the desert rose is not just ornamental, but it is an important part of their survival toolkit. The pulp of the desert rose contains mixtures of potent cardiac glycosides with no known antidote. The Hadza process this pulp into a thick, brown, paste, often mixed with powdered seeds from *Strophanthus eminii*, a member of the dog bane family, that they apply to their hunting arrows. How the Hadza first discovered this lethal property is a mystery, but the knowledge has been preserved for generations and passed down orally from one hunter to the next. For our students, this encounter with the desert rose was more than a botanical curiosity. It was an introduction to Hadza ingenuity and their sophisticated knowledge of their homeland.



Maji Moto as seen from the island of rocks. Photo courtesy of Pascal Gagneux.

July 4: Goodbye, Lucy – Snake Stop (Take 2)

After lunch at Maji Moto, we continued southward along the eastern shore of Lake Eyasi. The landscape here felt almost lunar. It is flat, it is dry, it is desolate, it is dry as bone. It seemed impossible that anything could survive in such a barren, desperate, and harsh expanse. Yet life endures and the Hadza themselves manage in this marginal environment.

After what seemed like several hours in this desolation, we turned eastward and out of Eyasi’s dry basin toward Yaeda Valley. As we ascended the ridge that divided Lake Eyasi and Yaeda Valley, the emptiness suddenly gave way to woodland and our road became little more than a winding track weaving around rocks, acacia, and majestic baobab trees.

Eventually, we came to a water crossing - a small but flowing stream. It was here that Douglas suggested we attempt a second

try at rehoming our friend. After our first rehoming attempt, the snake had been affectionately named Lucy by the students. While Lucifer was the inspiration for the name, it became clear by the snake’s rather pleasant demeanor during its trials and tribulations with us that it deserved a kind name. So we brought Lucy, packaged safely in the garbage sack, near the stream and let it go. This time Lucy seemed much happier in this setting and glided away into the underbrush.

We had grown fond of our limbless friend and felt it was our responsibility for its safe return to freedom. With our goodbyes to Lucy said and wishes for safe and happy life given, we took advantage of the opportunity to rehearse a song and dance (this will come into play later in our adventure) before continuing on.



Lucy being released by the very brave Prisca Sumari. Photo courtesy of Pascal Gagneux.

July 4: Prepare Your Minds for Maximum Amazement – Hadza Campsite 1

With Lucy safely re-homed, we pressed on toward our destination in the eastern ridges of Yaeda Valley. Our home for the next two nights would be a campsite in the wilderness near the village of Yaeda Chini. Yaeda Chini is part of the home range of the Hadzabe but now also hosts a settlement of other tribes and major conservation and cultural preservation initiatives, including a community-led REDD+ project and a UNESCO-supported program to protect the Hadzane language and traditional tracking knowledge.

As we entered the broad Yaeda Valley, we were surprised to find that heavy rains in recent years had transformed what was seasonal marshland into an extensive lake. We skirted around its southern periphery, driving past fields of bottle gourds (possibly one of the first domesticated plants), and then up along the eastern shore where the road took us past makeshift villages composed of tarpaulin-covered shelters and patchwork markets. Water provides incredible habitats for all manner of life but also represents economic opportunity and thousands from across Tanzania had come to fish and sell their catch, which is smoked on top of adobe kilns.

Such settlements also come at a cost. If the lake dries, these communities will vanish and leave behind mountains of trash

and ecological damage. In the meantime, their presence places immense pressure on the Hadza, who rely on the valley’s woodlands and plains for hunting and gathering. Competition for resources, coupled with the introduction of alcohol, drugs, prostitution, and disease threatens to accelerate the erosion of Hadza life-ways already under strain.

By now, the day had slipped away and the setting sun briefly painted the sky in brilliant orange before extinguishing. Our progress was slowed by the growing dark and washed-out bridges and gullies carved by monsoonal floods that forced detours and tentative crossings. It was 8 PM when we finally spotted the faint side-track that led into the woodland and to our designated camp. We were dusty, road-weary, and grateful the long drive was over. But we were nonetheless lifted in spirit by the sight of the Hadza who were to be our guides during our stay. Names were exchanged and greetings offered in rapid fire as we stumbled in the darkness to find our tents, already pitched by the Dorobo advance team. Dinner was shared around a campfire set at the base of a massive baobab tree, where Douglas and Prisca translated between us and our Hadza companions. The firelight flickered across faces old and new, bridging two vastly different cultures divided by language but drawn together by shared humanity and curiosity.

TRAVEL MAP NARRATIONS

The next morning, July 5th, revealed our first daylight view of Hadzaland. Dominating the otherwise typical but beautiful East African woods were massive baobabs, which have stood sentinel for hundreds of years. There was an approachability to this landscape but also a palpable sense of sacredness as this land had sustained and borne witness to the Hadza for at least 100,000 years. To add perspective, it is thought that the first migrations of modern humans to leave Africa began ~70,000 years ago. While new populations were established across Europe, Asia, Oceania, and the Americas; while agriculture and domestication fed the first major civilizations in Mesopotamia; while the age of exploration, colonization, and slave trade forever changed the world; while countless wars were fought; while trains, cars, planes, rockets, satellites, nuclear technology, and computers brought us into the anthropocene—the Hadza were right here in this incredible land. And during this time under Hadza care, the land has remained alive, healthy, and productive—a stark contrast to the overworked agricultural lands across the world where fertilizers are required to sustain crops. Sadly, the Hadza way of life is under great pressure from numerous outside influences that erode their home range and culture.

We witnessed this erosion at the Hadza encampment we visited this day. Traditionally, the Hadza are nomadic and only stay in a location for a few months so the land isn't over taxed and able to replenish resources. However, the encroachment of pastoralist tribes, such as the Datoga (who were displaced by their more powerful neighbors, the Maasai), has severely reduced their traditional home range, and settlements and tourists, such as ourselves, have radically altered their culture. We were dismayed by the new power line that decorated the skyline above, the trash piles of plastics dirtying the ground, and the chickens that rooted for food in the encampment. The time of the traditional Hadza way of life is fast approaching an inevitable end.

After greetings were given, a group of Hadza women led us into the woods to teach us how to forage for tubers. Where we saw only scrub and trees, they read subtle signs in the vegetation and used rhythmic taps of their digging sticks to locate buried tubers. The students joined in and helped excavate the roots until we had assembled a generous pile. The Hadza men then



Lora assists with digging for tubers. Photo courtesy of Pascal Gagneux.

demonstrated how to kindle fire by spinning an arrow shaft against a wooden base until friction generated enough hot wood dust to coax an ember into life. The ember was fed into a bundle of dried grass to mature into flame and soon a simple ground fire roasted our tubers. With blackened skin and steaming hot, the tubers burst with moisture and flavor. It is a simple yet nourishing food that has sustained the Hadza for millennia.

After we returned to our camp site, we received a lesson in arrow making. Hadza men prepared branches of *Grewia*, a relative of the crossberry bush we can find in La Jolla, by heating them in the hot ashes of the campfire to make peeling the bark easy and to make the wood pliable. They demonstrated how to trim off knots and reduce the branch to the desired thickness using a knife. They then straightened each shaft with careful counter-bending, using fire for heat and their teeth as clamps. By sighting down the length of the shaft, they judged where adjustments were needed until each was perfectly true. Decorative etchings were cut with blades and then rubbed with ash for contrast. Finally, feathers from guinea fowl (*Guttera edouardi*), or other birds, including the endemic Tanzanian spur fowl (*Pternistis rufopictus*), were fletched onto the shafts, bound with animal tendon softened in the mouth (the tendon dries tightly around the fletching and arrow shaft, eliminating the need for knots). The result was an elegant arrow as a gift to each of us that were both functional tools and works of art.

July 6: The Great Gideru Ridge – Hadza Campsite 2

We awoke to a glorious morning in Hadzaland, the air cool but the sky promised heat later in the day. After a quick breakfast, we dismantled our camp and gathered to discuss the hike ahead. The plan was ambitious: we would spend the next four to five hours crossing the breadth of Yaeda Valley to Gideru Ridge, the long escapement that lined the western side of the valley. We would be exposed to the elements—and realities of being on foot in the wilderness—guided by several younger Hadza men who would serve as our protectors.

We left camp in a single file procession with Hadza bookending our group to keep us safe and on track. Our path took us down and into the flat of the valley. At first, the vegetation was dense, dominated by acacia and towering baobab. But soon the woodland gave way to more open country, where succulents, tall grasses, and low-growing *Grewia* bushes prevailed, punctuated here and there by isolated acacias and Baobab. From this flat we could see Gideru Ridge, which loomed in the distance, rising above the other side of Yaeda Valley and tall against the horizon. Gideru Ridge is a significant geographical and cultural location in Tanzania, known for its beautiful views, cultural importance to the Hadza, and role in local conservation efforts. It is part of the Yaeda Valley region and is recognized for its natural beauty, especially during sunset, and is protected under land tenure rights.

As we walked, the Hadza reminded us that the valley is never empty. We sampled the tart sweetness of *Grewia* berries and cracked open baobab seeds, tasting the sharp, citrus-like pulp. Opportunistic as ever, the Hadza scanned for game along the way, pausing to take aim at a distant gazelle or bird. Our noisy march made stealth impossible, and the animals were safe from us that day. Eventually, our path crossed into grazed and cultivated land, taking us past simple mud huts, herds of goats and cattle, and squash and bottle gourd fields—signs of expanding pastoral and agricultural communities pressing into what was once exclusively Hadza territory. It was difficult not to wonder how the Hadza feel watching their homeland shrink under the weight of encroachment. Their patience and adaptability are remarkable, but the pressures are unmistakable.

By mid-afternoon, we had reached the base of Gideru Ridge and



One last group photo with our incredible hosts. Photo courtesy of Douglas Duncan Simbeye.

paused for a short rest before beginning the ascent. The climb was steady, following a narrow, winding footpath to the summit. It was there that we found our new campsite tucked between two impossibly large rocks, and where another group of Hadza awaited us as hosts. After settling in, we scrambled onto the largest of the immense rocks where we watched the sun set in brilliant orange and violet. Simultaneously, a drongo bird (*Dicrurus adsimilis*) vocalized on a nearby branch. These all-black birds have “v” shaped tails and are infamous for mimicking the alarm calls of other species in order to scare away the birds and steal food left behind (one of the rare examples of prevarication in non-humans). There, we discussed plans for the following day. Pairs of students would be joined by a Hadza hunter to experience firsthand the skill, patience, and knowledge that help sustain their foraging life.

The next morning began in darkness as we prepared for the hunt. The fire was stoked, tea and coffee were sipped, and we readied our water supply before the first hints of dawn stretched across the ridge. As the sun rose, the hunting parties departed one by one, fanning out into the wilderness with anticipation. However, success was not expected as our presence was hardly subtle. Still, our Hadza guides treated the exercise with seriousness, moving silently, scanning the distance for movement and reading tracks that were laid down on the earth. Against the odds, several groups returned with pimbi, or rock hyrax (*Procavia capensis*), a small, rabbit-sized mammal that lives in rocky crevices. Despite its appearance, the hyrax is the closest living relative of elephants and manatees, sharing unique

dental and foot structures. These animals also carry their own strain of tuberculosis-related mycobacteria. The Hadza quickly butchered and roasted several of our catch over open flame and offered us a taste of liver.

Later in the day, the camp shifted to more settled rhythms of craft and instruction. The Hadza men demonstrated how to cold-forged arrowheads from nails, hammering them against a hard basalt stone using a small metal mallet and a metal chisel until they formed lethal points. The Hadza women, seated in a small circle, showed us how they craft beaded necklaces and bracelets. An archery contest followed, where each student was taught how to nock an arrow and draw and release the bow. Our clumsy attempts were met with laughter and patient correction.

That evening, dinner featured pimbi stew, complemented with other staples for those less inclined toward game meat. Afterward, the night exploded into music and movement. Around the fire, the Hadza led us in an extensive song and dance session, voices rising in call and response, feet stomping in dust, hands clapping in rhythm. Students and Hadza alike moved together, dissolving barriers of culture and language in a shared celebration of life. The Hadza humored us by cheering our attempt at performing a song and dance for them. But it was really they who filled the night with their traditional songs and even Hadza rap!

When at last we retired to our tents, we did so weary but exhilarated. The day had been long and demanding, yet it had offered us rare glimpses into a way of life at once fragile, resilient, and profoundly connected to the land. The true weight of what we had just experienced would not be felt until the morning.

The air permeated with our collective and quiet disappointment as we broke camp in Hadzaland for the final time. Our departure was imminent but none truly wanted to leave. To experience

this landscape and these people is to undergo an immediate and indelible transformation that is impossible to explain to those who have not walked here. You begin to question everything you know about life in the so-called “western industrialized world,” a life that now feels imaginary and impossibly out of step with the natural order.

The Hadza seem to inhabit an alternate reality and you wonder if theirs is the one we should all be living in. It feels truer to the human story and is a way of life, or something very much like it, that nurtured our species for most of its existence. In that light, it is not the Hadza who are unusual. It is us, those who live in concrete and metal forests, surrounded by plastics, silicon, and synthetics, that are the anomalies. And yet, it would be a mistake to romanticize the Hadza as a perfect window into human evolution. They are not living relics or fossilized embodiments of the past. They are complex modern human beings, just as we are. And like us, they can be many things at once. They can and do inform anthropologists about past and present realities of foraging societies, deepening our understanding and appreciation of survival in the East African Rift complex. They are imbued with a grace, fearlessness, and essence that captivates, while also being fully relatable as people with humor, opinions, depth, and phenomenal style.

We rode in silence as our trucks strained over the rough and washed-out track descending from Gideru Ridge and back toward the new lake in Yaeda Valley. No one wanted to say goodbye to our Hadza companions and no one wanted this chapter of discovery to end. For the students who experienced the Hadza for the first time, the weight of the moment was even heavier. They had just spent time with one of the last remaining forager societies on Earth—a people whose way of life they are unlikely to experience again. Whether by lack of opportunity to return, or because the Hadza as they are today will inevitably disappear, this farewell had the gravity of finality.

July 9: Just Trust Me, Good Things are Coming – Tarangire National Park

And so, with heavy hearts, we left Hadzaland behind. Our convoy hugged the lake’s edge, retracing part of the southern shoreline before veering east onto a dirt road that wound its way out of Yaeda Valley and up towards the Mbulu highland. The scenery shifted with every mile as sparse woodlands gave way to ever increasing patchworks of fields and villages. Soon the track entered Mbulu, a region of steep, terraced slopes where generations of farmers have carved out areas for cultivation. It was here that the road turned to pavement, which we all appreciated as the descent from Mbulu is notoriously sharp and demanding. The transition from the highland to the lowland is oddly abrupt with no foothills to temper the way up or down. Once in the flats, we pressed on through Magara, a town perched near the southwestern shore of Lake Manyara, surrounded by

rice and sugar cane fields. We were getting closer and closer to the next stage of our journey, Tarangire National Park.

Tarangire National Park is located in the Manyara Region and named after the Tarangire River, which provides a crucial water source during the dry season. The river draws animals from across the region, transforming Tarangire into one of East Africa’s great seasonal refuges. The park covers roughly 2,600 km², making it Tanzania’s sixth-largest, and is celebrated for its large elephant herds, as well as for the dramatic influx of migratory wildlife. At the height of the dry season, as many as 250,000 animals converge here, including wildebeest, zebra, buffalo, antelope, and numerous predators.



Good timing and good luck conspired to place us in front of this lounging leopard at Tarangire National Park. Photo courtesy of Jesse Robie.

Including Tarangire in our itinerary was a deliberate choice to bolster the ecological aspect of anthropogeny training as human origins cannot be separated from the ecosystems that sustained and shaped our ancestors. In 2022, the Field Course skipped the Hadza section due to Covid-19 concerns and instead made a short visit to Tarangire and we discovered it provided an unparalleled opportunity to observe ecological dynamics in greater content and closeness than the Ngorongoro Crater. So, in planning the 2025 course, we agreed the park had much to offer our students as it was a chance to immerse them in another dimension of Tanzania’s living environment. Tarangire did not disappoint.

It was late afternoon when we rolled through the gates of Tarangire, and it was as if the park had conspired to welcome us. Almost immediately, we were treated to rapid fire sightings: baboons grooming in roadside troops, bands of mongoose darting in and out of their termite mound hollows, birds flittering about in every direction, elephants lumbering through the brush, giraffes stretching impossibly long necks to collect the high acacia leaves, gazelles grazing and bounding gracefully, buffalo with grumpy faces, and lions splashing about in the river. Perhaps most exciting of all was the elusive leopard high above us on a thick branch of a sausage tree (*Kigelia africana*). The sheer volume of animals we saw was astounding in the compression of our short evening game drive. The lingering melancholy from leaving Hadzaland had given way to sheer joy and awe at this living parade of creatures.

But our window for wildlife viewing quickly closed as dusk started. So we made our way to camp, which was in a delightful grassland inside the park. Once again, the Dorobo staff had prepared everything for us with our tents neatly erected, the campfire blazing, and dinner ready. Under the canopy of stars, we ate and laughed, grateful for one more night immersed in the Tanzanian wild.

Determined to make the most of our final hours, we rose long before dawn the next morning. Our headlamps flashed in the dark as we busily packed our tents for the final time. All night, the soundscape had been alive with the yips of hyenas and roars of lions, and as we packed camp, a park ranger hurriedly drove in and warned us of an approaching male lion. Skeptical, we scanned the grasses with our lights but saw nothing and resumed our packing. Perhaps, in our short time on safari we had become jaded to the potential dangers. Thankfully, we did not receive the uninvited visitor.

With the camp broken down for the final time, this being the conclusion of our safari, we snapped a quick group photo and set off to see what the night delivered and morning had in store. And wouldn’t you believe it, the ranger had been right! A short distance from camp we found a single male lion walking through the tall, dewy grass toward a termite mound. He climbed the mound, scanned the landscape with regal authority, issued a few low grunts, and then lay down.

Further along, we crossed paths with three spectacularly massive elephants. The behemoths, with feet the size of tires,

TRAVEL MAP NARRATIONS

were eerily silent as they as they moved through the bush and across the road just in front of us. The rest of the morning was filled with countless birds, giraffes, gazelles, and more lions. Everywhere we looked, the land offered plenty and showcased its vitality.

By noon, it was time to depart. As we drove out of the park, we were struck by the sudden and striking change between the lush, balanced ecosystem of Tarangire and the scarred, overgrazed, and overworked farmland next door. The contrast was sobering: where nature was left to itself, it thrived in harmony, and where humans imposed agriculture, the land suffered. One couldn't help but reflect back to the Hadza and their stewardship of the land in which they reside.



Who says cats hate water? Playful lions at Tarangire National Park. Photo courtesy of Jesse Robie.

July 10: A Dark Legacy in the Shadows of Paradise – Zanzibar

Welcome to Zanzibar! Ok, no feet actually touched the ground here, as it was a simple stop-and-go while en route to Dar es Salaam. Despite this, the historical significance of this archipelago, composed of the islands Unguja (often called Zanzibar Island) and Pemba, is worthy of reflection.

Situated about 25 miles off the coast of Tanzania, the Zanzibar of today is a blend of its history and heritage as a former political and trade powerhouse, its vibrant cultural fusion of African, Arab, Persian, and Indian influences, its tropical beauty, and its modern tourism-centered economy. Visitors are drawn to the unique architecture of Stone Town, the white sand beaches, and the brilliant coral reefs, often sojourning here for rest and renewal before or after a safari or climbing Mount Kilimanjaro.

Called the “Spice Islands,” Zanzibar once stood as the economic and political heart of the western Indian Ocean between the 17th and 19th centuries, producing cloves, nutmeg, cinnamon, and black pepper for global markets. However, there is darker legacy as Zanzibar was also a major ivory exporter and the

epicenter of the East African Slave Trade. Older than the Atlantic Slave Trade, the East African Slave Trade lasted from the 8th century to its abolition in 1873. Over the centuries, millions of enslaved Africans taken from modern-day Tanzania, Malawi, Mozambique, the Congo, and Zambia were sold through Zanzibar's markets and shipped to Arabia, Persia, and India. This legacy will surface again later when the Field Course passes through Uvinza, a small town on the western side of Tanzania. The active salt mines of Uvinza were once worked by enslaved people captured in the Congo and forced to march across Tanzania under brutal conditions carrying salt for the Zanzibar ports. The journey was so deadly that, according to accounts, skeletons of the enslaved once marked the route.

As travelers and educators, it is vital to engage with these histories, especially when they contrast the apparent beauty of the present. The Anthropogeny Field Course students were challenged to counter the romanticization of today's tropical paradise with the legacy of terror, enslavement, and death for millions of Africans.

July 11: Pouring Salt on the Wound of History – Uvinza

Our touchdown at the quaint Kigoma airport (TKQ), a place imbued with the spirit of the frontier, brought a renewed sense of adventure. Here, the Field Course not only entered new territory but also shifted to a new purpose. Our mission: to engage in comparative primatology by observing and participating in the field research of wild chimpanzees and red-tailed monkeys. But first, we had to make the long drive from Kigoma to our destination deep in the Tanzanian bush. We piled our bags and ourselves into the waiting Land Cruisers and sped southeast toward Issa Valley and the Greater Mahale Ecosystem Research Conservation (GMERC) project site,



The Uvinza chumvi (salt) evaporation pools and workers tending to piles of salt. Photo courtesy of Pascal Gagneux.

seemingly engaged in a four-hour race against the sinking sun to reach camp before dark.

Along the way, the paved road from Kigoma passed through Uvinza, a town once tied to the Arab-led East African Slave Trade. Historically, enslaved people captured in the Congo crossed Lake Tanganyika and were marched to Uvinza where salt from its ancient mines was loaded onto their backs for the long journey toward the markets of Zanzibar. The contrast between past and present Uvinza is both striking and tangible. The Uvinza of today is small and nestled in a shallow valley along the Malagarasi River. The unmistakable salt mine that once

relied on slaves is still active and dominates much of the valley. Long conveyor belts stretch skyward and spill cascades of white crystals into large piles and beyond are large but shallow pools of shimmering salt water, each in a different stage of evaporation. Here, salt is drawn from deep underground by pumping in hot, fresh water to make a brine that is pumped back to the surface to dry slowly under the equatorial sun.

With Uvinza in the rearview and the Malagarasi crossed, the smooth pavement abruptly ended and the now rust-red earth track synonymous with Africa criss-crossed ribbon-fashion up and out of the valley.

July 11: Field Primatology – Issa Valley and GMERC

The race against the sun to reach Issa Valley and the GMERC site ended in a draw between the last of the dying rays of light and our arrival at the turnoff that would take us to the camp. As dark settled in and the relative-ease of the brick-red dirt road now a distant memory, the beams of light broadcast from our trucks lit the way as we crawled for three-miles on the off-road drive. Our course followed a sandy double track that twisted over scabbly rock outcrops, around sharp corners framed by slender yet towering trees, and steadily downward into the depths of the wild. The jostling, the bumps, and the bouncing reached their crescendo as we crossed over rutted channels carved through solid rock by a natural spring. And with that, the final turns brought faint camp lights into view. We made it, finally.

In a flurry of action, lit by the solemn glow of several distant LED lights and the blinding beams of headlamps, we danced between the giving of greetings and the unloading of bags and supplies from the trucks. Our Field Course team intermingled with GMERC camp staff, the field assistants, and several resident researchers who gathered to welcome us. Amid the bustle, the Field Course students stood wide-eyed, their faces displaying shadowy moments of bewildered wonder. In this limited light, they could see only fragments of the impressive camp—an oasis of safety and civilization in a wilderness shared with all manner

of unseen creatures and dangers. They would not get to see their new home in full until morning, but for now they were shown



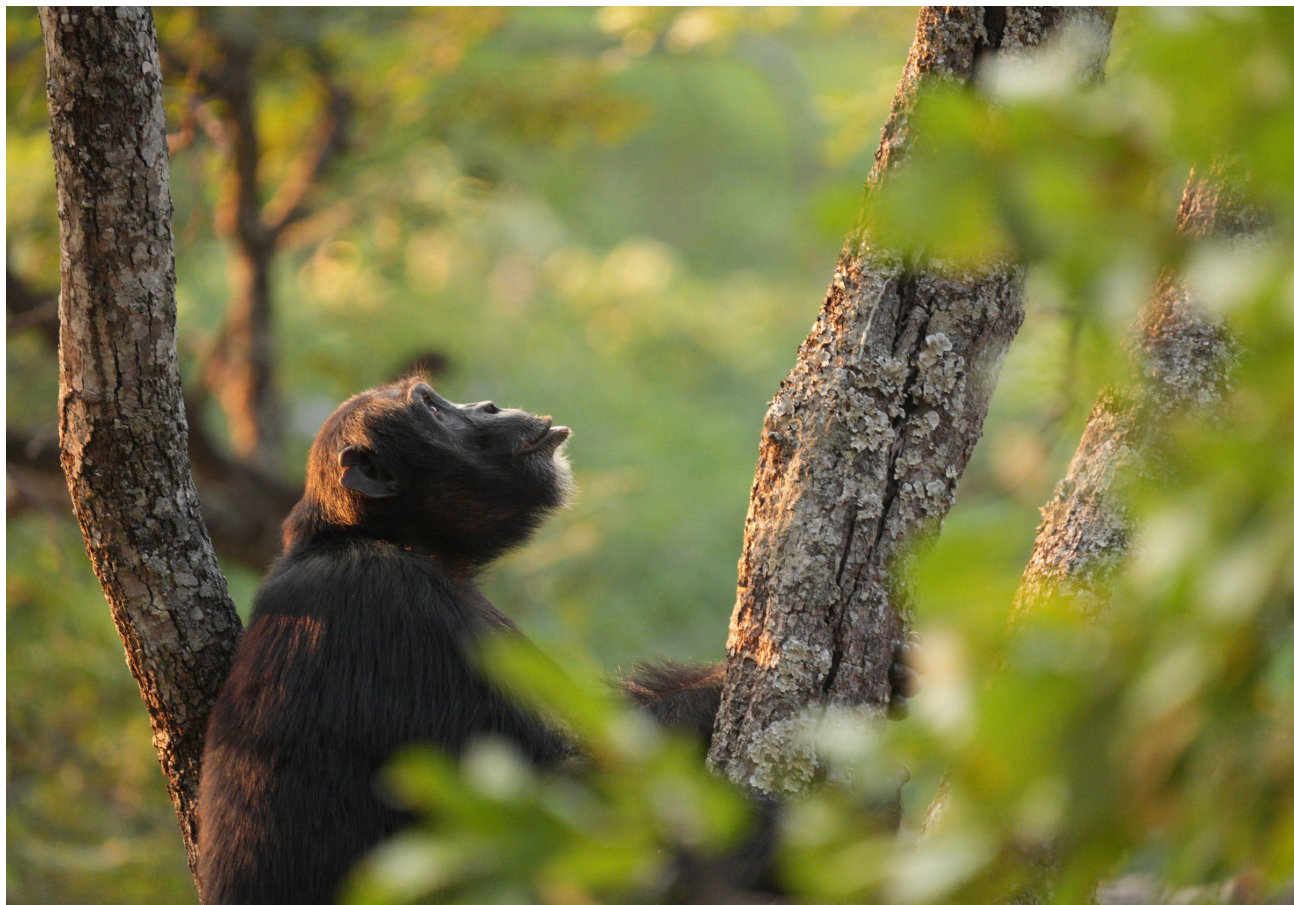
The view of the valley for which Issa is named. Photo courtesy of JC Gorman.

their tents and nearest bathrooms, given their field work assignments for the next day, and dismissed for bed. Thus, they entered their first night's sleep in Issa Valley.

For our students, now veterans of a Tanzanian safari and adventures with the Hadza foragers, it seemed there was little left that could surprise. But the beauty of the Field Course is that just when one thought they had seen and done it all, it contrived a way to push

them further out of their element and into new environments with new academic, mental, and physical challenges. And it did so at one of the most unique and productive primate research sites in the world.

Credit for the development of GMERC belongs to Fiona and Alex, whose PhD research inspired the founding of the site. Their vision, leadership, and dedication to the land, the animals, and the people of the GMERC team has transformed it into a major research location. Here, experts and students from universities around the world pursue projects that test hypotheses and generate data on the lives of the chimpanzees and red-tailed monkeys in a marginal habitat, as well as illuminate pieces of the human story. Several film crews have traveled here to capture the work on camera for documentaries.



A male chimpanzee vocalizes just after sunrise. Photo courtesy of Jesse Robie.

The GMERC camp has evolved tremendously since the first Anthropogeny Field Course visited in 2011. Back then, it was a simple camp with two small structures and a few tents set on the ground. Now, there are semi-permanent structures with brick foundations that house the central eating, meeting, and kitchen areas, as well as the storage buildings, and lab and research spaces. The accommodations, still tents, are now on raised platforms and protected by wooden structures and thatched roofs. Two large solar arrays provide the entire camp with sufficient electricity to run all of the necessary tools, computers, and lighting, servicing all buildings and accommodation structures. Wells provide fresh water to handwashing stations, the kitchen, and filters for drinking. The bathrooms, while pit-latrines style, are solid structures with built-in porcelain squatting-style toilets. If one had to “rough it” for six months or a year, this is surely the way to do it.

What sets Issa Valley apart from places like Gombe or Mahale is its location and environment. Issa Valley is the easternmost region where chimpanzees can still survive. And they do so in a landscape utterly unlike the lush, dense jungles typically associated with their species. Issa Valley is actually numerous, steep valleys at significant altitude with miombo woodland

up top and riparian forests below. Miombo is a dry mosaic of grass and woodland dominated by *Brachystegia* trees. The tall *Brachystegia* are widely spaced, allowing grasses to thrive beneath them. Fire is a frequent but vital part of the miombo’s life cycle. In contrast, the riparian forests that line the streams and waterways of Issa’s many valley floors form narrow, ribbon-like sanctuaries. Their green canopies and cool but dense understories provided refuge for countless species, as well as prime sources of fruiting trees. Unlike the miombo above, the riparian forests are packed with thick foliage and creeping liana vines that make travel difficult, but offer much in the way of food.

For the chimpanzees (*Pan troglodytes*) of Issa Valley, survival demands adaptability. They rely on the small riparian forests, knowing precisely when and where certain fruits and foods are available. They risk the relative safety of the thick forests and must traverse the open miombo in search of resources. It is very much a life on the edge of the very limits for these chimpanzees.

For the red-tailed monkeys (*Cercopithecus ascanius*) that reside at Issa Valley, the riverine and woodland habitats provide abundant opportunities to forage for fruits, flowers, young leaves, and insects, including insect galls on the underside of

leaves. They travel in cohesive groups, using their agility to leap from tree-to-tree, rarely having to touch the ground. Highly social and ever alert, they add a constant backdrop of chirps, alarm calls, and rustling of leaves, a lively contrast to the slower, more deliberate movements of the chimpanzees. The monkeys also make for an occasional meal for the chimpanzees if paths cross and hunting opportunity is presented.

Additionally, the Issa landscape also resembles the reconstructed environment that supported *Ardipithecus ramidus* almost 2,000 miles to the north (we observed the 4.2 mya fossils of *Ardipithecus*, known as “Ardi,” at the National Museum in Ethiopia). This makes Issa Valley a living laboratory where researchers can explore questions about bipedality, comparing Ardi, humans, and chimpanzees. The research at Issa has revealed that the chimpanzees here use bipedal movement in trees more frequently than those at any other site. Because of the demands of the miombo and riparian environments, they have adapted their locomotion while in trees, quite possibly in a similar response that drove Ardi to be an arboreal biped. It should be noted that this form of chimpanzee bipedalism involves overhead brachiation, with forelimbs used for balance and stability while moving through the canopy. On the ground, they return to their classic quadrupedal knuckle-walk.

From the perspective of an obligate biped, there are clear advantages and serious trade-offs to walking on two legs in this diverse environment. Humans enjoy speed and efficiency across open, flat grasslands and clear paths, but struggle painfully through the dense undergrowth of the riparian forest, as well as climbing up and descending down the steep valley walls. Following chimpanzees in these situations is a losing proposition. Only their pauses to feed or groom allowed us to catch up and catch our breath.

The first morning at GMERC brought the students into the precise rhythms of the camp and provided their first full view of the site and surrounding landscape. GMERC operates on consistency. Breakfast of tea, coffee, beans, rice, fruit, and hardboiled eggs is ready by 4:30 AM. Members of the

morning teams trickle in and out to eat and warm by the fire starting at 5:00 AM. They assemble at the changing station at the fringe of camp to don their field clothes, disinfect hands and footwear, and begin their silent march into the pre-dawn dark by 6:00 AM. Those on afternoon teams can enjoy a relaxed morning at camp before they too trek into the wilderness to relieve the morning team by 1:00 PM. Once handed off, the morning team makes the long, hard hike back to camp, arriving by 2:00 PM. Once at camp, they clean up, eat, download data, discuss findings, work on research projects, and perform camp maintenance. Dinner, similar in content as breakfast, is ready by 5:30 PM. The afternoon teams must stay with their subjects, as best they can, until they are nested before they can return to camp, typically returning by 8:00 PM. Rinse and repeat.

Regardless of the team, the goal and the operation is the same: find and stay with the subjects, observe and record behaviors, collect samples of feces and urine, and photograph and video them when possible. Those on the morning team must be in place before dawn at the location of last contact, while the afternoon team must stay with the animals until they nest at night. The data collected depends on the project but typically involves “focals” in which behavior is recorded every 5 minutes. The GMERC teams use iPhones to enter coded data for each focal, which are then translated and assembled into meaningful conglomerations of analyses and figures. Ultimately, this data is published in scientific papers. Not all activity is primate-focused as there are numerous land and botanical surveys to conduct



A red-tailed monkey at Issa Valley. Photo courtesy of Jesse Robie.

TRAVEL MAP NARRATIONS

variety of ongoing and new research projects, and camera traps to maintain.

So, this was our introduction to real primate field research and camp life. Over the course of our five days at the GMERC site, the Field Course students had multiple opportunities each to conduct observations and data entry of both chimpanzees and red-tailed monkeys, as well as to participate in botanical surveys with Tanzanian botanist Yahya Abeid to record the diversity of plant species of the area. These opportunities were precious as they not only received an unfiltered and immersive experience, they got to do all of these tasks alongside the researchers and field assistants who do this day in and day out.

The students discovered that the work of primatology is tedious, tiring, unforgiving, and monotonous. The commute to and from observation sites is long and grueling. Mental and physical limits are tested daily. You will rage at the unrelenting vines that conspire to grip you in their clutches. You will drift off in reveries, longing to socialize as you observe your subjects eating, playing, reproducing, squabbling, grooming, and sleeping. You learn real fast if you are cut out for field primatology and the sad truth is that most people are not. But the payoff for those who experience this work is profound: they are the rare few who get to see these amazing animals in full display in their natural

environments. Second to this is most certainly taking a sunlit bath in the deliciously cool water of the stream near camp, with mesmerizing butterflies fluttering about the flowers and foliage. What a world!

The final morning at Issa Valley arrived with a mix of relief and sadness. Relief came from knowing the long, grueling hikes and daily battles with vines were behind us. Sadness pervaded us all as we realized this marked the beginning of the end of our extraordinary adventure together. No laboratory, classroom, or textbook could ever replicate the rich experiences, lessons, and transformations provided by the Field Course. They certainly can't capture the majestic beauty of the many different landscapes we encountered or the vibrant diversity of peoples we met.

To commemorate our time here, we set out before dawn for one last hike to a nearby overlook that offered sweeping, 360-degree views of the interwoven valley system that makes up Issa Valley. There, in the cool stillness of early morning, we found ourselves high above all and in silence, letting the landscape speak for itself as the sun rose in pink and orange. Each of us began the quiet work of processing everything we had seen, learned, and felt. All too soon it was time to return to camp where we said our goodbyes to the new friends we made there.

July 19: Our Bodies and Minds are in San Diego but Our Imaginations are Forever in East Africa

With a screech of tires and a plume of rubberized smoke, our landing at San Diego International Airport marked the conclusion of the 2025 Anthropogeny Field Course. The ten Anthropogeny Graduate Specialization students traveled thousands of miles traversing the globe to Ethiopia and Tanzania to get firsthand experience in paleontology, ecology, ethnography, and comparative primatology. But they also returned transformed and better equipped to be the next generation of scientists, leaders, and globally minded citizens. This group of UC San Diego graduate students will forever be connected by their shared experiences in East Africa where they breathed the air, shared smiles, were immersed in magical landscapes, and marveled at incredible animals.

We hope these narrations have captured your imagination as well, allowing you to experience the journey alongside us. If they did, and if you believe as we do, that the Field Course provides unparalleled training and inspiration for these future experts, CARTA invites you to be a part of the next journey. By making a charitable contribution, you can help fund the twelfth iteration of the Anthropogeny Field Course and directly shape the lives of remarkable graduate students. Please scan the QR code on page 47 to make your life-changing contribution.



A gymnastic olive baboon (*Papio anubis*) at Tarangire National Park, Tanzania. Photo courtesy of Jesse Robie.

PARTNERS

The 2025 Anthropogeny Field Course was made possible by many extraordinary people, institutions, and supporters:

- UC San Diego and UC San Diego Health, who encourage, support, and provide a home for CARTA and the Anthropogeny Graduate Specialization.
- Our friends at the National Museum of Ethiopia, who generously took time from their demanding work to introduce us to the wonders of paleontology.
- CARTA staff, Jesse Robie and Linda Nelson, who manage and organize all aspects of the Anthropogeny Field Course.
- Finally, CARTA extends its deepest gratitude to the donors who provide the financial backing for this bold scholastic endeavor.
- The amazing students who participated in this eleventh Anthropogeny Field Course. They brought curiosity, dedication, joy, and good humor to every moment, and embraced each opportunity to learn, explore, and grow.
- Alex Piel and Fiona Stewart, our co-faculty from University College London (UCL), who shared their deep expertise and provided access to GMERC at Issa Valley.
- Dorobo Safaris and our incredible guides—Douglas Duncan Simbeye and Prisca Sumari—who shared their passion for their country, its people, and its wildlife.
- The Hadza, despite immense pressures on their lands and culture, offered lessons in what it means to be human.



Partnership with GMERC

The Greater Mahale Ecosystem Research and Conservation (GMERC) Project is a Tanzania-based group that leads scientific investigation into primate behavior, ecology, and conservation. Although GMERC was incorporated in 2017, its efforts to better understand chimpanzees, baboons, and red-tail monkeys living in a savanna mosaic habitat date back to 2008 when long-term research was initiated at Issa Valley.

In 2011, the principal investigators of what is now GMERC, Dr. Fiona Stewart and Dr. Alex K. Piel PhD '14, proposed a partnership, whereby CARTA would provide annual overhead support in exchange for GMERC's organization, facilitation, and participation in the annual Anthropogeny Field Course. This partnership has provided Graduate Specialization in Anthropogeny students with experiences in how human origins research is approached, from the study of analogous Plio-Pleistocene modern East African landscapes (Serengeti and Ngorongoro), to the behavioral ecology of contemporary hunter-gatherers (the Hadza) and humans' closest living relatives (wild chimpanzees). Not only does GMERC organize and facilitate these activities, but it also hosts the students at its field station in Issa Valley for primatological sessions.

With CARTA's support, GMERC has grown from two foreign researchers and three Tanzanian field assistants to a permanent, year-round research project with a team of fifteen researchers and assistants. GMERC leads investigation into primate behavioral ecology with troops of three habituated primate species. GMERC plays a key role in our broader understanding of human origins by way of studying animals that live in a similarly dry, mosaic habitat to that of key early hominins (e.g., *Ardipithecus ramidus*). Project data also provide important information regarding the evolution of bipedalism, cranio-anatomical biomechanics of primate feeding ecology, and habitat use.

In addition to hosting Graduate Specialization in Anthropogeny students and CARTA members, GMERC offers Tanzanian and international students, interns, researchers, and collaborators an opportunity to explore their own interests in human origins through the study of extant primates in the Rift Valley. The GMERC-CARTA partnership strengthens Tanzanian scientists' capacity for studying wild primates with the dual goal of informing human evolution and the conservation of these threatened species.

FUTURE OUTLOOK

As a core component of CARTA's Anthropogeny Graduate Specialization, the Anthropogeny Field Course serves as an elective capstone experience. To our knowledge, no comparable field course in human origins exists, even among archaeology programs in which field experience is vital training.

Unlike those traditional archaeology field courses, which are typically funded through student tuition and fees (covering transportation, lodging, and meals), putting lower income students at a disadvantage, the Anthropogeny Field Course has been fully subsidized by CARTA since its inception. While this model has expanded access to a transformative field experience, particularly for students who might otherwise be unable to financially participate, it has come at the cost of long-term fiscal sustainability.

To address this, CARTA introduced a cost-sharing measure for the 2025 Field Course, with students covering their own

international airfare (approximately \$2,500 USD each). Even with this adjustment, the total cost of delivering a single Anthropogeny Field Course is roughly \$50,000 USD (not including instructor and staff salaries).

Given rising costs of operating the course and the shifting landscape of federal and state education funding, it is critical that CARTA reassess its funding model. If no further changes are made and CARTA is unable to secure additional support, the Anthropogeny Field Course is projected to “sunset” in 2027.

Therefore, it is mission critical that CARTA implement additional cost-sharing and cost-saving strategies to align the program more closely with the self-sustaining model of archaeology field schools, while also securing stable sources of support from donors, foundations, and grants. The following outline presents steps essential for ensuring the Anthropogeny Field Course’s future and its sustainability.

Learn From Other Models

Investigate how comparable field programs are funded and apply insights from successful models to strengthen CARTA's funding strategy.

Reduce Costs

Explore cost-reduction opportunities where feasible, ensuring that quality and the integrity of the Anthropogeny Field Course are maintained.

- Increase student contribution:** Evaluate the impact of increasing student cost-sharing contributions to offset CARTA's expenses.
- Increase graduate student enrollment:** Maximizing the per-course student cohort may enhance program efficiency and reduce per-student costs. Optimal enrollment size would need to be determined due to limitations with in-country transport.
- Adjust course frequency:** A shift to a biennial or triennial course model may better balance costs with current demand.
- Program changes:** Evaluate the cost-benefit ratio of certain program components, such as visits to the National Museum of Ethiopia and other sites, to determine their educational value relative to their fiscal burden.

Evaluate Growth

There are internal and external avenues for expansion of the program that could move the Anthropogeny Field Course toward a more self-sustaining model. However, such expansion requires additional faculty with broad, transdisciplinary expertise, as well as significant investment in training, coordination, and logistics—all of which are potentially costly to implement and sustain.

- Create an undergraduate version:** Explore the feasibility of an undergraduate version of the Anthropogeny Field Course as a complementary, tuition-supported offering. Such a “sister” program could not only help subsidize the graduate-level course but also provide valuable teaching and leadership opportunities for graduate students serving as teaching assistants.
- Develop multi-institutional collaborations:** Forge strategic partnerships with other academic programs and institutions to help expand and fund the Anthropogeny Field Course. CARTA has already established a productive collaboration with faculty at University College London (UCL), yielding mutual benefits and laying a strong foundation for further

partnership. Expanding this relationship, potentially by including UCL students in the CARTA-led Anthropogeny Field Course, could provide a reliable funding stream and help solidify the Field Course as a lasting, signature program for both UC San Diego and UCL.

Similarly, Arizona State University's Institute for Human Origins, led by CARTA member Yohannes Haile-Selassie, shares a closely aligned academic mission and represents another promising partner for course participation.

CARTA's long-standing relationship with Dorobo Safaris, our Tanzanian field partner, offers yet another opportunity for growth. Dorobo currently hosts students from Lewis & Clark College and could benefit from integrating CARTA's academic content and faculty into their programming, thereby enhancing their educational offerings while extending CARTA's impact.

Secure Sustainable Funding

Buy-in from UC San Diego and external funders is essential for ensuring program continuance and longterm sustainability.

- Institutional support:** Secure renewed commitment from UC San Diego’s General Campus and School of Medicine.
- External support:** Seek impactful philanthropic support from independent donors (offer participation in an Anthropogeny Field Course to incentivize donors to underwrite a course). Identify foundations and travel grants.
- Funding campaign:** Launch a targeted fundraising campaign to engage independent donors and alumni of the Anthropogeny Specialization Track. Many alumni, whose own experience in the Anthropogeny Field Course left an indelible mark on their personal and professional trajectories, are now well established in their careers. They represent an underutilized source of support and have the potential to provide sustaining contributions.

Increase Visibility

In an era where the value of education and scholarly inquiry is increasingly underappreciated, it is critical that CARTA enhances the visibility of its Anthropogeny Field Course, both within UC San Diego and among external audiences such as foundations, donors, alumni, and the broader CARTA community. Greater recognition of the Field Course’s transformative impact on student development can help secure stronger institutional support. At the same time, increased visibility can drive philanthropic interest beyond the bounds of the University. CARTA's global audience, drawn to our free, public scientific programming, may be unaware of our educational mission. Elevating the Anthropogeny Field Course through events, communications, and expanded web presence can help convert existing enthusiasm into meaningful support.

SUPPORT CARTA TODAY!

CARTA invites you to help sustain this unique, ambitious, and impactful education effort dedicated to understanding the human phenomenon.

Scan the QR code to support CARTA's Anthropogeny Field Course.









UC San Diego

salk
Where cures begin.

Center for Academic and Training
in Anthropogeny (CARTA)
University of California San Diego
9500 Gilman Drive MC 0060
La Jolla, CA 92093-0060
Phone: 858-246-0846

-  carta.anthropogeny.org
-  carta-info@anthropogeny.org
-  [ucsdcarta](https://www.facebook.com/ucsdcarta)
-  [carta_ucsd](https://www.instagram.com/carta_ucsd)
-  [ucsdcarta](https://www.linkedin.com/company/ucsdcarta)
-  [anthropogeny.org](https://twitter.com/anthropogeny.org)
-  [cartaucsd](https://www.youtube.com/cartaucsd)

