ANTHROQUEST

THE LEAKEY FOUNDATION NEWSLETTER

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SUMMER 2020

INSIDE

About the cover:
In pre-print research, a team of Leakey Foundation grantees have found that apes and some other primates are as susceptible to COVID-19 as humans.

Read more on page 18.

Cover photo by Rod Waddington
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THE LEAKEY FOUNDATION

AnthroQuest is a publication of The Leakey Foundation. It is published twice annually. We hope you like our new look for a new decade!

Contact us at info@leakeyfoundation.org if you would like to update your mailing information.

From left: Leakey Foundation Life Trustee Bill Wirthlin, Berhane Asfaw, Leakey Foundation grantee and former Baldwin Fellow who served as Director of the National Museum of Ethiopia, President Camilla Smith, and Trustee Chet Kamin in the fossil vault at the National Museum of Ethiopia.

Read all about their trip in the next issue of AnthroQuest.

As this issue of *AnthroQuest* goes to press, the world is struggling to comprehend and cope with the difficult and far-reaching challenges of the global COVID-19 pandemic.

In times like these, empirical science is vitally important. Understanding how life evolves can give valuable insight into diseases and what we can do to limit their harm.

Pandemics have arisen throughout history. I find myself thinking about the population bottleneck that *Homo sapiens* experienced. Was disease responsible? Our human story is one of adaptation, ingenuity, and altruism. As a species, we can cooperate and achieve amazing things when we work together for the good of all.

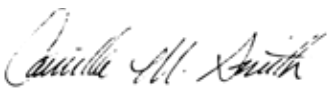
Our researchers study primates, which are also in danger from COVID-19. Because the virus is spreading worldwide, many researchers will not be going to their field sites until the pandemic is under control.

Some funders have decided not to fund research this year. The Leakey Foundation, however, will continue to support our grantees despite fieldwork being postponed.

I am proud to work with you to support bright young scientists whose research will lead to a better understanding of human biology and evolution. This knowledge of our physiology, our DNA, and our immune system is fundamental to the search for treatments and vaccines.

This research can also help us avoid future novel disease outbreaks by conserving wild habitat, and by shedding light on our relationship to each other, the environment, our contact with other animals, and evolving pathogens.

Thanks to your steadfast support, The Leakey Foundation will continue to fund research, provide educational opportunities, and promote science literacy for all. Together, we can contribute to a safe, healthy, and vibrant future.



Camilla Smith
President
The Leakey Foundation

FEATURE

Tracks Through Time

Hundreds of human footprints, the largest collection found in Africa, were uncovered by a team of Leakey Foundation-supported researchers.

William E.H. Harcourt-Smith
Leakey Foundation Grantee
Research Associate, Division of Paleontology, American Museum of Natural History, and Associate Professor in Anthropology, Lehman College, CUNY

Briana Pobiner
Leakey Foundation Grantee
Research Scientist and Museum Educator, Smithsonian Institution

Above:
Footprints, preserved in solidified ash near the Oldoinyo L'engai volcano in Tanzania, hint at human behavior from as long as 19,000 years ago.

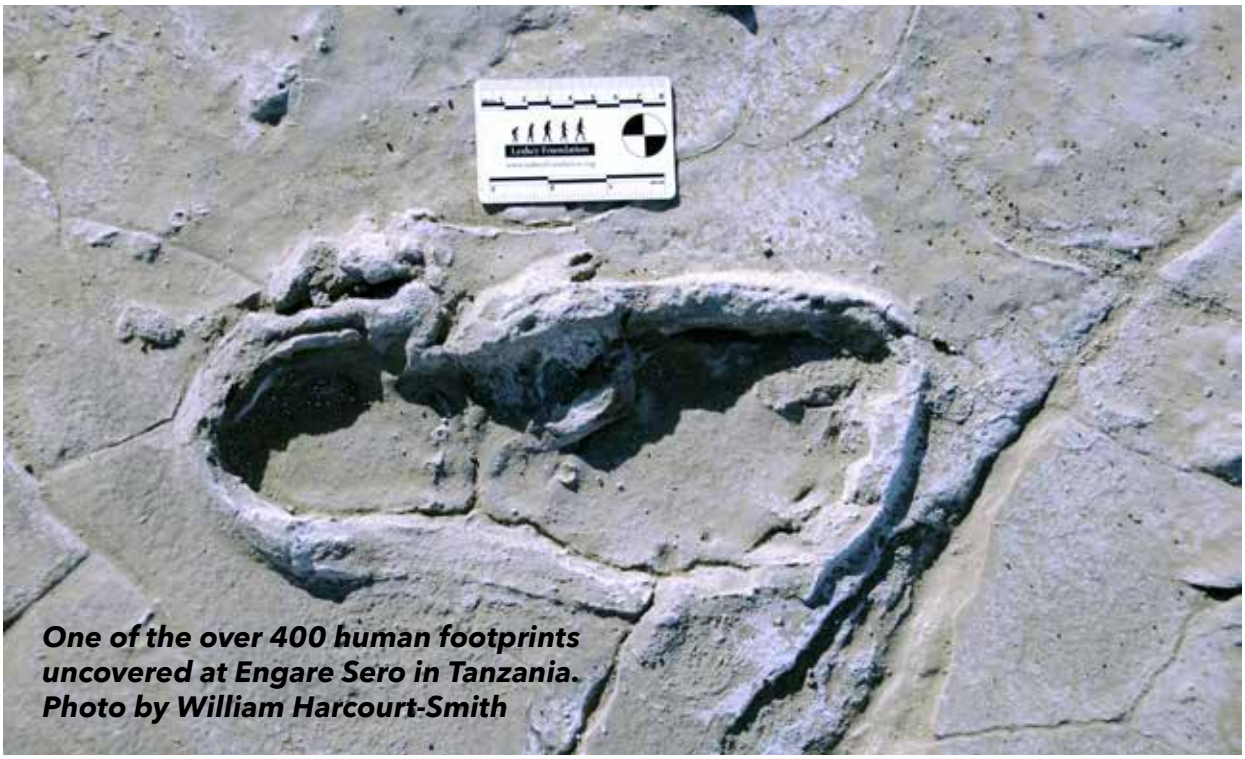
Photo by Leakey Foundation Grantee Cynthia Liutkus-Pierce

When it comes to reconstructing how ancient creatures lived, palaeontologists like us are as much detectives as we are scientists.

We're used to partial evidence, dead ends and red herrings. It's especially hard to reconstruct ancient behaviors, something we are particularly interested in. We must rely on either skeletal remains or the physical things left behind by ancient people to deduce anything about their lives, be it what they ate, how they moved or the origins of complex behaviors like creating tools or communicating with language.

Prehistoric footprints are a remarkable and precious source of evidence for the behavior and biology of ancient organisms, capturing a snapshot of their lives in deep time. In a new paper in *Nature Scientific Reports*, our research team documented and interpreted an extraordinary site in northern Tanzania called Engare Sero, where hundreds of human footprints were preserved in volcanic ash many thousands of years ago.

It's the most abundant assemblage of ancient human footprints currently known from Africa and suggests this ancient community had a division of labor between the adult females and males.



One of the over 400 human footprints uncovered at Engare Sero in Tanzania. Photo by William Harcourt-Smith

Footprints fill in the story

Footprints are unique in that they are a preserved moment in time when an animal moved across a landscape and left traces of its movements imprinted in the ground.

While they cannot tell you much about how an animal looked, they can be surprisingly useful for reconstructing other aspects of their biology. Footprints can tell you how fast an animal was running, where it was going and sometimes even if the animal was solitary or moved in herds.

For the human lineage, footprint sites have been especially important in furthering scientists' understanding of our own evolution. The iconic 3.66-million-year-old paleontological site of Laetoli in Tanzania, for instance, provided some of the earliest definitive evidence of upright walking in our ancient ancestors.

While Engare Sero is much younger than Laetoli, it provides a fascinating snapshot of a time period when our own species, *Homo sapiens*, was on the rise.

Ancient tracks in the shadow of Oldoinyo L'engai

When you walk along wet sand, your footprints might last for a few minutes, or a few hours, before being washed away by the ocean. But if you were to walk in wet volcanic ash and leave your footprints behind and the ash then dried nearly as hard as concrete, your footprints could last thousands – or even millions – of years. That's exactly what happened thousands of years ago when a group of at least 20 prehistoric people walked through a volcanic mudflow produced by the Oldoinyo L'engai volcano, still active today in what's now Tanzania.

The local Maasai have known about this set of ancient human footprints at Engare Sero for a while. When our research team leader, geologist Cynthia Liutkus-Pierce, first visited the site in 2009, only 56 footprints had been exposed by natural surface erosion – but she was still floored by what she saw.

With support from The Leakey Foundation, our multidisciplinary research team uncovered, documented and analyzed an astonishing 408

total human footprints. Using two dating techniques that measure radioactive decay in the material that preserved the footprints, we dated them to between 6,000 and 19,000 years ago. In this time period, modern humans were likely the only hominin species in Africa, and had already spread to many other parts of the globe.

What the prints describe

We meticulously traced each footprint trail and analyzed the size, spacings, and directions of the footprints. We determined that 17 of the tracks were created by a single group of individuals walking together in a southwesterly direction. Based on a sophisticated statistical analysis using a vast comparative dataset of modern foot dimensions, this group likely consisted of 14 adult females, with two adult males and one younger male.

Among modern foragers such as the Hadza in Tanzania and the Ache in Paraguay, women often gather food together in cooperative groups with occasional visits from or accompaniment by adult males. This scenario seems a plausible fit for the group structure and patterns of movements we inferred at Engare Sero.

There are also six other footprint tracks heading in an almost perfectly opposite direction, to the northeast. Most of the people who made these footprints were walking at different speeds, and at least one was running, suggesting that these tracks were not created by a single group traveling together.

This page from left: Project director Cynthia Liutkus-Pierce, Katie Wolf, and William Harcourt-Smith take measurements of a footprint.

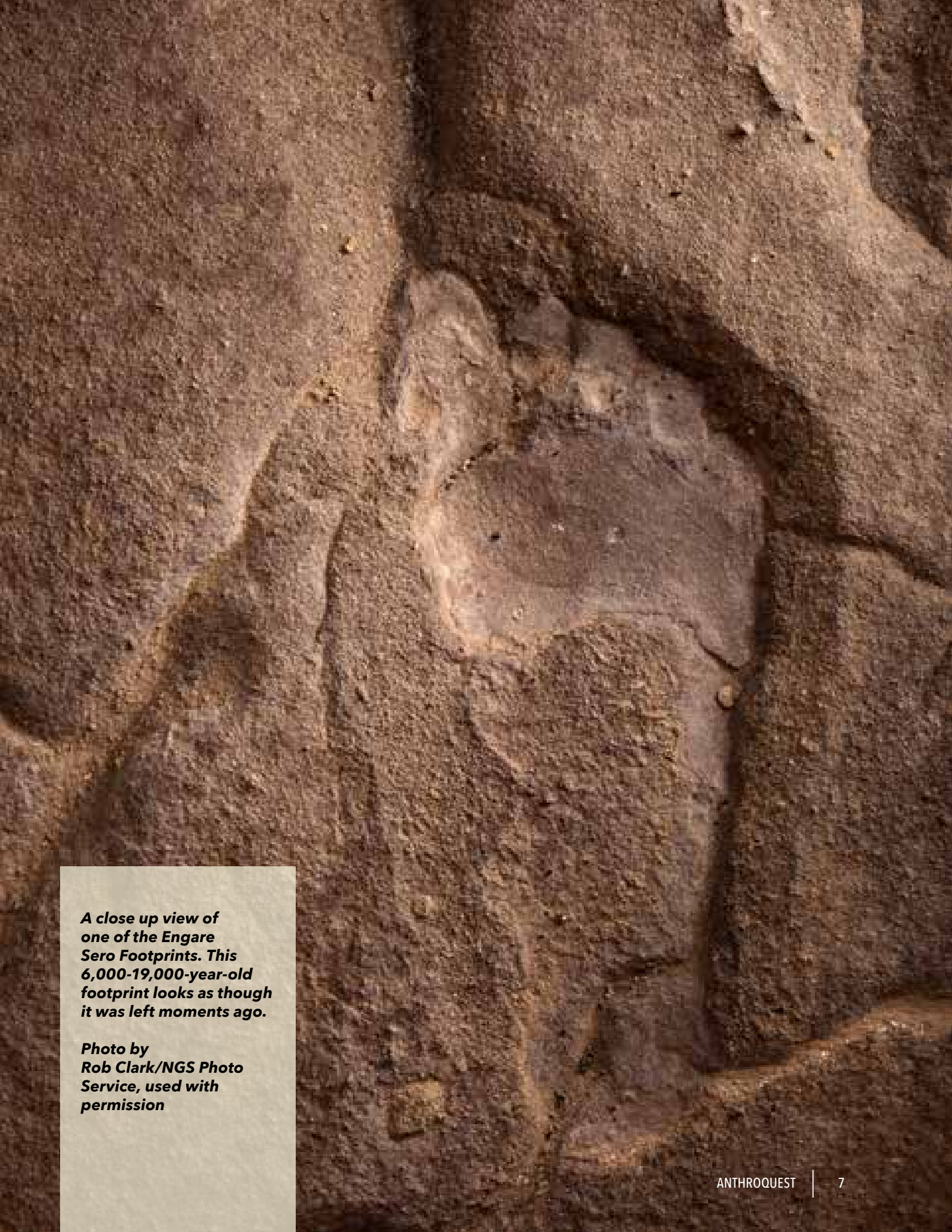
Photo by Briana Pobiner

This article was originally published on theconversation.com

Preserving Engare Sero for the future

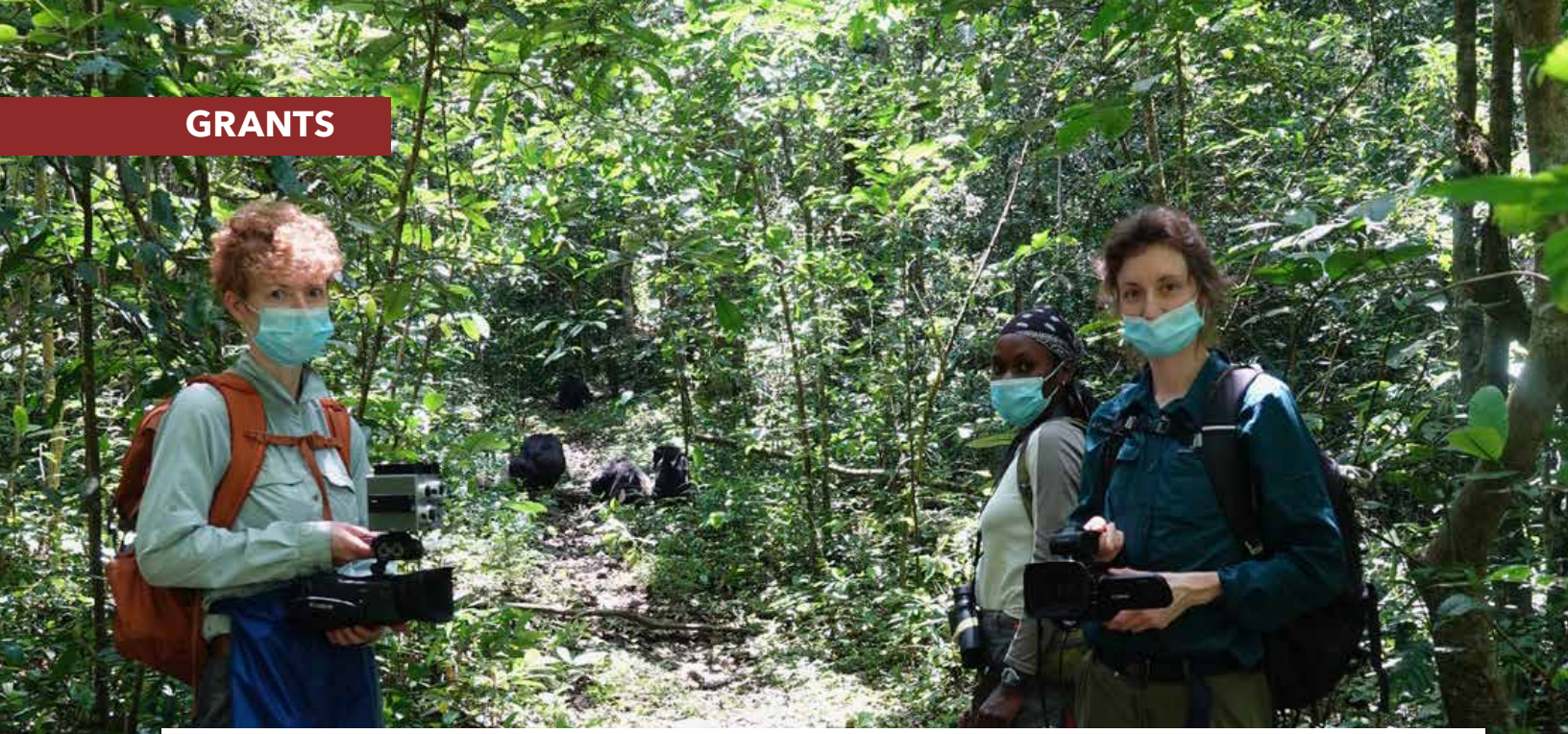
Several of the human footprint tracks lead to a nearby sand dune to the north. We've purposefully left any footprints preserved under the sand dune unexcavated for now, until we can work with the Tanzanian government to develop a conservation plan to track and limit erosion of the footprints.

The hardened ash is remarkably resilient to erosion from water and wind. Still, thanks to the Smithsonian's 3D Digitization Program, we have meticulously captured three-dimensional data for each of the footprints so we can trace any natural destruction of the prints over time. You can even download 3D files of a few of the Engare Sero footprints in case you want to 3D print your own copies. ❖



A close up view of one of the Engare Sero Footprints. This 6,000-19,000-year-old footprint looks as though it was left moments ago.

Photo by Rob Clark/NGS Photo Service, used with permission



Fall 2019 Grant Recipients

Behavioral Research

Rosemary Bettle, University of Michigan
The evolution of social intelligence in macaques

Matilda Brindle, University College London
Does masturbation serve an adaptive function in male rhesus macaques?

Rebecca Brittain, Rutgers University
The role of the gut microbiome in digestion and energy production in wild Bornean orangutans

Margaret Buehler, Tulane University
Subordinate male roles in primate groups with high reproductive skew

Harmonie Klein, Max Planck Institute for Evolutionary Anthropology
Hunting strategy and food sharing in wild central Chimpanzees

Sze Mei Lee, Monash University
Exploration of olfaction abilities and genetics in Asian indigenous communities

Laura MacLatchy, University of Michigan
Ecological determinants and arboreal feeding positional behavior in Pan troglodytes

Catherine Markham, Stony Brook University:
Competition within primate social groups: Rank effects on energy expenditure

Jerred Schafer, The University at Albany
The evolution of sex differences in mandrills

Elizabeth Tapanes, The George Washington University
Hair evolution in a comparative context

Julie Teichroeb, University of Toronto
Kinship patterns and mechanisms of male tolerance in a Rwenzori Angolan colobus multi-level society

Linda Vigilant, Max Planck Institute for Evolutionary Anthropology
Elucidating the hidden kinship structure of wild chimpanzee communities in Uganda


Matilda Brindle


Rebecca Brittain


Margaret Buehler


Linda Vigilant


Harmonie Klein


Jared Schafer


Julie Teichroeb

Facing Page:

Laura MacLatchy (left), Sharifah Namaganda (center) and Lauren Sarringhaus (right) at Kibale National Park.

Dr. Yohannes Haile-Selassie is the recipient of the 2019 Gordon P. Getty Grant for Multidisciplinary Research

Photo courtesy of CMNH

Paleoanthropology

Amanuel Beyin, University of Louisville
Investigation of Acheulean sites in the Red Sea coastal region of the Sudan

William Callison, Harvard University
Adaptations for bipedal gestation: Measuring the effects of pregnancy on thoracic motion during ventilation

Mulugeta Feseha, Addis Ababa University
Digitizing and distributing the fossil hominin and archaeology collections of the Ethiopian National Museum

Yohannes Haile-Selassie, Cleveland Museum of Natural History
Middle Pliocene hominin diversity and the origin of Homo: Collecting crucial fossil evidence from Woranso-Mille, Afar Region, Ethiopia

Alice Leplongeon, Muséum National d'Histoire Naturelle
Chole rock shelter and past human-environment interactions at the edge of Lake Victoria

Fredrick Manthi, National Museums of Kenya
Explorations of the Middle Pleistocene sites in Natodomeri, northwestern Kenya

María Martinón-Torres*, CENIEH
Ongoing research at Atapuerca

Kasih Norman, University of Wollongong
Rapid discovery and OSL dating of archaeological sites in Timor

Shanti Pappu, Sharma Centre for Heritage Education
Acheulian evolution and development of the Indian Middle Paleolithic at the stratified sites of Sendrayanpalayam and Kunjavam


Amanuel Beyin


Shanti Pappu


Kasih Norman


Eleanor Scerri


Sileshi Semaw

Joshua Robinson, Boston University
Multiproxy paleoecology of ~ 2.35 Ma early Homo from Ethiopia

Christina Ryder, University of Colorado Boulder
Saving old bones: Using near-infrared spectroscopy to predict collagen yield in bone

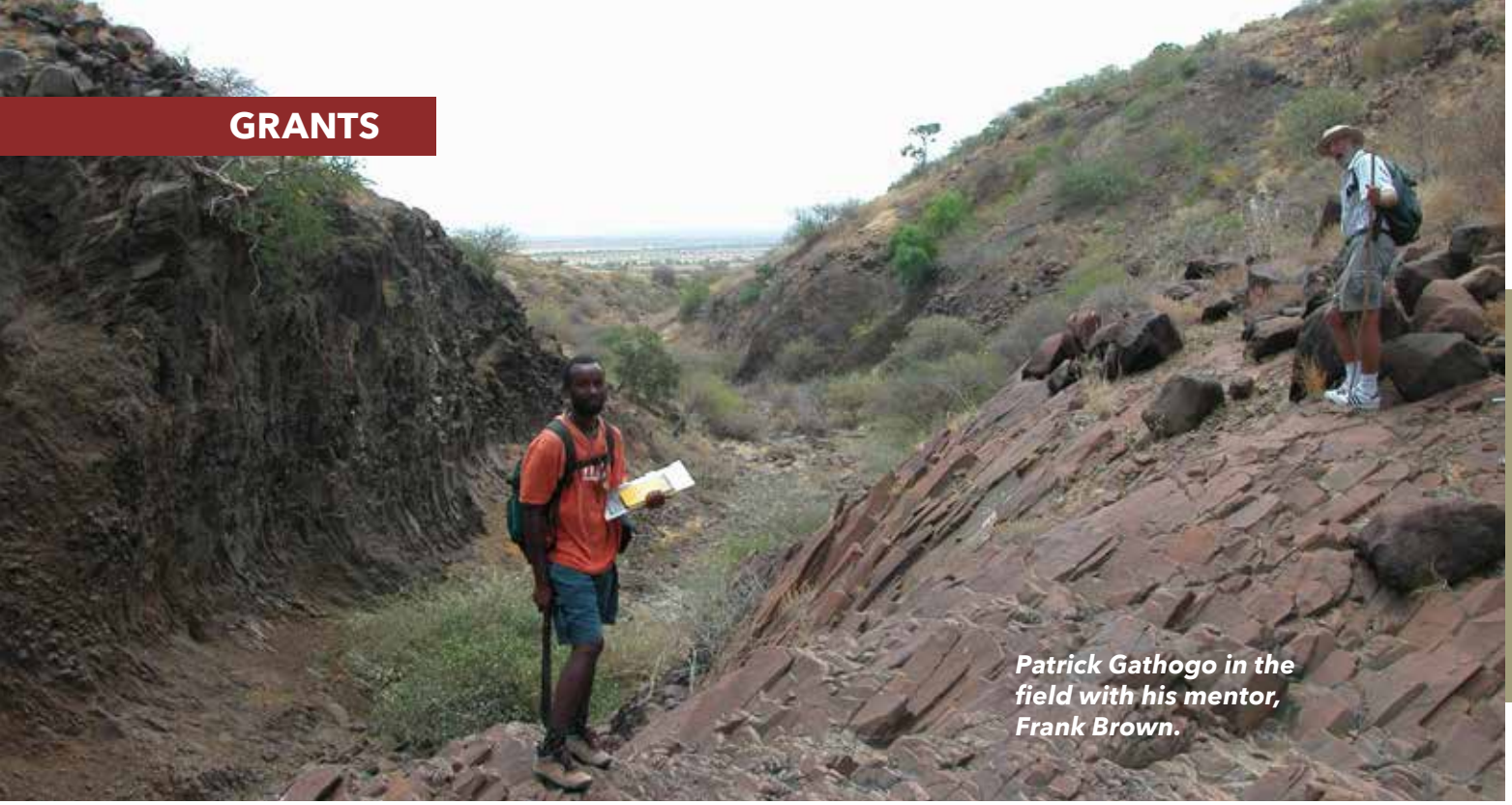
Eleanor Scerri, Max Planck Institute for the Science of Human History
Unravelling the rainforest: The Pleistocene cultural record of Anyama (Ivory Coast) and its ecological context

Sileshi Semaw, Centro Nacional de Investigación sobre la Evolución Humana
Middle Stone to Late Stone Age at Gona, Afar, Ethiopia: New sites from 50-10,000 years ago

Mary Shenk, Pennsylvania State University
Estimating fertility, disease, and famine using tooth cementum - a validation study in rural Matlab, Bangladesh

Fernando Villanea, Brown University
Neanderthal and Denisovan introgression in indigenous Americans

* Ongoing research supported through directed donations.



Patrick Gathogo in the field with his mentor, Frank Brown.

Dr. Patrick Gathogo Awarded the First Francis H. Brown African Scholarship

The Francis H. Brown African Scholarship Fund was established in 2018 to honor the life and work of Dr. Francis H. Brown, who served on The Leakey Foundation's Scientific Executive Committee for 24 years. Frank Brown was an eminent geologist whose study of the Omo-Turkana basin helped build the timeline of human evolution. Brown devoted his career to mapping and analyzing the geology of northern Kenya and southern Ethiopia, and his work provided a way to place fossil finds in chronological order.

Brown wished to create a fund to provide support for scholars from Ethiopia, Eritrea, and Kenya who are pursuing doctoral degrees or research in geology and botany related to the study of human origins. Family, friends, and colleagues added generous contributions to Dr. Brown's legacy gift. This fund now provides up to $25,000 for each successful applicant.

"During his 50 years of research in Kenya and Ethiopia, my father found friendship and family in the African communities in which he worked," said Brown's daughter Erica Brown Gaddis. "He personally helped many secondary, university, and graduate students achieve their educational dreams. He helped many others by encouraging them to follow their hearts and by helping them financially."

Dr. Patrick Gathogo, a former student and mentee of Frank Brown, has received the first award from the Francis H. Brown African Scholarship Fund. Dr. Gathogo is a geologist and a research associate at Stony Brook University. He earned his PhD as well as his undergraduate and master's degrees at the University of Utah where Brown was a professor. Gathogo worked extensively in the Turkana Basin with Frank Brown. He has also worked with Dr. Louise Leakey, who recommended Gathogo for this award. "There is no one I know who is better placed to carry the legacy of Frank Brown's work forward in the Turkana Basin," said Leakey," and I wholly support the effort of Patrick Gathogo to get back to the field and into the lab to build on the work that Frank had accomplished." ❖

SPOTLIGHT

Grantee Spotlight: Patrick Gathogo

Leakey Foundation grantee Dr. Patrick Gathogo is a geologist and research associate at Stony Brook University who is developing a new approach to geochronology that will extend the capability of the standard methods for dating hominid sites.

Patrick Gathogo (left) conducting research with Christopher Ngela on the shore of Lake Turkana in Kenya.

Q: When did you first meet Frank Brown?

I met Prof. Francis Brown during the summer of 1998 at a field camp that was led by Drs. Meave and Louise Leakey in the Lomekwi area of Turkana County, Kenya. I remember his arrival to the camp on a weekend afternoon very well because he was remarkably fluent in local languages and dialects with a full accent like the natives. The field crew and locals called him by a local name, "Mzee Mwasa," which I thought was his real name at first. Actually, I also thought he was born and raised in Kenya. It was not until later at night during dinner when he was introduced as Prof. Francis Brown by Dr. Meave Leakey. The following day Dr. Meave Leakey presented me with the opportunity to accompany Prof. Brown for the entire duration of his fieldwork that summer. Drs. Richard, Meave, and Louise Leakey subsequently recommended and facilitated for me to become Prof. Brown's geology student.

Q: How did Frank Brown influence your career?

First and most importantly, I owe my college education (BS, MS, and PhD) at the University of Utah to Prof. Brown. He helped with my tuition, accommodation, and living expenses, even using his personal finances. That provided me with a lot of time not only to focus on my college studies but also to gain practical experience in laboratory and field work with Prof. Brown. He started involving me in his research activities immediately after I joined the university. In fact, my first publications in *Nature* and the *Journal of Human Evolution* came from my participation as an undergraduate student. All of these factors provided a strong foundation that advanced my career. Additionally, after spending time with Prof. Brown as a mentee, his contagious enthusiasm and utmost devotion towards his career continue to influence my career by giving me a sense of fulfillment.

Q: Can you describe a memorable moment or highlight of your career so far?

Many of the memorable moments from my work happened while conducting fieldwork with Prof. Brown in the Turkana Basin. His unique ability to distinguish and correlate ancient rivers, lakes, and landscapes as we walked the outcrops made the seemingly monotonous rocks look very much alive. That ability of Prof. Brown looked magical to me when I started working with him in the field, and it continued captivating me every time we conducted fieldwork together for the many years that followed.

The most memorable moment with Prof. Brown took place in the Lomekwi area of Turkana Basin a day before the end of the summer field season in 1999. That was the day when he first identified a historic site where the cranium of what became a new hominin

genus, *Kenyanthropus platyops*, was discovered by a team led by Drs. Meave and Louise Leakey. I still vividly remember Prof. Brown's excitement soon after we came across the location of this site that he named LO6 North. At first, I could not comprehend the significance of that site, but I could tell it was very important based on the excitement. Prof. Brown took the rest of the day to explain the geological significance of that location in great detail as we traversed the site and its surrounding outcrops.

I came to learn that the new site was quite important because it indicates ancient habitats and depositional environments that were favorable for the likely occurrence of well-preserved hominid fossil. Prof. Brown demonstrated to me how the adjacent area in Lomekwi was also unique during the time interval that is represented by the new site. At that time a major lake, Lokochot Lake, that was many times larger than Lake Turkana covered most of the outcrop area in the basin. That was the moment I started aspiring to become like Prof. Brown. He recommended the new site to Dr. Meave Leakey and her team while on his way back from the field. I was lucky to witness the famous discovery of the *Kenyanthopus platyops* cranium by Justus Edung at the site a few days later.

Q: What does this award mean to you personally and professionally?

It is a great honor to receive this award. I am extremely happy. As a mentee of Prof. Brown, it is indeed a great feeling to realize that I will be the pioneer recipient of the award associated with his legacy. This award also presents me with an opportunity to pursue one of Prof. Brown's wish list of novel geology projects.

It was in light of this award that I become a part-time Research Associate Professor with the Stony Brook University through the Turkana Basin Institute. The affiliation will enable me to mentor students, including local residents, who choose to study the geology of the Turkana Basin where many hominid fossils have been discovered. It will also provide me with a platform to continue working on Prof. Brown's vision that inspired my project. The award will allow me to pursue this novel geology project that has the potential to significantly improve the geological context of hominid sites.

The primary objective of my project is to develop a new petrology-based geochronology approach that will extend the capability of the standard methods for dating hominid sites. Many outcrops that lack volcanic ash layers have proven to be quite challenging in terms of age determination, especially when they are separated by major faults. A good example is the eastern South Turkwel area of the Turkana Basin where hominid fossils have been discovered. In this example paleomagnetic polarity has offered multiple alternative ages, and the precision of biostratigraphy has been debatable. Unknown volcanic ash layer has been discovered at the top of section in the eastern area. The geology of the entire South Turkwel area was among the top priority projects of Prof. Brown, and I was privileged to conduct fieldwork there with him. My project will build upon this background and therefore focus on the area. I will utilize a combination of techniques including skills from Prof. Brown and my experience in reservoir petrology. ❖

Thank you to the donors who helped make the Francis H. Brown African Scholarship Fund possible

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GRANTEE SPOTLIGHT Q&A: *Mareike Janiak*

Mareike Janiak is a postdoctoral scholar at the University of Calgary. She received a Leakey Foundation grant in 2018 for her project entitled "Understanding adaptive radiation through evolution of digestive enzymes."

Q: Were you always interested in science?

A: I wouldn't say that I liked science as a child, but I definitely liked animals. I don't remember being encouraged to be interested in science as a kid. It was more the opposite. I remember someone telling me, "You're a girl, you don't have to be good at math!" The first person to actually spark a strong interest in science, especially biology and evolution, was my biology teacher in my last two years of high school.

Q: What is the big question you're trying to answer through your Leakey Foundation-funded research project?

Our overarching goal is to get a better idea of the adaptations that make humans such "adaptable" and flexible creatures, especially when it comes to what we eat.

Primates, in general, can survive on a wide variety of foods, but there are a lot of species with a range of specialized diets, like those focused on insects, leaves, or fruit. All of these foods have different challenges when it comes to digesting them. Little is known about how the species with specialized diets have adapted to digesting their foods.

We're looking for links between digestive enzyme adaptations and different diets in primates, but also other mammals to provide a broader comparative context. To do this in a non-invasive way, we turned to genomics – gene sequences contain an incredible amount of information that is available without the need for invasive animal research.

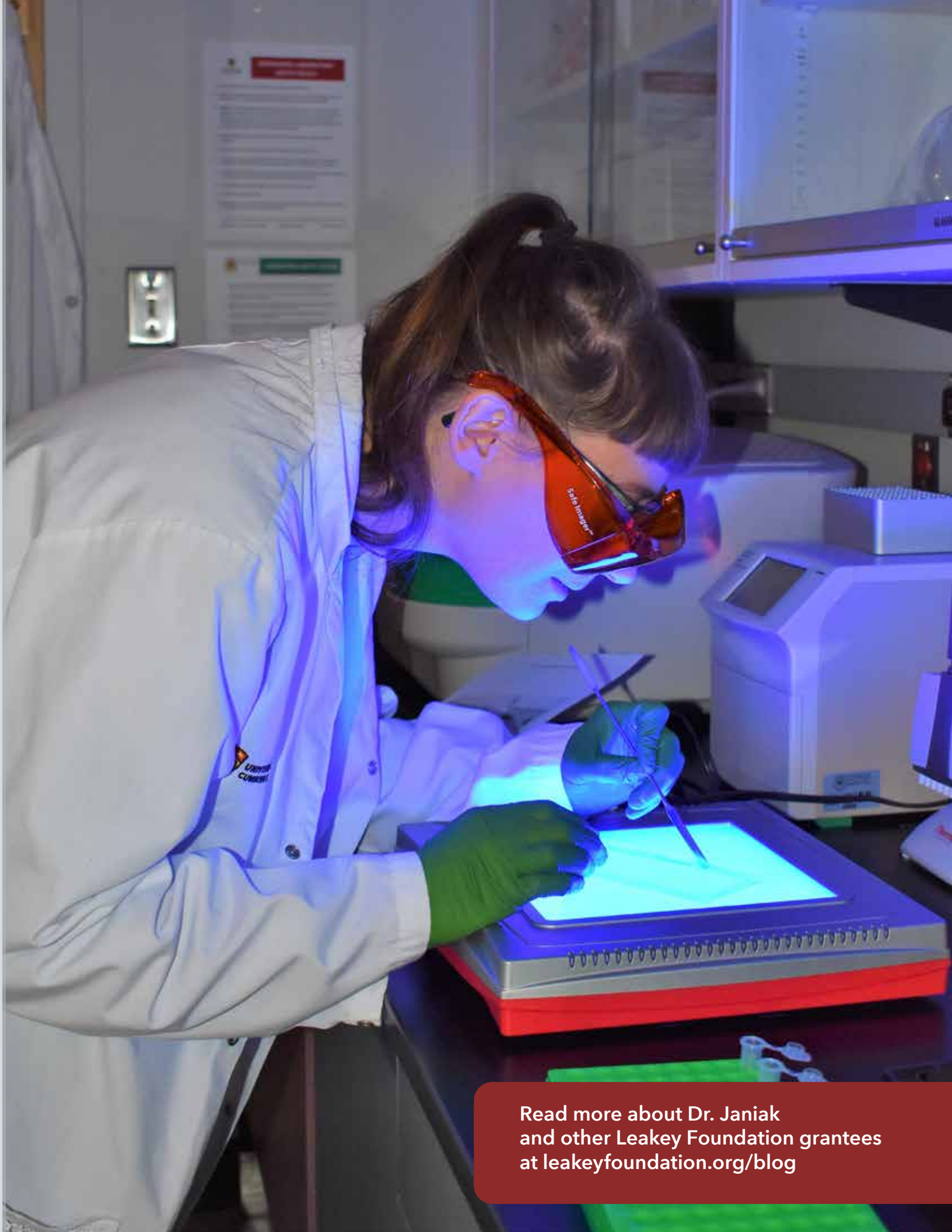
We were excited to start sequencing, but the coronavirus outbreak has put that on hold. At the moment, all of us in the Melin Lab at the University of Calgary are doing our part to flatten the curve and are working only from home. In the meantime, we are donating our spare gloves, masks, etc. to a hospital or lab that is testing for coronavirus.

Q: How did you feel when you found out you were awarded a Leakey Foundation grant?

I was thrilled, to say the least! I was waiting for a train in Penn Station in NYC when I got the email. I immediately texted my co-PI (and supervisor extraordinaire), Amanda Melin, a string of excited messages with lots of exclamation points! This project is the focus of my postdoc, so getting funding from The Leakey Foundation was crucial to being able to do the project in the way we had envisioned. The academic job market is tough (to say the least), so getting this grant and having the financial means to do my work is hugely important for early career researchers like myself. ❖

Mareike Janiak in the Melin lab at the University of Calgary, excising a DNA fragment of interest from an electrophoresis gel.

Photo by Gwen Duytschaever



Read more about Dr. Janiak
and other Leakey Foundation grantees
at leakeyfoundation.org/blog

FEATURE

New pre-print research by Leakey Foundation grantees shows how dozens of non-human primate species, including our closest relatives, are vulnerable to COVID-19.

Primates and COVID-19

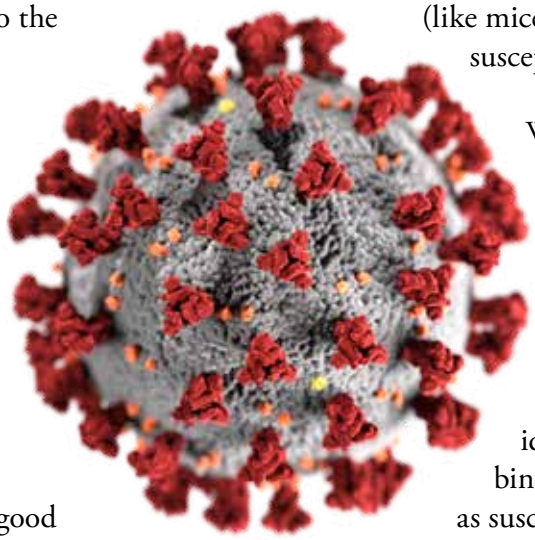
Mareike Janiak
Leakey Foundation Grantee
Postdoctoral Scholar
University of Calgary

The global COVID-19 pandemic is an ongoing humanitarian disaster. Concerns have also been raised about impacts of the novel coronavirus, SARS-CoV-2, on non-human animals, especially our closest living relatives, the great apes and other primates.

Outbreaks of other human diseases among wild primates have had fatal consequences. The Ebola virus killed 5000 gorillas in 2002-2003, and yellow-fever has caused mass mortality in howler monkeys across both Central and South America. In response to SARS-Cov-2, the International Union for Conservation of Nature (IUCN) has released a statement warning of the potential risks of the disease to non-human primates. If they were susceptible to COVID-19, this could be especially devastating to endangered species, whose numbers have already been decimated for other reasons, such as habitat loss. However, the actual risks to non-human primates were unknown.

Without evidence of susceptibility, it is difficult to fully assess risk and more difficult to implement protective measures widely, across zoos, research facilities, and other places where human and non-human primates come into close contact, including in the wild. My colleagues and I set out to harness the available primate genomic data to predict how susceptible non-

human primates might be to the novel coronavirus.



Research about how SARS-CoV-2 invades human cells is rapidly emerging and has identified the ACE2 receptor, which is expressed in the lungs and other tissues, as the primary target. Part of the reason the new virus has become so widespread and deadly is that it is very good at latching onto this receptor in humans, which it then uses to invade our cells. If you look at this image of SARS-CoV-2, you'll notice the surface of this round virus is covered in spikes.

These spike proteins bind effectively to the ACE2 protein, and thanks to the tireless efforts of researchers around the world (including some of our co-authors) we have a pretty good idea of where on ACE2 the coronavirus spike protein attaches. These attachment sites are called binding sites and are some of the individual amino acids that form the human ACE2 protein. Human ACE2 proteins have a combination of amino acids that SARS-CoV-2 can attach to very effectively. Many other animals do not have these binding sites – the virus cannot bind to the ACE2 protein in mice, for example, so it cannot invade their cells.

To assess the risk to non-human primates, we looked at the ACE2 sequence across species. We then modeled the protein interactions between ACE2 and SARS-CoV-2.

This approach can help us predict how susceptible non-human primates might be. If other primates have the same amino acids at these binding sites as humans do, then the virus will probably be able to bind to them very well, and the species may be at risk for COVID-19. However, if other primates have different amino acids at these sites (like mice), then they are probably less susceptible to the virus.

We located the regions of the ACE2 protein to which the SARS-CoV-2 spike protein attaches across 27 primate species and some other mammals. We found that apes and all African and Asian monkeys are identical to humans at all of the binding sites, so they are likely as susceptible to the new virus as humans are.

Primates from the Americas (platyrrhines) have some differences in binding sites. Lemurs and galagos also show variation at some of the binding sites. Our protein interaction models suggest that the changes in the mouse lemur, galagos, and platyrrhines might decrease the virus's ability to attach to ACE2 and make them less susceptible to infection by SARS-CoV-2. Sifakas, on the other hand, likely have similar susceptibility as humans. However, we want to be very clear that these are just computational models, so the safest course of action would be to treat all primates as potentially susceptible.

Overall, our results suggest that dozens of non-human primate species, including our closest relatives, are at risk for SARS-CoV-2 infection and are vulnerable to COVID-19, which could have devastating impacts on populations of primates that are already endangered.

Additional precautions may be necessary to protect captive primates, and action should be taken to limit contact between wild primate populations and humans. While the human toll of the novel coronavirus has been immense and is a tragedy that requires our focus and effort, we likewise have a duty to protect our closest living relatives from its effects. ❖

From left: Symposium organizer Chester Kamin with Mahzarin Banaji, Polly Weissner, co-organizer Richard Wrangham, Alison Brooks, Molly Crockett, Joshua Greene, Francis Fukuyama, and Sebastian Junger

Survival Symposium: Our Tribal Nature

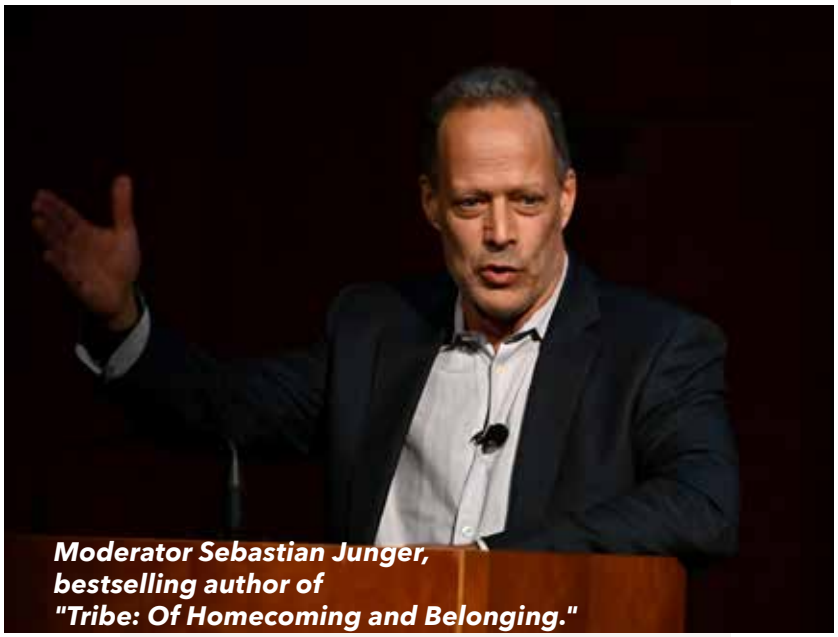
Hannah Wood
Founding Member
Leakey Foundation
Young Professionals Group

Louis Leakey became famous for uncovering human origins, yet he understood that they form only one part of our human story. This holistic view shaped The Leakey Foundation's mission and inspires innovative programming like the *Survival Symposium* series which brings leading thinkers together to explore how evolution defines our past, shapes our present, and impacts our future.

Challenges like climate change were the subject of the first *Survival Symposium* in 2016. "Our Tribal Nature: Tribalism, Politics, and Evolution," the second event in the series, tackled a different kind of problem: the paradox of human tribalism. "These symposiums allow us to analyze important issues in ways that aren't usually discussed," said Sharal Camisa, Executive Director of The Leakey Foundation.

Inspired by the late Dr. David Hamburg, a former Foundation trustee and advisor who studied human conflict, the program featured seven scientists whose talks focused on the evolutionary origins and functions of our tribal instincts and the role they play in building communities and tearing them apart through partisanship, racism, and xenophobia.

All images in this story are by Astrid Stawiarz/ Getty Images for The Leakey Foundation



Moderator Sebastian Junger, bestselling author of "Tribe: Of Homecoming and Belonging."

The speakers together on stage.

Polly Weissner

"Not only do we cooperate, but we do this extraordinary thing where humans are willing to die for each other."

-Sebastian Junger

Held in New York City in September 2019 and moderated by *New York Times* bestselling author Sebastian Junger, "Our Tribal Nature" examined the intense cooperation humans need to thrive. "It's essential to who we are," Junger said. "Not only do we cooperate, but we do this extraordinary thing where humans are willing to die for each other. We have to figure out how to take these adaptations that enabled us to succeed and make sure they are not harmful to us or to the planet in the new circumstances we find ourselves in."

One challenge Foundation trustee Chester Kamin faced in developing the symposium's theme with Harvard primatologist Dr. Richard Wrangham—separating "tribalism" as an evolutionary phenomenon from the derogatory use of "tribal" by European colonisers wanting to justify control over indigenous societies they viewed as "primitive"—illustrates this desire to dehumanize outsiders, a perfect example of tribalism's worst qualities.

Tribes Old and New

There is a big evolutionary advantage that comes from prioritizing the needs of the group over the individual, explained anthropologist Dr. Polly Weissner, the evening's first speaker. Weissner, who studies the formation of attitudes and behaviors within communities, defines a tribe as a group of people who identify with each other due to shared heritage, language, culture, and identity. "These small groups," she said, "were social security systems that cover risks over the lifespan." Her studies of contemporary tribal societies suggest that tribalism is increasingly driven not by traditional dynamics of cooperative community, but by "the exercise of power." Technology accelerates this change because eliminating face-to-face interaction makes it easier to reject outsiders.


Dr. Alison Brooks


Dr. Mahzarin Banaji


Dr. Richard Wrangham

Turning to much earlier technological innovations, ancient stone tools, paleoanthropologist and archaeologist Dr. Alison Brooks discussed the formation of ancient societies. Her research has uncovered evidence of social networks as long as 320,000 years ago. In the archaeological record, she explained, this is represented by "the movement of raw material from distant sources."

In his talk, Dr. Richard Wrangham looked at the deep evolutionary roots of human tribalism. "We see something similar in monkeys," said Wrangham. "But the thing about humans is that our tendencies for tribalism are exaggerated in some ways because we have this extraordinary increase in the amount of tolerance and cooperation that we show within groups." He went on to upack our tendency to enforce norms with moral outrage and aggression, a contrast to the physical aggression of other species, and how that exacerbates the emotional 'us' vs. 'them' dynamic that drives human tribalism.

Psychologist Dr. Mahzarin Banaji opened the night's second act with a lively audience experiment which revealed unconscious cognitive bias towards people most like oneself. Banaji's research has shown that this "implicit tribalism" emerges in children as young as three years old. "Our difficulty," said Banaji, "is that the very thing that makes us succeed, the very thing that protects us… is also the thing that not only harms us individually, but harms us as groups."

An Expanding Society

Dr. Molly Crockett studies how social media intensifies the neurobiology behind our tribal nature. Her talk explored the propensity for moral outrage. "These psychological and neural mechanisms for outrage evolved in the context of small face-to-face interactions in groups of hunter gatherers many thousands of years ago," said Crockett, "but much of our social discourse now takes place online in much larger networks than ever before in human history. I've been studying the neurobiology of moral outrage for more than a decade, but in 2016, in the wake of Brexit and

Dr. Molly Crockett

Dr. Francis Fukuyama

Trump, I started thinking about how the modern context of social media might be changing the nature of moral outrage with potentially far reaching consequences for social life."

Dr. Joshua Greene

According to psychologist Dr. Joshua Greene, this 'us' vs. 'them' conflict is a newer moral problem. The original dilemma of 'me' vs. 'us' facilitates the sacrifice of individual interests for the collective good. This is central to tribalism's evolutionary value. However, as our worldview expanded beyond our own community and small independent groups became large states, tribalism became a social construct as well as an evolutionary impulse.

The night's final speaker, author and political scientist Dr. Francis Fukuyama, argued that states exploit our tribal nature to exert control. "Our innate tribal propensity for altruism towards family and friends make homogeneity a tool states can use to strengthen their legitimacy," said Fukuyama. It's a sobering thought, but Dr. Fukuyama ended with optimism. "These tendencies towards in groups and out groups may be based on evolved human characteristics that are very deeply bred into our psyches, but the definitions of what constitutes the in-group and out-group are completely socially constructed," said Fukuyama. "You can redefine those identities, and you can make them broader and more inclusive rather than narrow and xenophobic."

"We hope that those who attended the conference took away two points," said Chet Kamin, reflecting on the symposium's success. "First, all of us are tribal. We all tend to trust and share among those we regard as similar to us and all too easily fear and distrust others. Second, and more fundamentally, evolutionary science offers fresh opportunities to find solutions to age-old problems. Although the application of evolutionary science to real-life threats such as tribalistic thinking is still in its infancy, the fact that The Leakey Foundation is helping to pioneer it is an exciting step forward." ❖

Watch the *Survival Symposium* online at youtube.com/theleakeyfoundation

Necessity is the Mother of Invention

By Sharal Camisa
Executive Director

As teachers scramble to bring courses online due to the pandemic, there is an urgent need for free, quality educational tools. A challenge of this magnitude requires creative solutions, and that is why The Leakey Foundation is focusing on projects that address the unprecedented situation facing educators and students.

Dr. Bence Viola, Leakey Foundation grantee and professor at the University of Toronto explained, "We are all struggling with moving our courses online suddenly, and any help would be really welcome."

One of the ways we are helping is by creating lesson plans to accompany our award-winning *Origin Stories* podcast. These lesson plans will greatly enhance its value to teachers and students.

Listen and subscribe at leakeyfoundation.org/originstories

Kimberly Cavanaugh, a professor of anthropology at USCB in South Carolina wrote, "I love the *Origin Stories* podcast and use several of the episodes in my classes... hearing the voices of scientists directly impacts learning outcomes for the topic."

Studies have shown that podcasts help students, "bridge the conceptual distance between new and prior knowledge, better understand topics in lectures, and stimulate thinking more deeply about the lecture's content and the possible applications of the subjects of the lecture." (Popova, Kirschner & Joiner, 2014).

On May 5th, the Foundation participated in #GivingTuesdayNow, a global day of philanthropy. Our supporters gave generously to make these new lesson plans possible. Trustee Mark Jordan and Jennifer Gomersall offered to match all donations up to $4,200, and Ann and Gordon Getty matched the total amount raised. With those matches and gifts from 46 supporters, our one-day fundraising total was $23,650.

Origin Stories connects listeners to the larger world, and for this reason I personally sponsored two lesson plans. During this pandemic, when students are asked to shelter-in-place and social distance, these episodes can transport them to faraway places, connect them to colorful characters, and provide rich stories to inspire scientific curiosity. I am proud that the Foundation will continue to honor our commitment to science education while acknowledging that the current teaching landscape is drastically different than it was only a few months ago. ❖

Introducing Lunch Break Science

Our planned in-person events have been postponed until further notice, so we are adapting by exapanding our free online educational outreach. *Lunch Break Science,* The Leakey Foundation's new summer series, launched Thursday, June 25. This series features short talks and interviews with Leakey Foundation grantees about the latest in human origins research.

Join us every Thursday through August 27 at 11 am Pacific, 12 pm Mountain, 1 pm Central, 2 pm Eastern**.**

Lunch Break Science streams live on Facebook, Twitter, YouTube, and leakeyfoundation.org/live.

Schedule

June 25 – Zarin Machanda
July 2 – Lauren Schroeder
July 9 – Chalachew Seyoum
July 16 – Jenny Tung
July 23 – Rachna Reddy
July 30 – Hailay Reda
August 6 – Daniel Lieberman
August 13 – Research Bite - TBD
August 20 – Anne Stone
August 27 – Ainash Childebayeva

Register for calendar reminders at leakeyfoundation.org/live

Origin Stories: The Cave Punan

Deep in the remote forests of Borneo lives a group of hunter-gatherers who speak a language never before shared with outsiders, until now.

Our *Origin Stories* podcast tells the story of the Punan Batu, or Cave Punan people, and their urgent plea for help to save their forest home.

Be among the first to hear the Song Language of the Punan Batu.

leakeyfoundation.org/originstories

Check Out Our YouTube Channel

Videos from our past lectures and symposia are available online at **youtube.com/theleakeyfoundation**

Subscribe today to receive notifications when we post new videos, including *Lunch Break Science*!

LEAKEY FOUNDATION RESEARCH HIGHLIGHTS

Erik Seiffert identifying a small fossil from the site where Ucayalipithecus was found.
Credit: Dorien de Vries

Fossil Teeth Hint at How Monkeys Crossed the Atlantic

Four fossilized monkey teeth found deep in the Peruvian Amazon provide new evidence that more than one group of ancient primates journeyed across the Atlantic Ocean from Africa, according to Leakey Foundation-supported research recently published in the journal *Science*.

The teeth are from a newly discovered species belonging to an extinct family of African primates known as parapithecids. Fossils discovered at the same site in Peru had earlier offered the first proof that South American monkeys evolved from African primates. These tiny teeth help date the transatlantic migration of primates to about 34 million years ago, around the time a major drop in sea level would have made the ocean voyage shorter.

Susan Perry observing a white-faced capuchin monkey at the Lomas Barbudal research site in Costa Rica.

Learning Across the Lifespan

Dr, Susan Perry's Lomas Barbudal Monkey Project is celebrating its 30th anniversary. This long-term capuchin monkey study site was launched in 1990 with a pilot grant from The Leakey Foundation. A study by Perry, recently published in the journal *Philosophical Transcations of the Royal Society B,* explores shifts in how capuchin monkeys approach learning and decision-making across their lifespan. Do they rely on trial-and-error or seek information from others? Do they stick with what they already know or try something new? These findings are based on personality trait ratings of monkeys gathered by more than 50 highly trained observers who knew these monkeys well. This research has fascinating implications for understanding human cognitive development.

Skeletal remains of Homo antecessor.
Credit:
Prof. José María Bermúdez de Castro

Proteins Retrieved From 800,000-Year-Old Fossil Tooth

An important advancement in human evolution studies has been achieved after scientists retrieved the oldest human genetic data set from an 800,000-year-old tooth belonging to *Homo antecessor.* The findings, published in *Nature* and funded in part by The Leakey Foundation, shed light on one of the branching points in the human family tree. "Our results support the idea that *Homo antecessor* was a sister group to the group containing *Homo sapiens*, Neanderthals, and Denisovans," says grantee Frido Welker, first author on the paper. He and his colleagues used a new molecular method, palaeoproteomics, which enables scientists to retrieve molecular evidence to accurately reconstruct human evolution from further back in time than ever before.

Your support made this work possible! Help uncover more of the human story. Become a Bedrock Donor today!

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