

# Seek

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## Shorts

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## Decoding ancient DNA

A Kansas State University researcher is helping to unlock the mystery behind the migration of prehistoric humans from Asia to the Americas.

Marta Alfonso-Durruty, associate professor of anthropology, is part of an international collaborative research project that is sequencing ancient genetic markers to understand how North America and South America — from Alaska to Chile — were populated. She is also a co-author of the group's paper, "Early human dispersals within the Americas," published in the journal *Science*.

For 10 years, Alfonso-Durruty has researched prehistoric remains in the area of Patagonia, Chile. For the latest study, researchers used DNA from ancient dental samples to determine genetic traits. With the resulting gene sequencing, Alfonso-Durruty collaborated with researchers conducting similar projects in other locations to map population patterns from Alaska to Patagonia.

"This work helps us understand the population dynamics that account for the original peopling of the Americas," Alfonso-Durruty said. "It is also revealing there might have been even older populations that entered the Americas before the dates that we have from 12,000 years ago."

According to Alfonso-Durruty, the combined research also has concluded that the populations were moving across the continents very quickly and that they were very diverse in how they used the natural environment. For example, the tools used by each group might have been very different, but the people still had close genetic relations.



*Researchers carefully extract DNA from dental samples to keep teeth intact. Top: Ancient dental samples are organized with the corresponding DNA diagram and await a CT scan. Bottom: A dental sample, left, is next to the matching 3D image created of the tooth, right.*

*Southern Patagonia, Chile, near the Cordillera Darwin mountain range, is where Marta Alfonso-Durruty, associate professor of anthropology, conducts research. (All photo credit: Marta Alfonso-Durruty)*



The protein Headcase, or Hdc, functions together with the protein Unkempt, or Unk, to regulate tissue growth in fruit flies.

## Study identifies proteins that could suppress tumor growth in humans

The concept sounds simple but understanding the process has been elusive: Cut off the nutrient supply to suppress the growth of tumors.

Researchers with Kansas State University's College of Veterinary Medicine are unveiling promising results for this concept by studying the behaviors of specific proteins in fruit flies. The proteins have known counterparts in humans.

Jianzhong Yu, assistant professor of anatomy and physiology, is collaborating with a team that recently identified Headcase, or Hdc, and Unkempt, or Unk. Both are two nutrient-restriction-specific tumor suppressor proteins that restrict cell-cycle progression and tissue growth in response to nutrient stress in *Drosophila* or fruit flies.

"Given the role of the human counterparts of these proteins, our results suggest that Hdc and Unk may function as tumor suppressors in mammals," Yu said. "Although the human ortholog of Unk has not been studied in the context of cell proliferation, we showed that both Hdc and Unk are able to inhibit tissue growth in vivo in the *Drosophila* model. It is worthwhile in the future to investigate the growth control function of these two proteins, especially in regard to the formation of cancer tumors."



Scott Tanona, associate professor of philosophy, is part of a team studying responsible research conduct.

## The ethics of science

Kansas State University collaborators are working across disciplines to explore responsible conduct in research and the goals and values of science that influence practice.

Jon Herington, assistant professor of philosophy; Scott Tanona, associate professor of philosophy; and James Lavery, assistant professor of physics, have received funding from the National Science Foundation to study what scientists think the goals of science should be and how responsible research obeys personal, rule-based, ethical limits.

The team wants to create a new area of study that can address the understanding of what is considered science and the responsibility in conducting ethical research.

"There has been a lot of research done recently on how we motivate scientists to engage in responsible conduct," Herington said. "Our project takes a different approach that says what drives people to engage in responsible conduct in research is not whether they know what the rules are, but what their views are about the goals of science as a whole and whether they think it's their job to help ensure those goals get met. For training in science to be effective at encouraging responsible research, it needs to engage with these views."



*A series of approximately 7- to 8-million-year-old lava flows from the Green Hills in the central Wrangell volcanic arc. The terrain, including the small receding glacier in background, is representative of the Wrangell Mountains.*



*Matthew Brueseke, associate professor of geology, collects river cobbles for age-dating and geochemical analyses from the Kuskulana River in Alaska's Wrangell Mountains.*

## Unearthing new information on Alaska's Wrangell volcanic belt

A new study by a team of geologists that includes Kansas State University's Matthew Brueseke, associate professor of geology, has found that the Wrangell volcanic belt in Alaska's Wrangell-St. Elias National Park and Preserve is older than previously recognized and has determined why its volcanic field has been persistently active since it formed.

The study produced new geochemical and geochronological data that covers the entirety of the volcanic arc's formation. Coupled with data from prior studies, the team determined the age of the volcanic belt.

"The new data helped demonstrate that the Wrangell volcanic belt magmatism initiated at least approximately 30 million years ago, which is several million years earlier than previously recognized," Brueseke said.

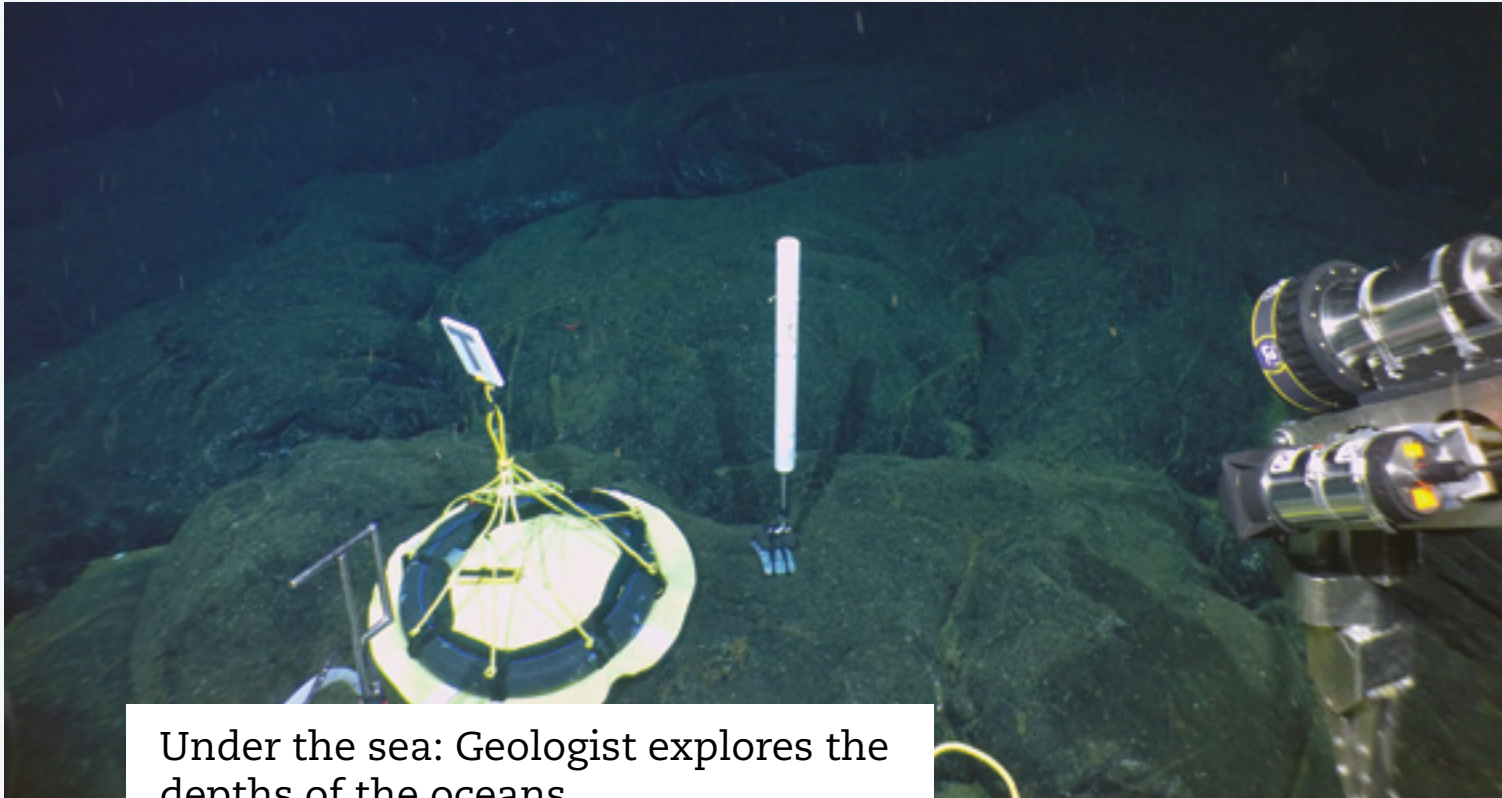
The group also determined that location and geometry have a lot to do with the continuous activity and size of the volcanoes. This creates an environment that allows for increased volumes of magma, which can then move up through the crust along the faults and possibly erupt.

The Wrangell volcanic belt is home to some of the largest — by height and volume — volcanoes on Earth, including at least two that are historically active and considered hazardous by the U.S. Geological Survey.

### ➤ Seek more

View additional photos and videos from geologists Matthew Brueseke and Aida Farough.

[k-state.edu/seek](https://k-state.edu/seek)



## Under the sea: Geologist explores the depths of the oceans

Kansas may be landlocked, but that has not stopped a Kansas State University geologist from going 1.5 miles underwater to explore the deepest parts of the Pacific Ocean.

Aida Farough, a teaching assistant professor of geology, has been spending weeks at sea while she studies the ocean floor, underwater volcanoes and hydrothermal vents at mid-ocean ridges. But Farough's underwater explorations are doing more than helping scientists understand the minerals and microbial life on the ocean floor. Her research can provide key insights to the origin of life on Earth as well as the existence of life and hydrothermal vents on other planets.

"Just because we don't have an ocean in our backyard in Kansas, we shouldn't ignore the oceans and the opportunities of marine exploration," Farough said. "We know less about the oceans than we know about some of the planets in our solar system. In fact, we have better maps of Mars than parts of the oceans within the U.S. territory."

That's why Farough is involved in several large international research projects that are aiming to learn more about the geologic processes on the ocean floor.

During one National Science Foundation-funded research cruise with the University-National Oceanographic Laboratory System, Farough dove to the bottom of the Pacific Ocean — a depth of 2,500 meters, or about 1.5 miles — in Human Occupied Vehicle Alvin. Farough also recently spent two months with International Ocean Discovery Program scientists on the U.S. research drilling vessel called the JOIDES Resolution to study the mineral resources near Brothers volcano, which is the most hydrothermally active volcano in the Kermadec Arc in the Pacific Ocean northeast of New Zealand.

*A circular thermal blanket and a current meter take measurements of the heat flow from the seafloor at the East Pacific Rise. Aida Farough, teaching assistant professor of geology, deployed this thermal blanket.*



*Aida Farough, teaching assistant professor of geology, stands on board the U.S. research drilling vessel called the JOIDES Resolution.*



## Just chill: Research keeps school lunches safe

The school field trip is a springtime ritual: Buses burst with exuberant children who are happy to learn outside classroom walls. But packed lunches coupled with warm temperatures could allow dangerous bacteria to flourish and sicken the travelers.

Researchers from the Kansas State University Center for Food Safety in Child Nutrition Programs in the College of Human Ecology and the Food Science Institute in the animal sciences and industry department have published a study confirming that limiting the time lunches are stored in coolers to less than four hours may reduce the risk of salmonella and listeria monocytogenes growth in a typical school lunch of deli sandwiches, apple slices and baby carrots.

Randy Phebus, professor of animal sciences and industry and interim director of the Food Science Institute, said food safety often is at the back of everyone's mind when field trip excitement hits.

"Spring or summertime heat can cause a school bus waiting in a hot parking lot to reach temperatures that could compromise food stored for a later lunch," Phebus said. "We wanted to know what level of risk this scenario actually poses to schoolchildren."



*Ram Raghavan, spatial epidemiologist, collects long-horned ticks near southeast Queensland in Australia.*

## Predicting the spread of invasive ticks

A tick species known as the long-horned tick could establish itself in North America if the ticks are transported accidentally, according to a study published in Nature's *Scientific Reports* by Ram Raghavan, assistant professor in Kansas State University's College of Veterinary Medicine, and his international team of collaborators.

"The long-horned tick is also known as the east Asian tick, in Australia as the bush tick and in New Zealand as the cattle tick," said Raghavan, a spatial epidemiologist. "This species of tick is native to Japan, China, Primorsky Krai region of eastern Russia and Korea; and it is well-established as an invasive species in Australia, New Zealand and on several Pacific Islands."

In some of these countries, Australia and New Zealand in particular, Raghavan said this tick is implicated in the transmission of theileriosis to cattle — costing several millions of dollars each year — and in other places the tick is known to transmit severe fever thrombocytopenia virus to humans.

Raghavan has conducted extensive field surveys in Queensland, Australia, and collaborated with Steve Barker of the University of Queensland to understand the natural habitat characteristics of these ticks and their wildlife hosts.

# Researchers Down Under

Kansas State University is a worldwide leader in research collaborations with Australia. The university was the first U.S. educational institution to partner with the Australian-American Fulbright Commission, which manages an international exchange program between the U.S. and Australia. Through the program, Australian Fulbright Scholars come to K-State for up to six months to collaborate with university researchers.

The K-State-Fulbright partnership has existed for five years and the university has hosted 10 scholars, including the only Fulbright Distinguished Chairs in the U.S. The university recently renewed the program for five more years.

The university also leverages the Australian Fulbright program through the Oz to Oz program, a seminar series

in which every senior Australian Fulbright Scholar is invited to visit K-State and interact with faculty, staff and students. The university has hosted 12 visits for the 2018-2019 academic year.

“No other university in the country is doing anything like the Oz to Oz program with Fulbrighters from any other country in the world,” said John Leslie, university distinguished professor of plant pathology who helped start the Australian Fulbright program at K-State. “This program focuses on research and helping our faculty members build and expand international networks and collaborations.”

Learn more about the latest Fulbright Scholars from Australia.



*Jeremy Davey, professor, University of the Sunshine Coast*  
Area of study: Sociology

**K-State collaborator:** Lisa Melander, associate professor of sociology

Davey is investigating impaired driving and studying the enforcement of drunk driving laws and drugged driving laws, particularly in the context of the legalization of marijuana in parts of the U.S. He is especially interested in Kansas because of its proximity to Colorado, which has legalized marijuana. Kansas is a Top 10 state in the U.S. for road crashes per vehicle miles traveled, Davey said. He is comparing laws in Kansas and the U.S. with Australian laws, which involve random drug tests.



*Brett Summerell, director, The Royal Botanic Garden Sydney*

Area of study: Plant pathology

**K-State collaborator:** John Leslie, university distinguished professor of plant pathology

Summerell is collaborating with Leslie on a revision of their book, “The Fusarium Laboratory Manual.” Their research focuses on a new species of Fusarium, a mold that causes diseases in most agriculturally important crop plants. Fusarium also can infect livestock and immunocompromised people as well as produce toxins that affect health and limit trade. Summerell has collaborated with the university's plant pathology department since the 1990s. He is a K-State adjunct professor of plant pathology and serves every year as an instructor in the Fusarium Laboratory Workshop.



*Geoff Cockfield, professor, University of Southern Queensland*

Area of study: Agricultural economics

**K-State collaborator:** Allen Featherstone, professor and head of the agricultural economics department

Cockfield has conducted a comparative study of Australian and U.S. agricultural policy. Australia's agricultural sector is mostly deregulated, which provides little support to farmers and exposes farms to immediate market forces. Cockfield has been learning more about U.S. policy and working with K-State experts in crop insurance, market programs, water management and farm bill policy.