travels six times a year to Ecuador, Mozambique, Jordan, and India for projects on topics such as indoor air pollution and refugee mental health. Al-Delaimy has a green card but says he is now afraid to leave the United States. He takes no solace from the fact that the executive order's ban on entry for nationals of the seven countries is limited to 90 days. "I am fearful that this is just going to be extended and extended."

The U.S. scientific community is bound to lose some luster. One potential loss is Yasser Roudi, an Iranian national and an award-winning theoretical physicist and neuroscientist who has dual appointments at the Kavli Institute for Systems Neuroscience Centre for Neural Computation in Trondheim, Norway, and the Institute for Advanced Study in Princeton, New Jersey. He is preparing to return to Norway next month for a 6-month stint in his Trondheim lab, where he collaborates with Nobel laureates May-Britt Moser and Edvard Moser. He recognizes that he may not be able to return to Princeton. Still, Roudi says, "My case is to some degree luxurious because I have a job somewhere else. … But this is going to affect a lot of other people who are in the process of establishing themselves as scientists. That is the biggest place that society will feel the damage."

As dean of the Graduate School at the University of Rhode Island in Kingston, Nasser Zawia, a neuroscientist of Yemeni origin and a naturalized U.S. citizen, oversees recruitment of international graduate students and helps land postdocs. He is deeply concerned about the impact of the executive order. "The Ivy League [schools] are not going to suffer because they get a lot of good domestic talent. But the others who rely on international scholars and students and postdocs will be impacted."

One ray of hope for affected scientists lies in the order's provision allowing the secretaries of state or homeland security to issue visas, on a case-by-case basis, "in the national interest." "We're going to have to demonstrate that the rescue of science and learning is in the national interest," Goodman says. "It's going to take American Nobel laureates and university presidents and us together pleading each case."

Trump's signature on the order may still be drying, but the lives of many scientists are already being upended. Esmailbeigi had booked a ticket to Tehran for her father's 60th birthday party in March. Instead, she's now contemplating a permanent departure—possibly to the United Kingdom, where her sister works in bioinformatics. "You don't choose which country you're born into. But you choose which country you move to," she says. "I chose here, despite all the difficulties. Now, I honestly regret that decision." ■

SCIENTIFIC COMMUNITY

Mexican scientists feel the Trump effect

Economic crisis, border wall threaten collaborations

By **Lizzie Wade**, *in Mexico City*

For Andrés Moreno-Estrada, the news was welcome but the timing, terrible. Moreno-Estrada, who hunts for genetic variations linked to disease, recently learned that he had won a 13-million-peso grant from Mexico and the United Kingdom to sequence DNA from blood samples in a public health biobank. But 13 million pesos isn't what it was before Donald Trump assumed the U.S. presidency. When the population geneticist at the National Laboratory of Genomics for Biodiversity (LANGEBIO) in Irapuato, Mexico, submitted his proposal in November 2015, the exchange rate was 16 pesos to the dollar, and his grant would have been worth $812,500. Now, the rate is 21 pesos to the dollar. "There's no way I can do what I committed to," he says, unless he raises more money.

> ***"Geography made us cousins. This is like breaking up a family."***
>
> **Carlos Gay**, National Autonomous University of Mexico

The fall of the peso, provoked in part by Trump's insistence on building a border wall and making Mexico pay for it, is one contributor to the waves of angst sweeping through the Mexican science community. "Every time Trump tweets something about Mexico, the peso takes a hit," says Daniela Robles-Espinoza, a cancer geneticist who is outfitting a new lab at the International Laboratory for Human Genome Research in Juriquilla, Mexico. As the dollar value of grants shrinks, so does buying power: Mexican scientists purchase most of the research materials and equipment they use from the United States. The peso depreciation also strains Mexican scientists hoping to travel to international conferences or publish in journals that require publication fees.

Trump's harsh stance toward Mexico has made scientists here nervous about the fate of U.S. funding for cross-border collaborations. "The worry is that [Trump] will limit, or perhaps end, some of the academic exchange we have," either through new regulations or by cutting off money for collaborations, says Jaime Urrutia-

PHOTO: BLOOMBERG/CONTRIBUTOR/GETTY IMAGES

Bad blood between the presidents of Mexico and the United States could poison science cooperation.

Fucugauchi, a geophysicist at the National Autonomous University of Mexico (UNAM) here and president of the Mexican Academy of Sciences. The U.S. National Science Foundation currently supports about 200 projects with Mexican collaborators. Mexico's National Council for Science Technology (Conacyt) said in a statement that "it is an opportune moment" to expand collaborations with other countries including the European Union and China.

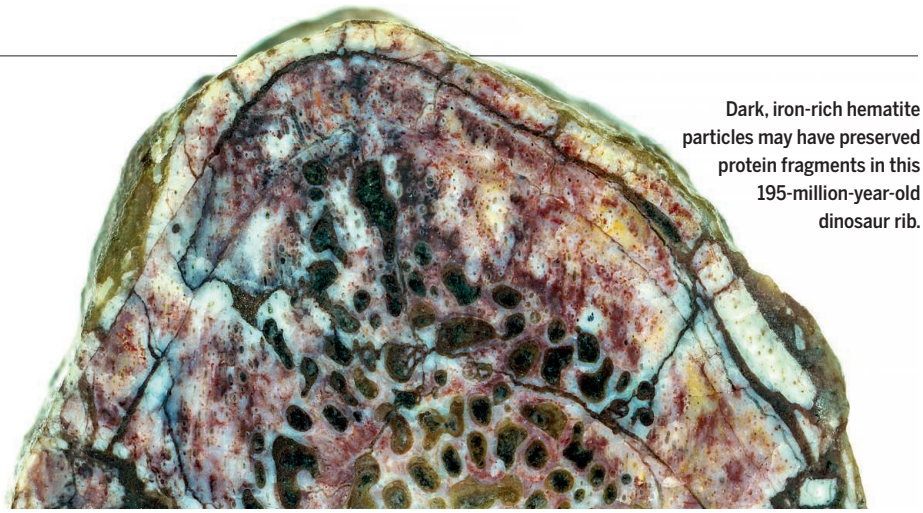
Economic turmoil could also harm industries that support innovation in Mexico. Many Mexican scientists and engineers work in auto manufacturing, aerospace, and pharmaceuticals. Trump has threatened to impose tariffs on cars assembled in Mexico, which has already prompted Ford to abandon plans for a new factory in San Luis Potosí. If foreign companies that have been hiring Mexicans with advanced degrees stop doing business in the country, "that would be a true disaster," says Luis Herrera-Estrella, director of LANGEBIO. "It would cause terrible unemployment in Mexico."

Amid nationwide calls to support Mexican businesses and boycott U.S. firms, Lorenza Haddad sees a glimmer of hope. A Mexican geneticist who studied in the United States, she's the CEO of Código 46, a new company in Cuernavaca that plans to offer genotyping services for personalized medicine to Mexican clients starting next month. "The way Mexico has been talked about lately, it puts us on the map a lot more than before," she says.

Chilly relations may also change the calculus for promising young Mexican scientists planning to go abroad. Like scientists from countries targeted by Trump's immigration order (see p. 439), Mexican researchers who normally would come to the United States for graduate training or postdocs say they may find a warmer welcome elsewhere. In 2016 Conacyt awarded 1550 grants to graduate students and researchers studying in the United States, making it the No. 1 destination for Mexican scientists abroad. Santiago Rábade, who is working toward his master's degree in earth sciences at UNAM, says that many peers are now considering pursuing degrees in the European Union or Japan—"where there is less anti-Mexican sentiment." Rábade says he still plans to apply to doctoral programs at U.S. universities, but he is uneasy. "I'm making a major life decision. Is the United States really a good place to be for 5 years?" he asks. "It no longer seems like a friendly place."

"Geography made us cousins," says UNAM climate scientist Carlos Gay. "This is like breaking up a family." ■

Additional reporting by Jeffrey Mervis.



Dark, iron-rich hematite particles may have preserved protein fragments in this 195-million-year-old dinosaur rib.

PHOTO: ROBERT REISZ

PALEONTOLOGY

Researchers close in on ancient dinosaur proteins

"Milestone" paper opens door to molecular approach

By **Robert F. Service**

It's not quite Jurassic Park: No one has revived long-extinct dinosaurs. But two new studies suggest that it is possible to isolate protein fragments from dinosaurs much further back in time than ever thought possible. One study, led by Mary Schweitzer, a paleontologist from North Carolina State University in Raleigh who has chased dinosaur proteins for decades, confirms her highly controversial claim to have recovered 80-million-year-old dinosaur collagen. The other paper suggests that protein may even have survived in a 195-million-year-old dino fossil.

The Schweitzer paper is a "milestone," says ancient protein expert Enrico Cappellini of the University of Copenhagen's Natural History Museum of Denmark, who was skeptical of some of Schweitzer's earlier work. "I'm fully convinced beyond a reasonable doubt the evidence is authentic." He calls the second study "a long shot that is suggestive." But together, Cappellini and others argue, the papers have the potential to transform dinosaur paleontology into a molecular science, much as analyzing ancient DNA has revolutionized the study of human evolution.

Back in 2007 and 2009, Schweitzer reported in *Science* that she and her colleagues had isolated intact protein fragments from 65-million- and 80-million-year-old dinosaur fossils (*Science*, 13 April 2007, p. 277, and *Science*, 1 May 2009, pp. 578 and 626). But the claims were met with howls of skepticism from biochemists and paleontologists who saw no way that fragile organic molecules could survive for tens of millions of years, and wondered whether her samples were contaminated with modern proteins.

Then last year Cappellini and Matthew Collins, a paleoproteomics expert at the University of York in the United Kingdom, and colleagues managed to identify protein fragments from 3.8-million-year-old ostrich egg shells, a claim that most of their colleagues found convincing (see http://scim.ag/ostrichshells). Now, the case for dramatically older proteins seems to be firming up, too.

Last week in the *Journal of Proteome Research*, Schweitzer, her postdoc Elena Schroeter, and colleagues report that they did a complete makeover of their 2009 experiment to rule out any possible contamination. They took new samples from the same 80-million-year-old fossil, of a duck-billed dinosaur called *Brachylophosaurus canadensis*. They reworked procedures for extracting would-be proteins from the bone, identified protein fragments with a more sensitive mass spectrometer, and compared the recovered protein sequences to those from many more living animals. Schroeter even went so far as to break down the mass spectrometer piece by piece, soak the whole thing in methanol to remove any possible contaminants, and reassemble the machine. "About the only thing that is the same [as the 2009 experiments] is the dinosaur," Schweitzer says.

In their 2009 paper Schweitzer's team had identified three fragments of a pro-

Science

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