and bottle in a single device. At the meeting, physicist Zhaowen Tang of the Los Alamos lab described his team's plans to put a particle detector inside a bottle neutron trap and count neutrons using both methods.

Another possibility is that the beam and bottle approaches have been measuring the neutron lifetime correctly, but that some unseen factor accounts for the discrepancy between the two. A leading idea is that neutrons might occasionally decay into not just protons but also dark matter, the mysterious unseen material that makes up much of the Universe[3].

"It would be amazing if the good old neutron turns out to be the particle that opens the gates of the dark sector for us," says Bartosz Fornal, a theoretical physicist at the University of California, San Diego. But experimentalists haven't yet been able to confirm this, several teams reported at the Denver meeting.

In the meantime, the NIST beam experiment has been gathering fresh data, using sensitive detectors and other components that will make it more precise than past runs — measuring the neutron lifetime to within one second, rather than three to four seconds as has happened so far. "Everybody's waiting for the results," says Nadia Fomin, a physicist at the University of Tennessee in Knoxville. The team is already designing its next-generation experiment, which aims to nail the neutron lifetime to within 0.3 seconds. ■

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2. Yue, A. T. *et al. Phys. Rev. Lett.* **111**, 222501 (2013).
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POLITICS

Science embroiled in China–US tensions

Government-funded research, conference travel and visas are all touched by the situation.

BY ANDREW SILVER, JEFF TOLLEFSON & ELIZABETH GIBNEY

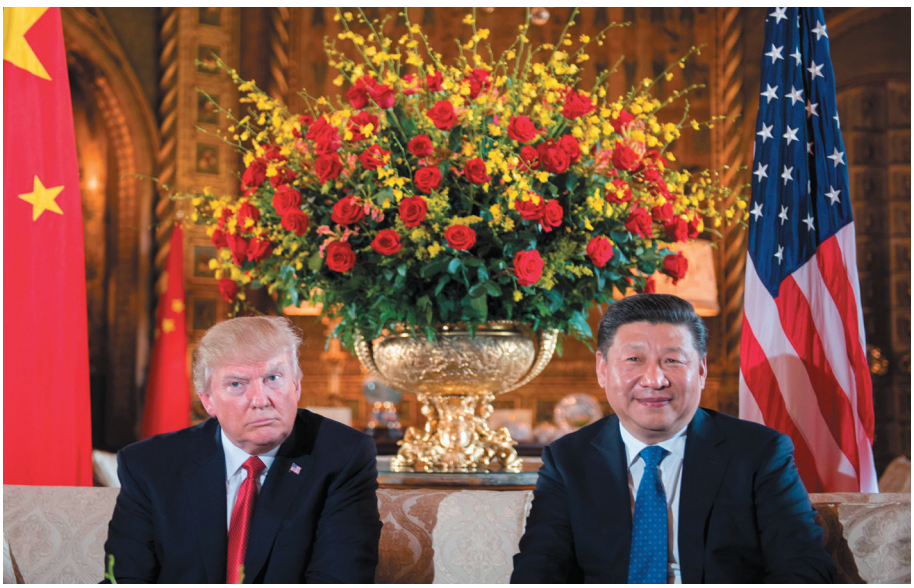
Research is becoming increasingly mired in ongoing political tensions between the United States and China.

In the latest twist, the University of Texas MD Anderson Cancer Center in Houston has moved to terminate the employment of three scientists after the US National Institutes of Health (NIH) said that they had committed serious violations of agency rules regarding confidentiality of peer review, conflicts of interest and disclosure of foreign ties. The agency also sent letters to MD Anderson, which receives NIH funding, about two other researchers.

The revelations, first published jointly by *Science* (see go.nature.com/2vhuxik) and the *Houston Chronicle*, are part of a wider NIH crackdown. MD Anderson officials have not released the names of the scientists, but confirmed to *Nature* that all self-identified as "Asian" on internal documents. *Science* reported that at least three are ethnically Chinese.

Meanwhile, Chinese scientists planning to attend meetings in the United States told *Nature* that they are experiencing significant delays in obtaining short-term visas. Those affected include star quantum physicist Jian-Wei Pan, who heads China's world-leading programme in super-secure quantum communication at the University of Science and Technology of China in Hefei.

Nature investigates the circumstances of the tensions, and the repercussions for scientists.



JIM WATSON/GETTY

US President Donald Trump with Chinese President Xi Jinping in Florida in 2017.

What's the background?

For several years, the United States has accused China of distorting global trade by offering generous subsidies to favoured industries and restricting foreign companies' access to its markets. It also says that Chinese policies are forcing US companies to hand over intellectual property in exchange for access to Chinese markets. After several rounds of negotiations to resolve these issues failed, US President Donald Trump started a trade war when he put tariffs on 818 Chinese goods. China followed suit with tariffs on 545 US goods. Further meetings between the two countries have so far failed to strike new trading terms.

How did science get sucked in?

Last August, NIH director Francis Collins wrote a letter to the more than 10,000 US institutions that the agency funds, stating that it was concerned that "some foreign entities" were interfering in the funding, research and peer review of NIH-supported projects.

Then, earlier this month, Collins told the Senate Appropriations Committee that investigations at 55 US universities had found some "egregious" breaches of rules governing the agency's grants and that universities would this month announce actions they have taken against foreign scientists caught breaking rules.

MD Anderson says it received letters from the NIH concerning five of its scientists, and elected to terminate the employment of three after it and the University of Texas system investigated. Two of the researchers chose to resign, and ▶

termination is under way for the third. The University of Texas and MD Anderson are still investigating one researcher, and say that ending another's employment is not warranted. Four of the researchers were accused of improperly sharing confidential information about grant applications, and one of sending at least one grant application containing proprietary information to a scientist in China, according to a redacted version of the letters.

Science and the *Houston Chronicle* also report that they have identified three further institutes that received letters from the NIH, concerning a total of eight researchers.

What about other agencies?

This February, a memo from the Department of Energy reportedly said the department was banning its employees, contracted scientists and grant recipients from participating in talent-recruitment programmes run by the governments of "sensitive" countries, over fears that participants could share government research.

The memo didn't specifically mention China, but since 2008, the country's Thousand Talents Plan has prompted thousands of Chinese engineers and scientists to return to China, many of them from the United States. Researchers are given prominent positions and generous funding, and some maintain affiliations at institutions in both countries.

What about visas?

The US state department has also imposed new restrictions. Following a policy introduced last June, Chinese graduates wanting to studying robotics, aviation or high-tech manufacturing in the United States can no longer apply for five-year study visas; the policy allows these students to apply for one-year visas only.

Is travel affected by the rising tensions?

It seems so. Several scientific conferences in the United States have reported visa delays for Chinese nationals, including the Astronomical Data Analysis Software & Systems conference in College Park, Maryland, last November. Of the 24 Chinese researchers who applied for the conference, only 6 were granted visas, says Peter Teuben, an astronomer at the University of Maryland in College Park who helped to organize the conference.

"Chinese students are looking to the European Union for career opportunities."

Pan told *Nature* that he has missed two conferences in the US this year, including the American Association for the Advancement of Science meeting — where he was to have collected the prestigious Newcomb Cleveland Prize for an outstanding paper published in the journal *Science* — because he was not granted a visa in time. "It is obviously more difficult to get a US visa [now]," says Pan.

He received a three-month, single-entry visa last month. In the past, he has obtained multi-entry visas for a year in less than a month. "The difficulty definitely causes obstacles for scientific collaboration between scientists in the US and other countries," he says.

Are the tensions affecting science in China?

Many Chinese scientists don't want to speak publicly about the situation. But Jay Siegel, dean of the School of Pharmacy at Tianjin University, says the country is less reliant on collaborating with the United States than it was a decade or two ago. Students and investors are looking to the European Union for career opportunities or business development, which is seen as more open and accepting of Chinese collaborations, says Siegel. If visa problems continue, Chinese researchers will try to strengthen their relationships with Europe. "They'll go where they're welcome." ■

GENETICS

Height's 'missing heritability' found

Analysis of 20,000 genomes reveals that rare gene variants can help to explain how the trait is inherited.

BY LINDA GEDDES

You need only to look at families to see that height is inherited — and studies of identical twins and families confirm that suspicion. But since the human genome was first sequenced nearly two decades ago, geneticists have struggled to fully identify the genetic factors responsible.

Many studies searching for the source of this heritability had focused on common gene variants. But even though researchers had identified hundreds of these common variants linked to height, each one had a tiny effect that together didn't amount to the genetic contribution predicted by family studies. This phenomenon, which occurs for many other diseases and traits, was dubbed missing heritability.

Now, a study suggests that most of the missing heritability for height and body mass index (BMI) can, as some researchers had suspected, be found in rare gene variants that had lain undiscovered until now.

"It is a reassuring paper because it suggests that there isn't something terribly wrong with genetics," says Tim Spector, a genetic epidemiologist at King's College London. "It's just that sorting it out is more complex than we thought." The research was posted to the bioRxiv preprint server on 25 March (P. Wainschtein *et al.* Preprint at bioRxiv https://doi.org/10.1101/588020; 2019).

SCOURING THE GENOME

To seek out the genetic factors that underlie diseases and traits, geneticists turn to mega-searches known as genome-wide association studies (GWAS). These scour the genomes of, typically, tens of thousands of people — or, increasingly, more than a million — for single-letter changes, or SNPs, in genes and elsewhere that commonly appear in individuals with a particular disease or that could explain a common trait such as height.

But GWAS have limitations. Because sequencing the entire genomes of thousands of people is expensive, GWAS themselves scan only a strategically selected set of SNPs, perhaps 500,000, in each person's genome. That's only a snapshot of the roughly six billion nucleotides — the building blocks of DNA — strung together in our genome. And these 500,000 common variants would have been found from sequencing the genomes of just a few hundred people, says Timothy Frayling, a human geneticist at the University of Exeter, UK.

A team led by Peter Visscher at the Queensland Brain Institute in Brisbane, Australia, decided to investigate whether rarer SNPs than those typically scanned in GWAS might explain the missing heritability for height and BMI. They turned to whole-genome sequences — complete readouts of all 6 billion bases — of 21,620 people. (The authors declined to comment on the preprint, because it is under submission at a journal.)

They relied on the simple principle that all people are related to some extent — albeit distantly — and that DNA can be used to calculate degrees of relatedness. Then, information on the people's height and BMI could be combined to identify both common and rare SNPs that might be contributing to these traits.

Say, for instance, that a pair of third cousins is closer in height than a pair of second cousins is