News in focus

say they know of researchers with Chinese backgrounds who have left the United States because they felt nervous or unsafe. Alice Huang, a biologist at the California Institute of Technology in Pasadena and vice-president of the 80-20 Educational Foundation, an advocacy group for Asian American equality, says she knows of around four researchers of Chinese descent who were US citizens and have left the country in the past two years. Some left because they felt they were being targeted by the FBI or NIH, or feared being investigated by them. But she thinks the numbers of researchers leaving the United States are much greater than the cases she's heard about. "We are damaging our own scientific enterprise," says Huang.

Chu knows of a Chinese national who earned a US PhD but has accepted a faculty position in China because of a perceived unfriendly environment in the United States. And he says he's heard from researchers working in science, engineering, technology and mathematics (STEM) who feel unwelcome, or who worry about losing out on jobs or competitive funding because of their country of origin. "I'm trying to convince these people not to go back [to China]," he says. "If it wasn't for immigrant scientists, we would be a second-tier STEM country." However, Chu notes that some researchers are leaving for good opportunities in China.

Researchers of Chinese descent in the United States are also increasingly seeking legal advice because they're concerned they'll be investigated by the government or their institution, says Frank Wu, president of Queen's College, City University of New York, who helps researchers to find suitable lawyers. He says that in the past two years, he's gone from receiving no calls from researchers seeking lawyers to receiving dozens of calls. "They're worried their lives will be ruined for no good reason," he says.

It's difficult to measure whether a significant number of ethnic Chinese scientists have been leaving the United States in response to the government crackdown. Those kinds of data aren't routinely collected, says Brad Farnsworth, vice-president for global engagement at the American Council on Education in Washington DC. But he says that ethnic Chinese researchers in the United States have become even more worried about being under scrutiny since Charles Lieber, a chemist at Harvard University in Cambridge, Massachusetts, was arrested in January for allegedly making false statements about his ties to China. "The level of anxiety has definitely gone up," Farnsworth says.

Concerns about racial profiling

Some scientists and US lawmakers have raised concerns that the government crackdown is verging on racial profiling – the practice of targeting people because of their racial or

ethnic background. The concerns sparked a formal investigation by Congress's House of Representatives. In February, representatives Jamie Raskin and Judy Chu, both Democrats, sent letters to the FBI and NIH requesting details of practices that they thought to be suggestive of racial profiling, such as reportedly encouraging universities to scrutinize Chinese Americans or researchers with connections to China. The letter to the FBI also mentions a 2018 study that found that 52% of individuals charged by the US Department of Justice with

"If it wasn't for immigrant scientists, we would be a second-tier STEM country."

economic espionage since 2009 have been of Chinese heritage (A. C. Kim *Cardozo Law Rev.* **40**, 749–822; 2018). But those people were more than twice as likely to be acquitted or have charges against them dropped compared with non-Asian defendants.

Raskin told *Nature* by e-mail that he has received responses from the agencies, and had a briefing with the NIH. "While I get the serious national security implications of Chinese government espionage, none of that justifies dragnet-style ethnic profiling of U.S. citizens who are Chinese-American," he says. "What distinguishes us from authoritarian governments is our Bill of Rights and commitment to the civil liberties and equal rights of all citizens."

The agencies have denied that racial profiling

is happening. An FBI spokesperson told *Nature* in a statement that it does not conduct investigations based solely on race, ethnicity or national origin into unlawful activity or threats to national security. "It would not be appropriate for the FBI to ask any university, company, or other entity to profile individuals based on their ethnicity," they wrote. The FBI also stated that it does not comment on engagements with Congress.

When asked to comment on the House investigation and the letter from Raskin and Chu, an NIH spokesperson told *Nature* that it does not comment on continuing investigations. The spokesperson noted that most researchers are honest contributors to the advancement of scientific knowledge. But over the past few years, the agency has been made aware of subversive efforts by foreign entities to coax US scientists to violate the terms and conditions of grant awards for personal gain. When the agency identifies threats, it notifies grant institutions and asks them to investigate, they said.

The Department of Justice does not target researchers for prosecution based on their ethnicity, says Adam Hickey, a deputy assistant attorney general at its national security division. But he agrees that many people prosecuted under the department's 'China Initiative', a programme to counter intellectual-property theft or economic espionage involving China, have been people of Chinese heritage. The initiative has led to several prosecutions of academics – mostly involving tax evasion, grant fraud or making false statements about overseas affiliations.

WHY ARCTIC FIRES ARE BAD NEWS FOR CLIMATE CHANGE

Unprecedented wildfires released record levels of carbon, partly because they burnt peatlands.

By Alexandra Witze

ildfires blazed along the Arctic Circle this summer, incinerating tundra and blanketing Siberian cities in smoke. By the time the fire season waned at the end of last month, the blazes had emitted a record 244 megatonnes of carbon dioxide – that's 35% more than last year, which also set records. One culprit, scientists say, could be peatlands that are burning as the top of the world melts.

Peatlands are carbon-rich soils that

accumulate as waterlogged plants slowly decay, sometimes over thousands of years. They are the most carbon-dense ecosystems on Earth; a typical northern peatland packs in roughly ten times as much carbon as a boreal forest. When peat burns, it releases its ancient carbon to the atmosphere, adding to the heat-trapping gases that cause climate change.

Nearly half the world's peatland-stored carbon lies between 60 and 70 degrees north, along the Arctic Circle. The problem with this is that historically frozen carbon-rich soils are expected to thaw as the planet warms, making them even more vulnerable to wildfires and more likely to release large amounts of carbon. It's a feedback loop: as peatlands release more carbon, global warming increases, which thaws more peat and causes more wildfires (see 'Peatlands burning'). A study published last month shows that northern peatlands could eventually shift from being a net sink for carbon to a net source, further accelerating climate change (G. Hugelius *et al. Proc. Natl Acad. Sci. USA* **117**, 20438–20446; 2020).

The unprecedented Arctic wildfires of 2019 and 2020 show that transformational shifts are already under way, says Thomas Smith, an environmental geographer at the London School of Economics and Political Science. "Alarming is the right term."

Zombie fires

CIRILL KUKHMAR/TASS/GETTY

As early as May, there were fires blazing north of the tree line in Siberia, which normally wouldn't happen until around July. One reason is that temperatures in winter and spring were warmer than usual, priming the landscape to burn. It's also possible that peat fires had been smouldering beneath the ice and snow all winter and then emerged, zombie-like, in the spring as the snow melted. Scientists have shown that this kind of low-temperature, flameless combustion can burn in peat and other organic matter, such as coal, for months or even years.

Researchers are now assessing just how bad this Arctic fire season was. The Russian Wildfires Remote Monitoring System catalogued 18,591 separate fires in Russia's two easternmost districts, with a total of nearly 14 million hectares burnt, says Evgeny Shvetsov, a fire specialist at the Sukachev Institute of



Fires in Siberia released record-setting amounts of carbon dioxide this year.

Forest, which is part of the Russian Academy of Sciences in Krasnoyarsk. Most of the burning happened in permafrost zones, where the ground is normally frozen year-round.

To estimate the record carbon dioxide emissions, scientists with the European Commission's Copernicus Atmosphere Monitoring Service used satellites to study the wildfires' locations and intensity, and then calculated how much fuel each had probably burnt (see go.nature.com/2zk8wcn). Yet even that is likely to be an underestimate, says Mark Parrington, an atmospheric scientist at the European Centre for Medium-Range Weather Forecasts in Reading, UK, who was involved in



the analysis. Fires that burn in peatland can be too low-intensity for satellite sensors to capture.

The problem with peat

How much this year's Arctic fires will affect global climate over the long term depends on what they burnt. That's because peatlands, unlike boreal forest, do not regrow quickly after a fire, so the carbon released is permanently lost to the atmosphere.

Smith has calculated that about half of the Arctic wildfires in May and June were on peatlands – and that in many cases, the fires went on for days, suggesting that they were fuelled by thick layers of peat or other soil rich in organic matter (see go.nature.com/3ip4d3y).

And the August study found that there are nearly four million square kilometres of peatlands in northern latitudes. More of that than previously thought is frozen and shallow – and therefore vulnerable to thawing and drying out, says Gustaf Hugelius, a permafrost scientist at Stockholm University who led the investigation. He and his colleagues also found that although peatlands have been helping to cool the climate for thousands of years, by storing carbon as they accumulate, they will probably become a net source of carbon being released into the atmosphere – which could happen by the end of the century.

Fire risk in Siberia is predicted to increase as the climate warms (B. G. Sherstyukov and A. B. Sherstyukov *Russ. Meteorol. Hydrol.* **39**, 292–301; 2014), but by many measures, the shift has already arrived, says Amber Soja, an environmental scientist who studies Arctic fires at the US National Institute of Aerospace in Hampton, Virginia. "What you would expect is already happening," she says. "And in some cases faster than we would have expected."

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