

# ANCIENT GENOMES SHOW HOW HUMANS ESCAPED EUROPE'S DEEP FREEZE

A pair of studies offers the most detailed look yet at groups of hunter-gatherers during the last ice age.

By Ewen Callaway

spread between humans. That leads Kuiken to think that the risk of a human pandemic is low. But the uptick in cases among wild birds and the discovery that the virus can be transmitted between mammals increase the risk that it could start spreading in humans. Kuiken would like to see increased surveillance of people who work in the poultry sector to make sure anyone who becomes infected is quickly isolated and treated.

If bird flu does trigger a human pandemic, there are a number of tools for combating the disease. Approved human vaccines against avian flu exist, and the World Health Organization monitors the evolution of H5N1 so that these vaccines can be updated appropriately. In the United States, the Biomedical Advanced Research and Development Authority has a stockpile of vaccines, although the supply is too low to be used to vaccinate widely around the world. Animal studies and observational data in humans suggest the antiviral drug Tamiflu is effective against H5N1 in people (J. R. Smith *J. Antimicrob. Chemother.* **65**, ii25–ii33; 2010), although there have been reports of resistant strains (M. D. de Jong *et al. N. Engl. J. Med.* **353**, 2667–2672; 2005). Non-pharmaceutical tools including face masks can also limit disease spread.

For a world still reeling from COVID-19, the prospect of another pandemic is alarming. Bird flu's current mortality rate in humans is around 50%, although that would be likely to drop if the virus gained the ability to infect cells in the upper respiratory tract — a prerequisite for efficient human-to-human spread. But several scientists say that an H5N1 pandemic would probably be more manageable than COVID-19 because of the drugs and vaccines that are already available, and because of tools such as mRNA vaccines that were developed as a result of COVID-19. "Not to say it won't be a mess," says Stallknecht, "but it probably won't be as bad as it could be."

Hill agrees that humanity has the tools needed to keep the virus in check. "The question is control at this point, and preventing a human pandemic," she says. "And I think both of those are achievable goals."

By Saima May Sidik

**L**ike retirees who flock to the Costa del Sol, ancient European hunter-gatherers sought out Spain's warmer climate during the peak of the last ice age.

A pair of ancient-genome studies shows that humans who had holed up in the Iberian Peninsula repopulated western Europe after the retreat of glaciers that covered large parts of the continent from about 26,000 to 19,000 years ago<sup>1,2</sup>.

The research — based on newly sequenced genomes from more than 100 individuals — offers the most detailed look yet at groups of hunter-gatherers who lived in Europe before, during and after the last ice age.

Ancient genomes from this period are scarce, so "even adding one data point is really important", says Mateja Hajdinjak, a molecular biologist at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, who was not involved in either study.

*Homo sapiens* migrating out of Africa reached Europe at least 45,000 years ago — and possibly earlier. But the handful of ancient genomes from this period suggest

that these pioneers left no genetic trace in later hunter-gatherers.

Instead, a landmark 2016 study<sup>3</sup> identified a genetic signature in 35,000-year-old remains from the Goyet cave system in Belgium, which persisted in hunter-gatherer populations that lived tens of thousands of years later. The Goyet remains were associated with artefacts from the Aurignacian, a Europe-wide material culture known for its elaborate cave-wall art and 'Venus' figurines.

## Missing persons

But the 2016 study raised a mystery. The Goyet ancestry was missing in remains from a roughly 20,000-year period leading up to and during the peak of the ice age, before reappearing later in hunter-gatherers in western Europe. "Where were these people hiding for 20,000 years?" asks Cosimo Posth, a palaeogeneticist at the University of Tübingen in Germany.

To find out, Posth and his colleagues sequenced ancient DNA from 116 hunter-gatherers who lived in Europe and western Asia between 35,000 and 5,000 years ago, and analysed previously sequenced genome data from hundreds more.



These 14,000-year-old skulls were found in western Germany. Their genetic ancestry suggests that human populations migrated in response to Europe's changing climate.

## News in focus

Among the trove they detailed in *Nature* on 1 March<sup>1</sup> are several pre-ice-age individuals from sites in France and Spain. Their remains were found with artefacts attributed to another pan-European material culture known for its figurines, called the Gravettian. When Posth's team looked at these people's genomes, the researchers found a direct link to the earlier Goyet population that had seemingly vanished.

The researchers traced this ancestry to 21,000- and 23,000-year-old remains from sites in northern Spain and southwestern France, respectively. These sites are linked to another culture called the Solutrean.

A separate study reported on 1 March in *Nature Ecology and Evolution*<sup>2</sup> found that the 23,000-year-old body of a man found at a site in southern Spain – also linked to Solutrean artefacts – also showed evidence of Goyet ancestry.

The two studies suggest that the Iberian Peninsula was a refuge for hunter-gatherers as the climate cooled and glaciers ensconced northern Europe. The genetic signature – the same one found in Goyet 35,000 years ago – later pops up across western Europe and even into Poland after Europe's climate warmed.

### Ice-age refuges

Iberia wasn't Europe's only ice-age holdout, says Posth. His team discovered a genetic signature in post-ice-age people in northern Italy that eventually reached Sicily. But these people were not related to humans who were in Italy before the peak of the ice age, nor to the western hunter-gatherer groups.

Instead, they descend from people who saw out the coldest periods in southeastern Europe, probably in the Balkans, says Posth. There is currently no ancient DNA from this period to confirm that hunch, he adds, leaving a "big empty spot on the map".

Colin Wren, an archaeologist at the University of Colorado Colorado Springs, says those findings confirm his own work, suggesting that ice-age Italy was less hospitable to humans than was Iberia<sup>4</sup>. Italy was once connected to Croatia by a now-submerged plain, so it makes sense that eastern hunter-gatherers moved in, he adds.

The studies paint a dynamic picture of European hunter-gatherer populations, which don't always line up with cultural shifts, says Natasha Reynolds, a palaeolithic archaeologist at the University of Bordeaux, France. They also show that, for parts of Europe at least, the coldest period of the ice age wasn't as inhospitable as it's often made out to be. "People weren't just huddling in caves waiting for the glaciers to retreat," she says.

1. Posth, C. et al. *Nature* **615**, 117–126 (2023).
2. Villalba-Mouco, V. et al. *Nature Ecol. Evol.* <https://doi.org/10.1038/s41559-023-01987-0> (2023).
3. Fu, Q. et al. *Nature* **534**, 200–205 (2016).
4. Wren C. D. & Burke, A. *PLoS ONE* **14**, e0217996 (2019).



Activists in Los Angeles, California, protest against anti-Asian racism.

# SHADOW OF US CHINA INITIATIVE LOOMS LARGE FOR SCIENTISTS

Anti-Asian scrutiny has only intensified since the programme ended one year ago, researchers say.

By Natasha Gilbert

**O**ne year after the US government ended its controversial China Initiative, scientists of Chinese heritage say that they are still being targeted unfairly and fear for their safety.

The initiative – which was aimed at safeguarding US laboratories and businesses from espionage – created the perception of bias against researchers of Chinese descent, said assistant attorney-general Matthew Olsen when shutting it down in February 2022, although he denied that the programme had actually used racial profiling. While it was active, more than 150 people were criminally charged for actions such as failing to disclose funding or partnerships with institutions in China, according to an analysis by *MIT Technology Review*. Nearly 90% of them were of Chinese heritage. Many of the charges brought by the US Department of Justice (DoJ) after the initiative's launch in 2018 were eventually dropped or dismissed, and some prosecutions ended in acquittal.

The climate of fear and anxiety hasn't gone

away – researchers are just being pressured in a new way, says Jenny Lee, a social scientist at the University of Arizona in Tucson who studies research collaborations and geopolitics. Since the initiative's official shutdown, the US government has adopted various anti-China policies. And although the DoJ is pursuing fewer criminal charges, it says that it will work increasingly with federal agencies to investigate researchers and issue civil and administrative penalties for noncompliance. Universities are also taking a more active role in assisting investigations and pursuing potential wrongdoing, sources tell *Nature*.

Unfortunately, the scrutiny "has only intensified", says Gang Chen, a mechanical engineer at the Massachusetts Institute of Technology in Cambridge, who was arrested in January 2021 under the China Initiative, only for the DoJ to drop the charges a year later. He and others who have had their lives upended by the initiative have been speaking out about the damage that it has done.

"The government has not done enough" to ease the situation, Chen adds. The DoJ did not

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