discovery led Scheib and her colleagues to look for signs of herpes in other remains. For this, the team needed to find people who had died with active infections. HSV-1 spends most of its time hiding in the nervous system of its host. But during times of stress, the virus moves into the bloodstream and flares up into 'cold' sores.

After sorting through dozens of remains, the researchers eventually found and extracted herpes DNA from the teeth of three people who died with active infections, including a young woman buried outside modern-day Cambridge, UK, in the sixth century.

By evaluating the genetic mutations that evolved among the four ancient genomes and comparing them with modern HSV-1 strains, the researchers deduced that they all had a common ancestor that popped up around 5,000 years ago. Before this, different versions of herpes were circulating, Scheib says. But HSV-1 evolved to ruthlessly outcompete them.

Kiss and tell

Exactly what led this new variety of herpes to be more successful than older versions is still unclear. But Scheib says the team's analysis suggests that HSV-1 emerged during a period of intense migration during the Bronze Age, when it could have hitched a ride with people as they moved into Europe from the steppe grasslands of Eurasia.

And it might also have spread with the growing practice of romantic kissing, which arose around 3,500 years ago on the Indian subcontinent and was probably later taken up in Europe, during Alexander the Great's military campaigns in the fourth century BC. Herpes is usually spread from parent to child through close contact. Romantic kissing might have provided HSV-1 with a faster route to infect people and could have helped the virus outcompete earlier versions of herpes, the researchers say.

Theoretically, researchers could sequence DNA from pathogens that infected even older humans and animals, living as much as one million years ago, Sikora says. This might allow scientists to learn about the organisms that infected ancient human species, such as Neanderthals and Denisovans. But technological limitations mean that researchers are currently able to sequence only the genetic material of pathogens that contain double-stranded DNA, excluding many important RNA viruses such as the ones that cause polio and measles.

Still, ancient DNA is providing a window into our shared history with disease, Sikora says. "We're at the beginning of the maturation of this field," he adds. "I expect we're going to get very exciting new insights in the next couple of years."

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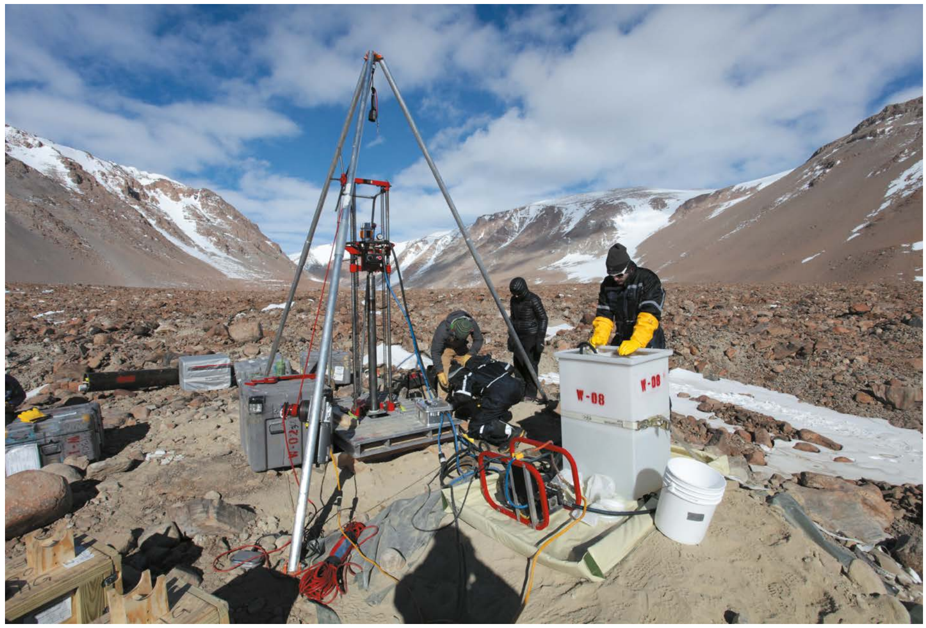

JAAKKO PUTKONEN

Researchers in Antarctica unearthed what could be the oldest ice ever recovered.

ANTARCTIC ICE CORE COULD BE WORLD'S OLDEST SO FAR

A sample extracted from close to the surface has been dated to between 3 million and 5 million years ago.

By McKenzie Prillaman

Ice in places such as Antarctica acts like a time capsule: its ancient, trapped air bubbles provide snapshots of Earth's atmosphere from millennia ago. Scientists have been hunting for increasingly older ice to extend the planet's climate record — and one team might have just struck gold.

Researchers have extracted a nearly 10-metre-long, sediment-filled ice core from Ong Valley in the Transantarctic Mountains, which separate eastern and western Antarctica. They estimate that the ice is up to 5 million years old — possibly the oldest ever recovered. An innovative method used to measure the core's age, published in *The Cryosphere* on 15 July[1], might pave the way for research on even older ice samples.

Most scientific ice cores are being collected from sites in eastern Antarctica, where ice has been deposited more cleanly — layer by layer from precipitation — than in Ong Valley. Several international teams are racing to extract the oldest continuous ice cores from these more orderly deposits deep underground, hoping to produce seamless timelines of atmospheric conditions that extend to about 1.5 million years ago.

The new method, however, could make it possible to date even older ice samples, deposited by glaciers, that are easier to access because they are closer to the surface. That's the view of lead author Marie Bergelin, a glacial geologist who was part of the Ong Valley ice project while at the University of North Dakota in Grand Forks. Instead of looking deep underground, Bergelin asked, "Where else can we potentially find old ice? Where else can we go and find unique deposits?"

Putting numbers to ice

Drilling deeply for continuous ice cores costs millions of dollars and can take more than a decade of planning and fieldwork. Seeking old ice that doesn't require as much of an investment, Bergelin and her colleagues settled on Ong Valley because previous estimates[2] suggested that ice buried below one of its glacial drifts — rock material transported by a glacier — is more than one million years old. After glaciers slid into Ong Valley, their surface ice began sublimating — turning into water vapour. That left behind a protective blanket of rock material with preserved ice underneath.

Ong Valley's sediment-filled ice probably can't provide the detailed climate record that continuous cores can. But it might still yield fresh information. The researchers collected their ice core during the 2017–18 field season. Going by what they know about how ice in this region was deposited, they developed a model of how rare isotopes of beryllium, aluminium and neon accumulated in the ice's debris over time. High-energy cosmic rays from outer space collide with rock material at or near the surface to create these isotopes. After comparing the model's predictions with the measured isotope profile in the ice core, they were able to estimate that some of the ice, up to a certain depth, was about 3 million years old.

Below that depth, isotope concentrations were much higher than expected, suggesting that two separate ice masses sit stacked on top of each other in this part of Ong Valley. The team estimates the older, deeper one to be between 4.3 million and 5.1 million years old.

"They're actually putting some numbers to this ice that we haven't been able to do before, so that's very exciting," says Alia Lesnek, a glacial geologist at the City University of New York.

Other researchers express uncertainty about the results because data that Bergelin and her colleagues didn't collect, such as carbon-isotope levels, could yield different ages. Scientists also wonder whether the model can be adapted for ice beyond Ong Valley's.

Still, scientists are excited about the age of the ice and what that means for future research. The study provides "very strong evidence that ice cores or ice samples can be preserved for 3 or 4 million years", says Yuzhen Yan, a palaeoclimatologist who in 2019 reported[3] an Antarctic ice core that is 2.7 million years old, while he was at Princeton University in New Jersey. "This opens a new possibility for future drilling operations."

Drilling deep

Although Ong Valley's ancient ice sits conveniently close to the surface, international teams searching for old ice that is part of continuous cores must drill hundreds to thousands of metres into Antarctica's frozen depths — nearly to bedrock.

Currently, the oldest continuous ice core goes back 800,000 years into the climate record. But scientists want an uninterrupted environmental record dating back to a period about one million years ago, when a major shift in Earth's climate occurred and the pace of ice-age cycles slowed. Understanding this sudden change might hint at what today's warming climate will bring.

Some projects have already begun drilling. Among these are Russia's VOICE project and Beyond EPICA — a collaboration between 10 European countries. Others, including efforts by Australia and Japan, will start in the next few years.

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PEOPLE WITH OMICRON VARIANT EXHALE LARGE AMOUNTS OF VIRUS

One 'superspreader' with Omicron shed 1,000 times as much viral RNA as people who had Alpha or Delta.

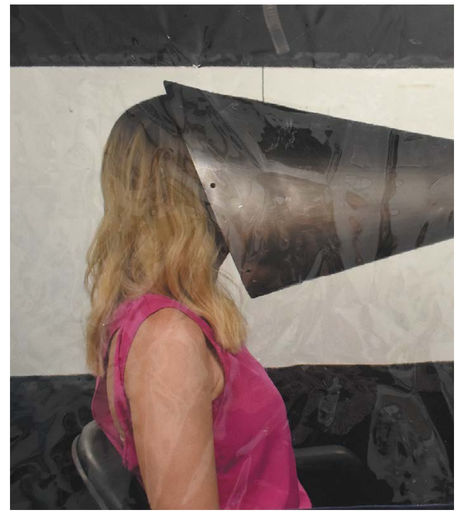
By McKenzie Prillaman

People infected with the Alpha, Delta or Omicron variants of SARS-CoV-2, all of which are highly transmissible, spew out more virus than people infected with other variants, a study has found. And individuals who contract COVID-19 after vaccination still shed virus into the air.

The work was posted on the medRxiv preprint server on 29 July (J. Lai *et al*. Preprint at medRxiv https://doi.org/h856; 2022). It has not yet been peer reviewed.

"This research showed that all three of those variants that have won the infection race … come out of the body more efficiently when people talk or shout than the earliest strains of the coronavirus," says John Volckens, a public-health engineer at Colorado State University in Fort Collins.

Thus, people should be "pushing governments to invest in improving indoor air quality", says study co-author Kristen Coleman, who researches emerging infectious diseases at the University of Maryland in College Park.



ISABEL TERESA SIERRA MALDONADO

A device called the Gesundheit-II can collect viral RNA exhaled by people infected with SARS-CoV-2.

Breathe out

For the study, Coleman and her colleagues recruited 93 people with SARS-CoV-2 infections. Participants' infections were caused by strains including the Alpha variant, which emerged in late 2020, and the later Delta and Omicron variants. All participants with the latter two strains caught the virus after being fully vaccinated.

The infected people faced into a cone-shaped apparatus and sang and shouted while an attached machine collected the particles they exhaled. The device separated out the fine 'aerosol' droplets measuring 5 micrometres or less in diameter, which can leak through cloth and surgical masks.

Participants infected with the Alpha, Delta or Omicron variants emitted significantly more viral RNA when exhaling than did people infected with other variants. These include ancestral variants, such as the one first detected in Wuhan, China, and those not associated with increased transmissibility — such as Gamma, which arose in late 2020.

The team also seeded cells in the laboratory with aerosol samples and found that four samples, each from a participant with either Delta or Omicron, infected the cells. The samples' ability to infect laboratory cells means that viral RNA in exhaled aerosols can spread the disease, says study co-author Jianyu Lai, an epidemiologist at the University of Maryland.

Malin Alsved, an aerosol-technology scientist at Lund University in Sweden, expressed concern that the researchers had mixed all the respiratory aerosols: "They have breathing, talking, speaking, screaming, coughing, even sneezing in the sample." Coleman responds that the team combined respiratory samples to mimic a real-life scenario.

Going viral

The study also highlights variation between individuals in the amount of exhaled virus, which ranged from non-detectable levels to those associated with 'superspreaders'. One Omicron-infected participant, for example, shed 1,000 times as much viral RNA through fine aerosol as the maximum level observed in those with Alpha or Delta. The researchers say that these discrepancies could be related to biological factors such as a person's age.

The team notes that people infected with SARS-CoV-2 exhale much lower amounts of viral RNA than do people infected with influenza, a comparable airborne disease. This suggests that SARS-CoV-2 could spin off variants that transmit even more virus.