Europeans' ability to digest milk, a team led by Evershed and two Bristol colleagues, chemist Mélanie Roffet-Salque and epidemiologist George Davey Smith, together with Mark Thomas, an evolutionary geneticist at University College London, collated archaeological and genomic data. They then modelled how various factors, such as the use of dairy milk and population size, explained the rise of lactase persistence, drawing on the genomes of more than 1,700 ancient Eurasian people.

The team found little overlap between leaps in lactose tolerance and heightened milk consumption, inferred by the presence of milk-fat residues on some 13,000 potsherds from more than 550 archaeological sites across Europe. "All previous hypotheses for what was the natural-selection advantage of lactase persistence pegged themselves to the extent of milk use," says Thomas, because of the presumed nutritional benefits of being able to consume milk without getting sick.

Another explanation

With that idea scotched, the researchers looked at how lactose tolerance relates to milk drinking in modern Europeans. In the UK Biobank, a repository of health and genomic data from half a million people in the United Kingdom, they found little correlation between milk consumption and lactose tolerance, with 92% of lactose-intolerant participants preferring fresh milk over alternatives. And lactose tolerance showed no clear health or fertility benefits that might drive natural selection.

This suggests that, for most lactose-intolerant people, the costs of drinking milk aren't that high today, Thomas says — and probably weren't in ancient times, either. "If you're healthy, you get a bit of diarrhoea, you get cramps, you fart a lot."

But the researchers propose that the consequences of milk drinking among lactose-intolerant people long ago would have been much more severe for those who were in ill health, as a result of famine or infection. Fluid loss through diarrhoea contributes to deaths from malnutrition and infection, especially in places with poor sanitation. The researchers' model found that lactase persistence was more likely to occur in ancient populations exposed to animal pathogens and famine than in those exposed to other factors examined.

The team proposes that natural selection for lactase tolerance was turbocharged during such exposure, when lactose-intolerant people would have been more likely to die than were those who lacked the suddenly beneficial gene variation.

Christina Warinner, a molecular archaeologist at Harvard University in Cambridge, Massachusetts, says the study puts numbers on and provides evidence for a picture that has been emerging over the past decade. "Now we have some idea where we need to start looking."

The Danuri craft will use multiple scientific instruments to probe properties of the Moon.

TO THE MOON! SOUTH KOREA'S FIRST LUNAR MISSION IS ON ITS WAY

The Korea Pathfinder Lunar Orbiter, or Danuri, will orbit the celestial body for a year.

By Smriti Mallapaty

South Korea's first lunar mission blasted off from Cape Canaveral in Florida at 7.08 p.m. local time on 4 August, and is now on its way to the Moon. The successful launch of Danuri, officially known as the Korea Pathfinder Lunar Orbiter, takes the country beyond Earth's orbit for the first time.

The launch was "spectacular", says Mark Robinson, a planetary scientist at Arizona State University in Tempe, who is the principal investigator for one of Danuri's instruments, called ShadowCam.

Danuri should arrive at its destination in around mid-December, and will orbit the Moon for a year. Its trajectory means the journey will take longer than those of most past missions to the Moon, which typically arrived in days, but will require minimal fuel.

About an hour after lift-off, the spacecraft detached from the Falcon 9 rocket on which it launched. The Korea Aerospace Research Institute's control centre in Daejeon then took command and made contact with the spacecraft.

"They have passed through some of the most significant gates," says Ian Garrick-Bethell, a planetary scientist at the University of California, Santa Cruz, who watched Danuri launch at Cape Canaveral. "I'm excited for the final challenge of lunar orbit insertion in December."

Researchers are eager for Danuri, which took more than six years to build and cost 237 billion won (US$180 million), to begin revealing insights about aspects of the Moon, ranging from its ancient magnetism to 'fairy castles' of dust sprinkled across its surface. There are also hopes that the craft will find hidden sources of water and ice in areas including the permanently cold, dark regions near the poles.

Scientists in South Korea say the mission will pave the way for the country's more ambitious plans to land on the Moon by 2030. Success for Danuri will secure future planetary exploration, says Kyeong-ja Kim, a planetary geoscientist at the Korea Institute of Geoscience and Mineral Resources in Daejeon, and principal investigator for one of Danuri's instruments, a γ-ray spectrometer.

Danuri carries five scientific instruments. Among the most exciting is PolCam, which will be the first camera in lunar orbit to map the texture of the Moon's surface using polarized light. Polarizers are popular for observations of Earth, such as those studying vegetation,

NASA

but have not previously been sent to study the Moon, says Rachel Klima, a planetary geologist at the Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland, who is part of the science team.

By capturing how light reflects off the lunar surface, PolCam will be able to reveal characteristics such as the size and density of grains of dust and rock. This could help researchers to study unusual objects such as the tiny, porous towers of dust called fairy castle structures, says Klima. These structures can't be reproduced on Earth because its gravity is stronger than the Moon's. This makes them difficult to study.

"It's a ground-breaking instrument," says William Farrand, a planetary geologist at the Space Science Institute in Boulder, Colorado, who will be working on PolCam data. He hopes to use the data to study deposits of volcanic ash and improve understanding of the history of explosive eruptions on the Moon.

ShadowCam is also widely anticipated. The highly sensitive camera, provided by NASA, will take images of the permanently shadowed regions of the Moon, which are devoid of sunlight. It will need to rely on scattered light such as that from far-off stars to take images of the surface topography.

Since shortly after the Moon formed, volatile materials such as water from comets have been hitting its surface and becoming trapped in these very cold regions, says Klima. "We've got billions of years of Solar System history locked in the layers of these cold traps." By giving researchers a view of the terrain in these regions, and identifying brighter regions that might be ice deposits, ShadowCam will be able to inform future landing missions that aim to study that history, she says.

Danuri's γ-ray spectrometer, called KGRS, has a broader energy range than previous γ-ray detectors sent to the Moon, and scientists hope that it will create the clearest maps yet of the distribution of elements including iron, titanium, uranium and thorium.

Kim says the spectrometer is also sensitive enough to detect hydrogen, which can be used to infer the presence of water on the surface, and create a water-resource map of the entire Moon. Previous probes have struggled to map the presence of water beyond the poles, where its abundance is relatively high, she says.

Danuri is the first in a long line of spacecraft expected to head to the Moon over the next year, including India's Chandrayaan-3, which will send a lander and rover to the Moon's surface, and the first mission in NASA's Artemis programme, which will make an uncrewed flight around the Moon in preparation for landing astronauts there in 2025.

"It's just so cool to see more and more countries sending up their own orbiters and adding to the global understanding of what's going on on the Moon," says Klima.

PANDEMIC DRIVES HUGE DROP IN CHILD VACCINATIONS

Last year, 25 million children missed immunizations against infections such as measles and polio.

By Giorgia Guglielmi

Since the start of the COVID-19 pandemic, global childhood vaccinations have experienced the largest sustained decline in about 30 years, according to a report published this month.

Data collected by the World Health Organization (WHO) and the United Nations children's charity UNICEF show that the percentage of children who received three doses of the vaccine against diphtheria, tetanus and whooping cough (DTP3) decreased by 5 percentage points between 2019 and 2021, to 81% worldwide (see 'Childhood immunizations decline'). DTP3 is considered to be a marker of vaccine coverage.

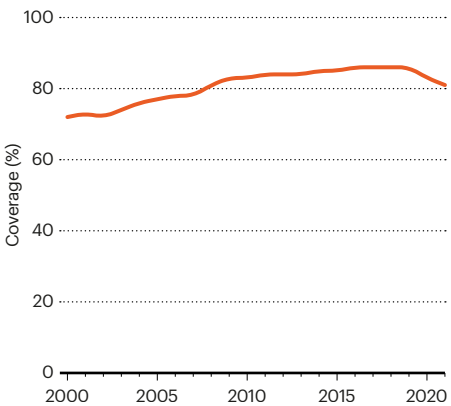
The report found that in 2021, 25 million children missed out on routine immunizations against diseases such as measles — leading to avoidable outbreaks. "If this downward trend continues, we can expect to see more cases, outbreaks and deaths from diseases which are completely preventable," a WHO spokesperson told *Nature*.

From 2011 to 2019, global vaccination coverage stagnated at around 85%. That rate plummeted in 2020 and 2021 during the pandemic, particularly in low- and middle-income nations. Of the 18 million children who did not receive a single dose of DTP during 2021, the highest numbers live in India, Nigeria, Indonesia, Ethiopia and the Philippines.

Higher-income countries saw only a slight drop in vaccination coverage — from 95% in 2019 to 94% in 2021. But the WHO spokesperson said that "even a small decrease in vaccine coverage combined with an increased number of vaccine-preventable disease cases worldwide can open the door for outbreaks".

CHILDHOOD IMMUNIZATIONS DECLINE

The percentage of children who received three doses of the vaccine against diphtheria, tetanus and whooping cough (DTP3) decreased by 5 percentage points between 2019 and 2021 to 81% worldwide, a 15-year low. DTP3 is considered to be a marker of other vaccine coverage.



SOURCE: WHO/UNICEF

Missed doses

The backsliding in vaccine coverage has pushed the world off-track on efforts to meet immunization goals, which include reducing the number of children who have not received any routine vaccinations by 50% by 2030. According to the WHO, nearly 25 million children missed their first measles dose in 2021, 5 million more than in 2019. Between January and April, nearly 50,000 measles cases were reported worldwide — more than double the number of cases reported during the first 4 months of 2021. And in February and May, Malawi and Mozambique reported their first outbreaks of wild poliovirus in almost 30 years.

According to the WHO, the drop in childhood immunizations is attributable, in part, to the pandemic. This has caused supply-chain disruption, diversion of resources and lockdowns, which have placed limits on vaccine services. Economic challenges have also decreased some governments' financing of routine vaccinations. Factors such as a rise in the number of communities affected by conflict or natural disasters have also played a part.

There is hope that vaccination efforts can get back on track. Many countries are implementing catch-up immunization campaigns. India, for example, has intensified its Indradhanush mission, which seeks to ensure that routine immunization services reach unvaccinated and partially vaccinated children and pregnant women.

However, as countries look to rebound from the pandemic, they will probably shift resources from health care to other sectors, says Giridhar Babu, an epidemiologist at the Public Health Foundation of India, a non-profit organization in New Delhi. "The next few months should be dedicated to ensure catch-up campaigns, especially in those countries where there's a high proportion of [unvaccinated] children," he says. "Saving children's lives can't be stopped."