basis for that recognition, he adds, that knowledge might help to counter variants that emerge in future.

Some structural studies have also provided possible explanations for another of Omicron's properties: that it seems to have more difficulty infecting the lungs than the nose and throat. This could be a reason it might cause milder disease than other variants.

Many studies focus on two possible mechanisms by which SARS-CoV-2 and its variants might enter a person's cells after binding to ACE2. The first involves a host-cell enzyme called TMPRSS2, which helps the virus to fuse with the cells and inject its genetic material directly into them. The other, slower pathway involves the virus entering host cells through bubbles known as endosomes before releasing its contents.

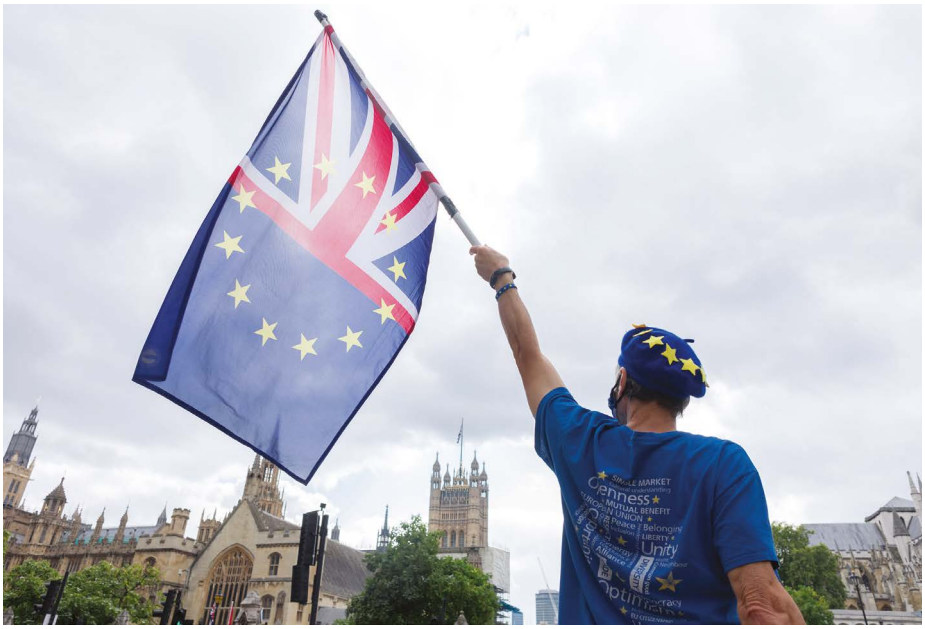
Several groups have found evidence that Omicron prefers the slower route[4]. For example, Veesler and his colleagues found[5] that cleavage of the spike protein, required for the TMPRSS2 pathway, was less efficient for Omicron than for Delta. The researchers also noted that there are higher levels of TMPRSS2 in the lungs than in the upper airways — possibly explaining Omicron's preference for infecting the nose and throat.

But not everyone agrees that Omicron prefers this entry route. Bing Chen, a structural biologist at Harvard Medical School in Boston, Massachusetts, suggests mechanism slightly different from either of the other two. He says that Omicron's mildness is related to ACE2.

To bind to ACE2, the virus's RBD needs to flip from a 'down' to an 'up' position. In a preprint[6], Chen and his colleagues have reported evidence that Omicron's RBD has difficulty moving into the 'up' conformation because of a structural change induced by one of its many mutations. As a result, Omicron requires higher levels of ACE2 to fuse with host cells than do other variants. "This could explain why Omicron doesn't really infect the lung cells, because lung cells generally have much lower ACE2 levels compared to the cells in the upper respiratory tract," Chen says. But further investigation is needed, he adds.

Researchers are hoping to use structural knowledge about Omicron to help develop more effective treatments and vaccines against it — and against future variants of concern. "Omicron really redefines what we thought variants look like," Veesler says.

1. Gobeil, S. M-C. *et al*. Preprint at bioRxiv https://doi.org/10.1101/2022.01.25.477784 (2022).
2. McCallum, M. *et al. Science* https://doi.org/10.1126/science.abn8652 (2022).
3. Mannar, D. *et al. Science* https://doi.org/10.1126/science.abn7760 (2022).
4. Peacock, T. P. *et al*. Preprint at bioRxiv https://doi.org/10.1101/2021.12.31.474653 (2022).
5. Meng, B. *et al*. Preprint at bioRxiv https://doi.org/10.1101/2021.12.17.473248 (2022).
6. Zhang, J. *et al*. Preprint at bioRxiv https://doi.org/10.1101/2022.01.11.475922 (2022).



BELINDA JIAO/SOPA IMAGES/LIGHTROCKET VIA GETTY

Prolonged Brexit negotiations mean some UK researchers can't access EU grant funding.

BREXIT ONE YEAR ON: PATIENCE 'WEARING THIN' AMONG UK SCIENTISTS

Researchers brace for tense weeks ahead as Europe turns up the heat on research negotiations.

By Holly Else

It has been just over a year since UK scientists celebrated a long-awaited trade deal between their government and the European Commission that defines their relationship after Brexit. After years of uncertainty, researchers welcomed the pact, which had wide-ranging effects on science, including on data regulation, nuclear and space research and clinical trials.

It also promised to pave the way for a formal partnership between the United Kingdom and the commission that would allow British researchers to bid for funding from the commission's flagship €95-billion (US$107-billion) research programme, Horizon Europe, which started doling out money last month.

But the two sides have yet to ratify the final agreement because of a row over a customs border between Great Britain and the island of Ireland. As a result, the UK government has deployed its safety-net funding guarantee to underwrite successful bids by UK scientists for Horizon Europe funding in the programme's early stages.

"We're starting to become very concerned about the situation," says Jo Burton, a policy manager at the Russell Group, a consortium of top UK research universities, with headquarters in Cambridge.

Research-policy scholars say that the commission is holding science "hostage" to achieve its wider political aims, and urge for progress in talks before patience in the United Kingdom wears out and the government abandons plans to associate with Horizon Europe.

Deal delayed

UK research was thrown into turmoil in the wake of the country's vote to leave the European Union in 2016. The uncertainty left many UK-based scientists unsure whether workers and research funding would continue to flow freely between the two entities. Much of the confusion around immigration has been resolved: EU researchers working in the United Kingdom have opted to either leave the country or apply for permission to stay. The UK government has also established new visa routes for scientists.

The eleventh-hour trade deal struck between Britain and the EU in January 2021 paved the way for Britain to 'associate' with Horizon Europe as a non-member state. It came as a huge relief to scientists, who finally had clarity that they would, in principle, be able to apply for funding from the

bloc's multibillion-euro pot for research and development.

But the process has been held up by political negotiations. Late last year, the commission's research head, Mariya Gabriel, said that an association deal would not be inked until the EU's disputes with Britain are resolved.

Those tensions centre on the Northern Ireland Protocol, a Brexit agreement between the two parties designed to prevent any checks on goods crossing the border between the Republic of Ireland, which remains in the EU, and Northern Ireland, part of the United Kingdom.

Without an association deal, scientists based in the United Kingdom will be locked out of Horizon Europe. Historically, UK scientists have had huge success securing funding from the European Commission, consistently ranking among the top beneficiaries.

"Association is being held hostage to the bigger political impasse of the Northern Ireland protocol," says Martin Smith, head of the policy lab at Wellcome, the London-based biomedical funder. "Patience is wearing thin."

The stalling negotiations mean that the UK government has made contingency plans so that researchers will still be able to access funding in the event of a deadlock. As early as 2019, the government began drawing up plans to create its own version of the European funding scheme in the event of a no-deal Brexit. And last year's research budget earmarked £2 billion (US$2.7 billion) per year to either cover the costs of associating with Horizon Europe or to create domestic alternatives.

"We have been getting increasingly nervous and that has reached a critical point," says Vivienne Stern, head of Universities UK International in London, which represents institutions in the United Kingdom. The risk is that, despite their best intentions, British politicians might run out of patience with the EU and shun association in favour of domestic funding.

It is not only the availability of EU research funding that hangs in the balance while talks are in deadlock. Britain's ability to take part in other joint science programmes, such as the European Atomic Energy Committee and Earth-observation programme Copernicus are tied to whether it associates.

Currently, workarounds are in place to ensure that the United Kingdom continues to participate in most of these programmes. But researchers do not have any power to make decisions about some projects.

In June last year, the EU ruled that the United Kingdom's data-protection regulations were adequate. This means that data, including those from clinical trials, are able to flow between research collaborators as they did before Brexit. The EU will review the regulations on a regular basis, and UK data policies might change in the future. "This is one of those things that is never going to go away," Smith says.

MAJOR AFRICAN RADIO TELESCOPE WILL HELP TO IMAGE BLACK HOLES

US$25-million facility in Namibia will be Africa's first millimetre-range radio telescope.

By Sarah Wild

Astronomers across Africa and Europe have reacted with delight to news that Africa's first millimetre-range radio telescope is to be built.

The Africa Millimetre Telescope will fill a gap in the coverage of the Event Horizon Telescope (EHT), a global network of telescopes that can receive and analyse radio waves of around 1 millimetre in length and that, in 2019, published the first-ever image of a black hole's edge, known as its event horizon.

The telescope will be located on or near Mount Gamsberg in Namibia. It will be a repurposed 15-metre telescope, currently located at La Silla in Chile, which is being donated by the Onsala Space Observatory in Sweden and the European Southern Observatory, headquartered near Munich, Germany.

The project, confirmed at the end of last year, is "another step toward solidifying Africa's position as a globally competitive and capable player in the field of astronomy", says Charles Takalana, head of the secretariat at the African Astronomical Society in Cape Town, South Africa. The telescope will "fill a missing observing window on the continent" and will be crucial for Africa's astrophysics communities, adds Roger Deane, who directs the Wits Centre for Astrophysics at the University of Witwatersrand in Johannesburg, South Africa.

Y. BELETSKY (LCO)/ESO

The Africa Millimetre Telescope in Namibia will reuse a 15-metre telescope from Chile.

The Africa Millimetre Telescope is a collaboration between Radboud University Nijmegen in the Netherlands and the University of Namibia in Windhoek. It will be about five years before the telescope gets to see first light. The project will cost around US$25 million, including construction, operations and outreach projects in the southern African country. Half of its funding has come from Radboud University. Other funders include the University of Namibia, the European Southern Observatory and the Netherlands Research School for Astronomy, based in Leiden.

The telescope team is completing what is called a critical design review, which will help to determine the observatory's exact location on the mountain, or whether it needs to be adjacent to it or located at another site; and whether extra funding will be needed.

Telescopes in the millimetre-wavelength range can image the event horizon of a black hole, says project manager Marc Klein Wolt, who is based at Radboud University. At longer wavelengths, "you only saw a blob, but at the millimetre wavelengths, you start to see the edge".

In 2019, the EHT team published a celebrated image of the supermassive black hole at the centre of the galaxy M87. It was the first picture to show the contour of a black hole's event horizon. "That image was the start of a new science, like the first observation of gravitational waves was the start of a new science," Klein Wolt says. Radboud University astrophysicist Heino Falcke, who announced the first black hole image, will be the Africa Millimetre Telescope's scientific leader.

However, the EHT will require only about one-fifth of the Africa Millimetre Telescope's total observation time, says astronomer Michael Backes, co-principal investigator of the project, who is based at the University of Namibia. "The lion's share of the time will be available for Namibian astronomers to develop their programmes," he says.

Possible projects in Namibia include monitoring the variations in the brightness of small and large black holes, in collaboration with optical telescopes and γ-ray telescopes such as the High Energy Stereoscopic System, which is also located in Namibia, and the planned Cherenkov Telescope Array in Chile, says Backes.