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FOCUS ON
CORONAVIRUS

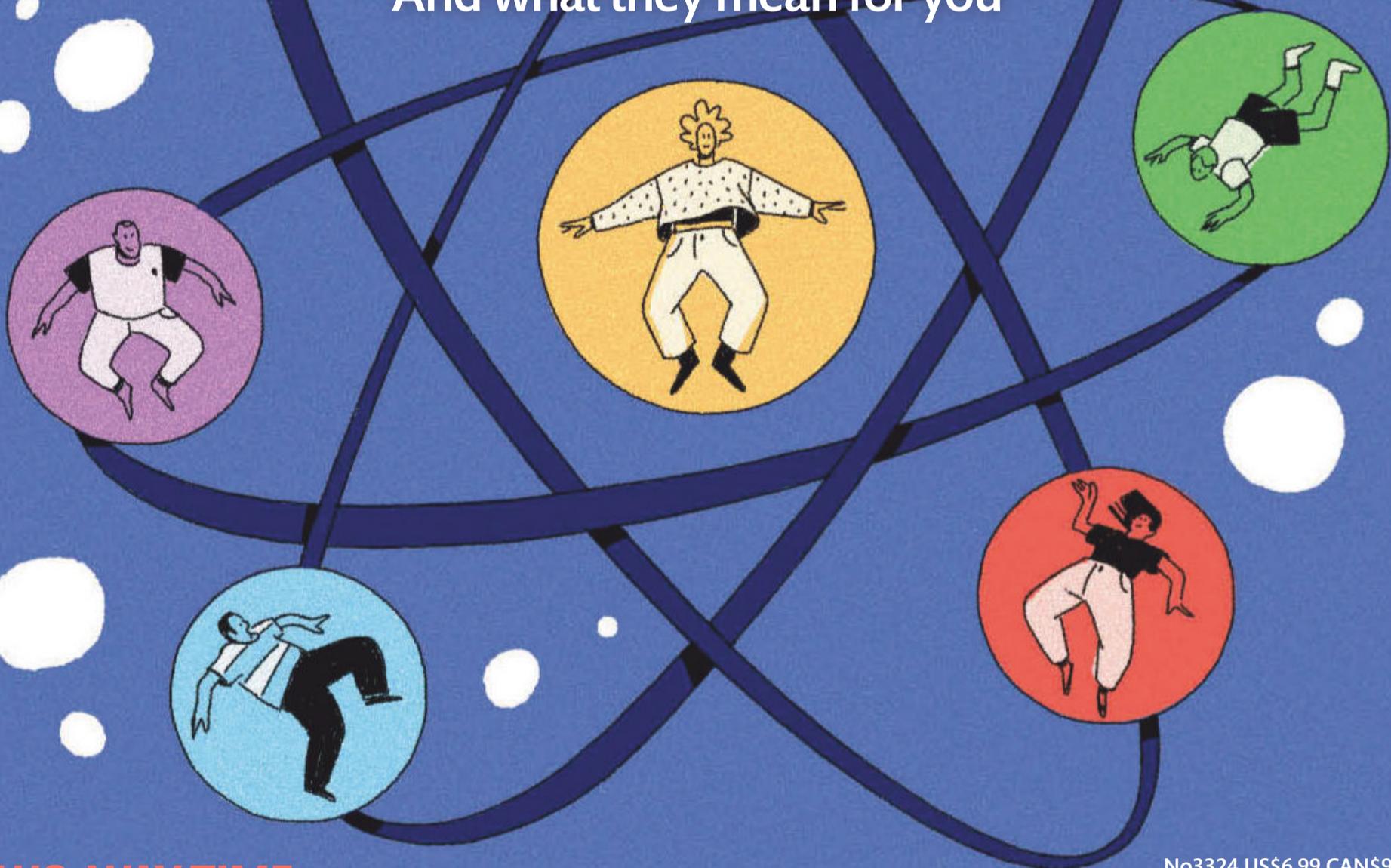
The threat from
the Brazilian variant

*How our abuse of nature
causes pandemics*

When will we
be back to normal?

THE FUNDAMENTAL LAWS OF FRIENDSHIP

And what they mean for you



TWO-WAY TIME

Did time also flow backwards from the big bang?

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Biology

Complex life's days are numbered

Earth sustains large oxygen-breathing organisms today, but in a billion years it won't

Karina Shah

ONE billion years from now, Earth's atmosphere will contain little oxygen, making it unsuitable for complex aerobic life.

Today, oxygen makes up around 21 per cent of Earth's atmosphere. Its oxygen-rich nature is ideal for large and complex organisms, like humans, that require the gas to survive. But early in Earth's history, oxygen levels were much lower – and they are likely to be low again in the distant future.

Kazumi Ozaki at Toho University in Funabashi, Japan, and Chris Reinhard at the Georgia Institute of Technology in Atlanta modelled Earth's climatic, biological and geological systems to predict how atmospheric conditions on Earth will change.

The researchers say that Earth's atmosphere will maintain high levels of oxygen for the next billion years before dramatically returning to low levels reminiscent of those that existed prior to what is known as the Great Oxidation Event of about 2.4 billion years ago.

One key reason for the shift is that, as our sun ages, it will become hotter and release more

energy. The researchers calculate that this will lead to a decrease in the amount of carbon dioxide in the atmosphere as CO₂ absorbs heat and then breaks down.

Ozaki and Reinhard estimate that, in a billion years, CO₂ levels will become so low that photosynthesising organisms – including plants – will be unable to survive and produce oxygen. The mass extinction of these

Our planet will one day lose its ability to support complex life

photosynthetic organisms will be the primary cause of the huge reduction in oxygen.

"The drop in oxygen is very, very extreme – we're talking around a million times less oxygen than there is today," says Reinhard.

Once the changes in Earth's atmosphere begin to occur, they will progress rapidly: the team's calculations suggest that the atmosphere could lose its oxygen over the course of just 10,000 years or so (*Nature Geoscience*, doi.org/fxq9).

"The biosphere cannot adapt to such a dramatic shift in environmental change," says Ozaki. Afterwards, life on Earth will be exclusively microbial, says Reinhard.

The research was conducted as part of a NASA project into planet habitability, and the predictions have implications for searching for life on other planets.

"Oxygen, in its many forms, is a very important biosignature since it is intertwined with life so fully on Earth," says Natalie Allen at Johns Hopkins University in Maryland. But Ozaki and Reinhard's new prediction shows that oxygen presence is variable and may not be permanent on a habitable planet.

"It suggests that even for planets around other stars that are very similar to Earth, large amounts of oxygen may not be detected in their atmosphere, even if they can support, or have supported, complex life," says Kevin Ortiz Ceballos at the University of Puerto Rico. Not detecting oxygen around planets doesn't mean that they are uninhabitable, he says. ■



ALEXANDR YURTCHEK/ALAMY

Internet

Wikipedia had a big spike in edits during the pandemic

BORED of the pandemic and stuck at home, many passed the time editing Wikipedia pages, according to data on the online encyclopaedia's changes over the past few years.

An analysis of 223 million edits to Wikipedia between 2018 and 2020 shows a 20 per cent increase in the number of changes made to English-language pages between January and September 2020.

Similar rises were recorded on 11 other language versions.

The impact didn't happen right away: the number of edits stalled in the immediate aftermath of major pandemic milestones, such as the start of a lockdown, before rising rapidly as people sought diversions from being stuck at home.

The Italian-language version of the site saw an 80 per cent relative increase in new editors signing up to amend pages following the introduction of Italy's lockdown in March 2020. "The impact and severity of the lockdown appears

to have had an effect," says Thorsten Ruprecht at Graz University of Technology in Austria, one of the team behind the research.

What Wikipedia editors turned their attention to isn't yet fully clear and is the subject of follow-up work by Ruprecht and his colleagues. Just over 1 per cent of all edits from January to September 2020 on the English-language Wikipedia were to

"So-called edit wars may have decreased, which leads us to believe there may be higher solidarity"

pages about covid-19 (arxiv.org/abs/2102.10090).

"Part of the story here is what didn't happen: they don't find a correspondingly large increase in the rates of contribution removal," says Kaylea Champion at the University of Washington in Seattle.

Wikipedia is infamous for protracted so-called edit wars over small points of fact, but they may have decreased, "which leads us to believe during the crisis there might be a higher level of solidarity", says Ruprecht. ■
Chris Stokel-Walker