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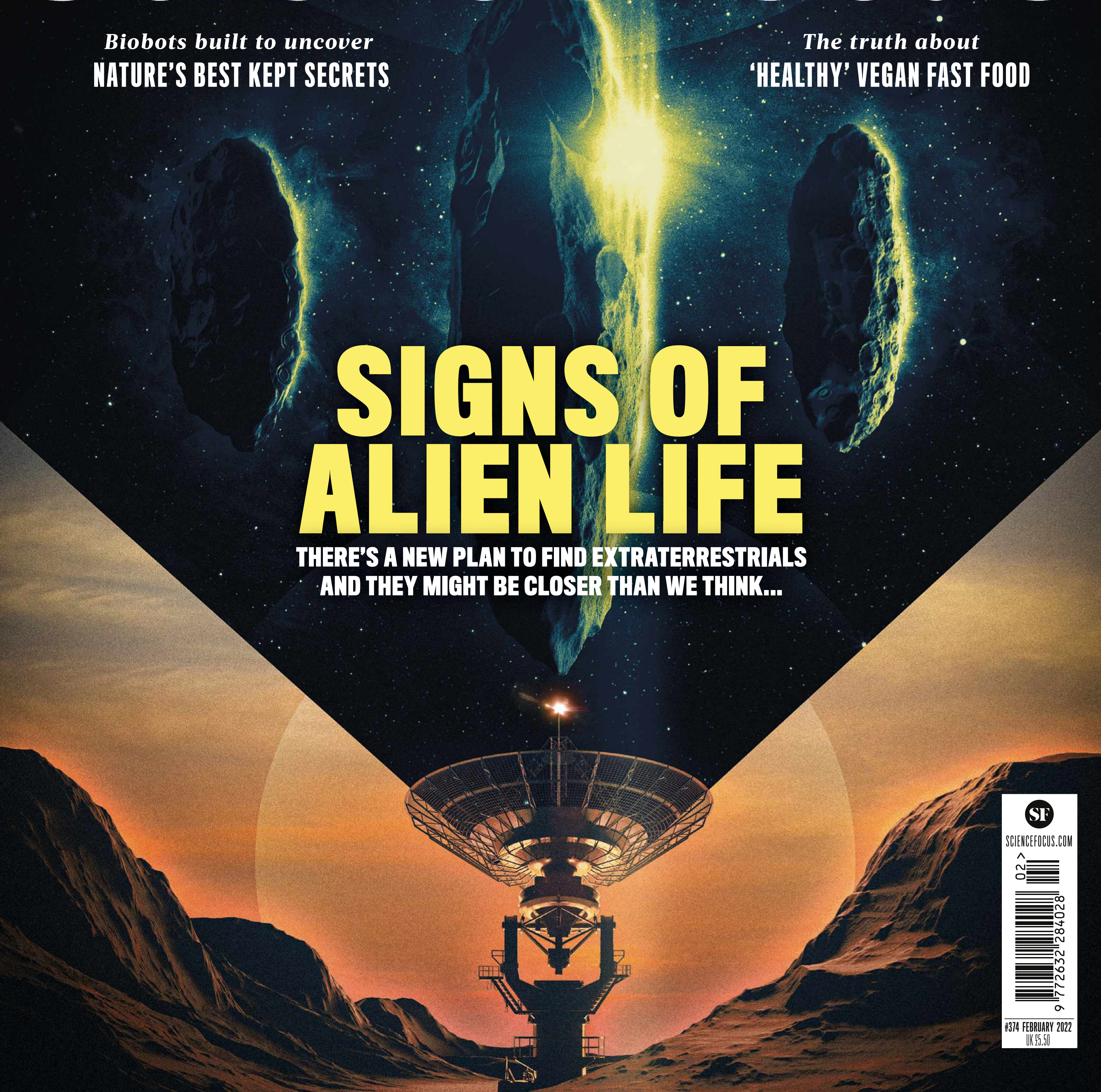

SIGNS OF ALIEN LIFE

THERE'S A NEW PLAN TO FIND EXTRATERRESTRIALS AND THEY MIGHT BE CLOSER THAN WE THINK...

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IN THIS ISSUE

Metaverse
Will it become the new Wild West?

Space
The plan to send water bears to a galaxy far, far away...

Health
We need to talk about postnatal depression in dads

SPACE

Mystery of Jupiter's polar cyclones solved using ocean physics

NASA's Juno spacecraft has sent back the first evidence that the massive polar storms are driven by a similar process to those governing oceans on Earth

Jupiter's cyclones are driven by a process called 'moist convection', just like vortices in Earth's oceans

UNIVERSITY OF MARYLAND SCHOOL OF MEDICINE, NASA/JPL-CALTECH/SWRI/MSSS

Jupiter's atmosphere is one of the most turbulent places in the Solar System, and thanks to the spacecraft Juno, we know that the poles are home to gigantic, persistent cyclones that rotate around areas of low pressure without dispersing.

However, the mystery of why Jupiter's cyclones have remained so stable has intrigued scientists since they were first observed in 2016. The number of cyclones has stayed the same over this time period: eight in the north pole and five at the south.

These large cyclones are up to 5,000km wide – wider than the continental United States – and each is associated with intermediate (around 500km to 1,600km wide) and smaller-scale vortices, around 100km wide.

Now, a new study published in the journal *Nature Physics* has provided evidence that these massive cyclones at Jupiter's poles are sustained by the same forces that power ocean vortices here on Earth.

The hotter, less dense air from deep in the gas giant's atmosphere is more buoyant, and so rises, where it condenses to form clouds. Meanwhile, cooler and denser air flows downwards. On Jupiter, the rapidly rising air within these clouds acts as an energy source, driving energy transfer and feeding the large circumpolar and polar cyclones in a process called 'moist convection'. This is similar to how ocean vortices on Earth are driven by the movements of cooler and warmer water.

"When I saw the richness of the turbulence around the Jovian cyclones with all the filaments and smaller eddies, it reminded me of the turbulence you see in the ocean around eddies," said study lead author and physical oceanographer Lia Siegelman, a postdoctoral fellow at the Scripps Institution of Oceanography at the University of California San Diego (UCSD). "These are especially evident on high-resolution satellite images of plankton blooms for example."

By analysing an array of detailed infrared images sent back by Juno, Siegelman and her colleagues were able to confirm the widely held hypothesis that the cyclones in Jupiter's north polar region were formed through moist convection. They measured temperature, calculated wind speed and tracked cloud movement, and by comparing these measurements with cloud thickness data, they were able to map these massive storms.

Siegelman says that understanding Jupiter's energy system could help to highlight the energy routes at play on our own planet. "To be able to study a planet that is so far away and find physics that apply there is fascinating," she said. "It begs the question, do these processes also hold true for our own blue dot?"

The Juno spacecraft is currently scheduled to continue operations until 2025 and is expected to make several more flybys of Jupiter before then.