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THE QUEST FOR A PERFECT SUNSCREEN

SPECIAL ISSUE

LIVING WITH AI

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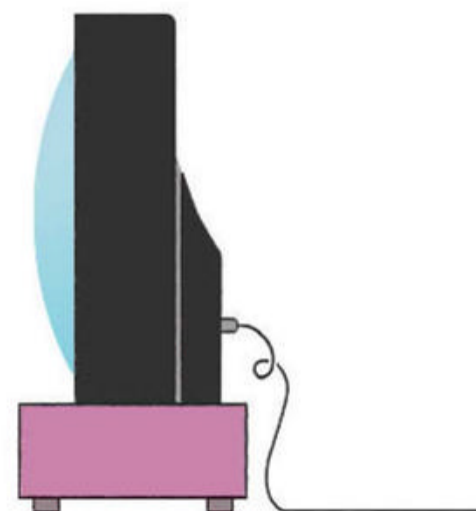
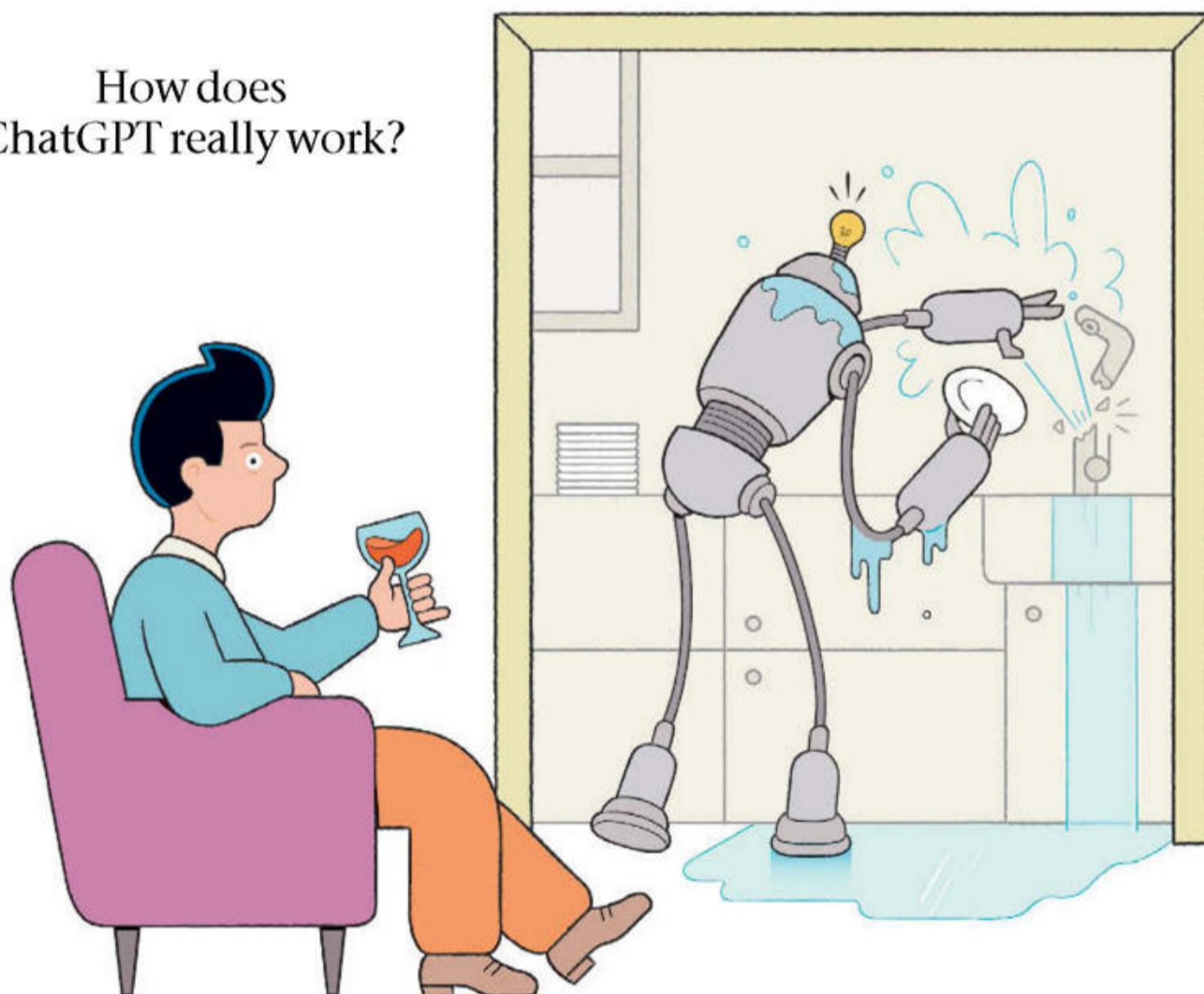
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Planetary science

Viking lander felt marsquakes

A reanalysis hints the Viking 2 lander was the first to detect quakes on Mars – in the 1970s

Jonathan O’Callaghan

NASA’s Viking 2 lander probably discovered quakes on Mars almost 50 years ago, but this has only just been confirmed thanks to data from the InSight probe.

In 1975, NASA launched two missions to Mars, Viking 1 and 2, to study the planet’s surface and search for life. Both probes were also equipped with a seismometer to hunt for marsquakes, tremors on the Martian surface similar to earthquakes, to see if they existed.

Viking 1’s seismometer failed to operate, but Viking 2’s worked for two years. While rudimentary, the instrument did pick up at least two signals that were thought to be quakes, one of which had a magnitude of 3.5. But mission scientists couldn’t be sure if they were quakes or simply wind passing over the lander.

“We couldn’t prove those two events,” says Andrew Lazarewicz, who is now retired but was a graduate student on the Viking team. “It was very frustrating.”

In 2018, another NASA lander called InSight was sent to Mars with a more advanced seismometer – “200,000 times

more sensitive than ours”, says Lazarewicz. The lander picked up more than 1300 marsquakes, the largest being a magnitude-5 “monster quake”, proving their existence. It is believed that marsquakes are mostly caused by the planet cooling and its crust cracking, or by meteorite impacts, because Mars today isn’t thought to have the tectonic plates that cause quakes on Earth.

Viking 2 studied the surface of Mars and tried to find signs of life there

Lazarewicz went back to data from Viking 2 and found that the events it recorded matched some quakes caught by InSight, all but confirming that Viking 2 detected the first marsquakes in the 1970s (*JGR Planets*, doi.org/kkv9). Back then, everybody was disappointed that the results were inconclusive, says Lazarewicz. “This is my way to repay the team. We did get marsquakes, and it was successful.”

“The results are really fascinating,” says Bruce Banerdt at NASA’s Jet Propulsion Laboratory in California, the lead on InSight,

which ran out of power in 2022. “It was a little puzzling that [Viking 2] hadn’t seen anything.”

“It’s a very exciting, yet tentative, interpretation,” says Simon Stähler at the Swiss Federal Institute of Technology in Zurich, Switzerland. More tests are needed to be confident in the result, he says, such as understanding the direction of travel of the recorded seismic waves.

The findings could be useful. Viking 2’s landing site is about 3000 kilometres from InSight. Both are in the Utopia Planitia region. The source of Viking 2’s marsquakes may have been Cerberus Fossae, a suspected site of former volcanic activity and the source of some of InSight’s quakes, potentially hinting at tectonic or remnant volcanic activity in this region. “If Cerberus Fossae has been active since the 1970s, that... tells us something about the source of the activity, whether it’s volcanic or tectonic,” says Banerdt.

Benjamin Fernando at the University of Oxford says the findings could also tell us if marsquakes are seasonal. ■



NASA/JPL-CALTECH

Nutrition

Plant-based milk has fewer key nutrients than cow’s milk

MOST plant-based milks have lower amounts of protein than cow’s milk, with nearly a third also having less calcium and vitamin D.

Plant-based milks have previously been shown to be low in four key minerals: phosphorus, magnesium, zinc and selenium. Now, Abigail Johnson at the University of Minnesota and her colleagues have analysed the nutritional labels of 237 milk

alternatives made from almonds, oats, rice or soya beans that are available in the US or were until recently. They compared the protein, calcium and vitamin D levels to those of cow’s milk, using a nutritional database.

On average, the plant-based milks had just 2 grams of protein per 240 millilitres, with a lot of variation between products, while cow’s milk has 8 grams per 240 millilitres, regardless of whether it is skimmed, semi-skimmed or full fat. Protein is important for muscle growth, energy and digestion. The 19 per cent of plant-based products

that matched or exceeded the protein content of cow’s milk tended to be soya-based, says Johnson.

“It’s important to be aware that swapping [cow’s milk] for plant-based milk may not be a one-to-one substitution, even though that might be how you’re using it,” says Johnson. Still, most people get protein from other sources, such as meat, beans and legumes, she says.

Sixty-nine per cent of the

“It’s important to be aware that exchanging cow’s milk for plant-based milk may not be a one-to-one swap”

plant-based milks were fortified with calcium and vitamin D. In these products, the calcium and vitamin D levels matched those in cow’s milk. However, levels were lower in unfortified alternatives. Calcium and vitamin D both help to strengthen bones, while vitamin D also boosts the immune system.

The findings were presented at the annual meeting of the American Society for Nutrition in Boston. They are important because the nutrients are already underconsumed, says a spokesperson for the US Food and Drug Administration. ■

Carissa Wong