

# NEWS IN FOCUS

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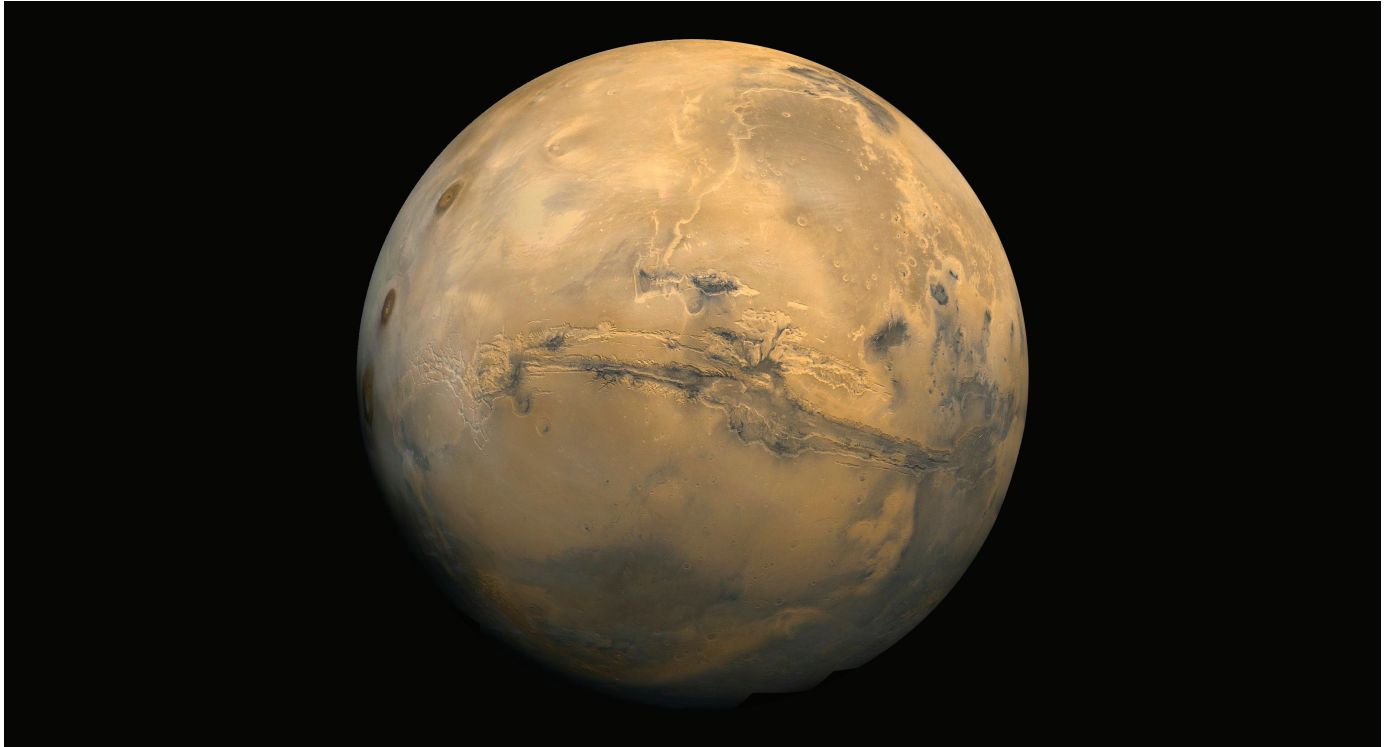
**POLICY** Scientists disappointed by European court ruling on gene-edited plants **p.16**

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NASA



Mars is thought to host a buried lake that could change how scientists want to explore the red planet.

## PLANETARY SCIENCE

# Signs of buried lake on Mars tantalize scientists

*If confirmed, the lake would be the first body of liquid water ever detected on the red planet.*

BY ALEXANDRA WITZE

A large saltwater lake seems to lurk under ice near Mars's south pole. If confirmed, it would be the first body of liquid water ever detected on the red planet, and a significant milestone in the quest to determine whether life exists there.

"It's a very promising place to look for life on Mars," says Roberto Orosei, a planetary scientist at the National Institute of Astrophysics in Bologna, Italy. "But we do not know for sure if it is inhabited." On Earth, similar 'subglacial' lakes are home to microbial life.

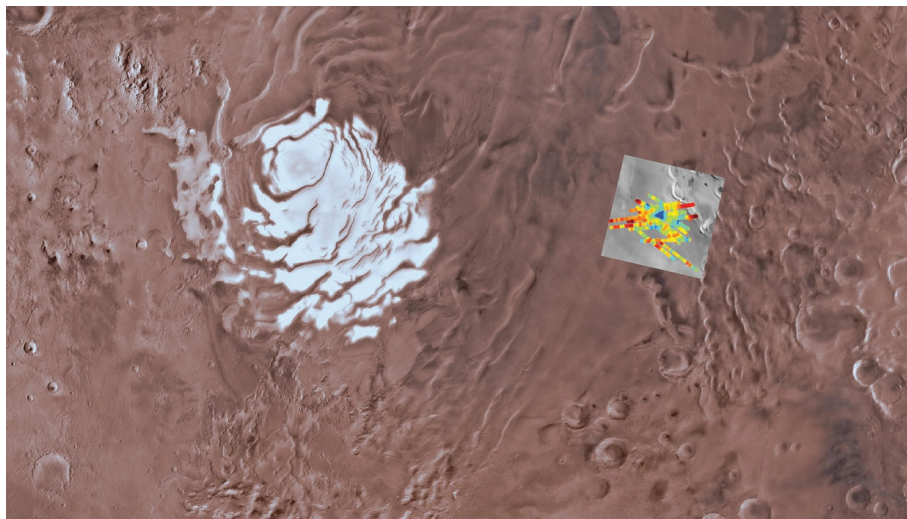
A team of Italian researchers, led by Orosei, reported the discovery on 25 July in *Science*<sup>1</sup>. They spotted evidence of the buried lake in radar data from the European Space Agency's Mars Express spacecraft.

Others say that the work is tantalizing but, like anything else in the controversial hunt for water on Mars, it needs more supporting evidence. "It's not quite a slam dunk yet," says Jeffrey Plaut, a planetary scientist at NASA's Jet Propulsion Laboratory in Pasadena, California, who has searched for water using data from Mars Express<sup>2</sup>.

If further studies confirm the existence of a

lake, the discovery could open new avenues for investigating Mars. Researchers have drilled into subglacial lakes on Earth and sampled the water for signs of microbes, while others are developing technologies to reach a buried ocean on Jupiter's moon Europa. There are no ice-drilling missions currently slated for Mars — but the latest discovery could change how scientists think about exploring the planet.

"It begins a new line of inquiry that's very exciting," says Jim Green, NASA's chief scientist. Water appears across Mars today in various forms, left over from a time billions of years ago when the planet was warmer and wetter. ▶



Radar tracks on Mars's Planum Australe show the location of a potential buried lake (in blue).

► Orbiting probes have spotted ice, including buried glaciers, in many locations. Spacecraft have photographed steep slopes whose appearance changes seasonally, as if liquid water is running downhill and leaving dark marks. And NASA's Curiosity rover has measured water vapour in the planet's atmosphere.

Orosei and his colleagues found the lake using a radar instrument called MARSIS aboard Mars Express, which launched in 2003. It sends radio waves bouncing off the planet's surface and subsurface layers; the way in which the radar signal reflects back reveals the type of material that is present, such as rock, ice or water. The scientists focused their search on the layers of ice and dust that cover the planet's south pole.

But the observations were frustratingly inconsistent. Mars Express sometimes saw a bright reflection in several locations, which did not reappear the next time the spacecraft flew over those sites. Finally, in 2012, the scientists decided to get MARSIS to send back raw data, instead of performing automated

processing before beaming the data to Earth. "This changed everything, and it was much more obvious to spot the bright reflectors," says Orosei.

The data showed the reflections coming from a 20-kilometre-long zone in a region known as Planum Australe. After ruling out other possible causes, such as carbon dioxide ice, the scientists concluded that the reflections were coming from subsurface water.

The lake is about 1.5 kilometres beneath Mars's icy surface and is at least 1 metre deep. To keep from freezing, the water must be very salty, Orosei says — perhaps similar to supersalty subglacial lakes reported in the Canadian Arctic earlier this year<sup>3</sup>. Salt-rich rocks beneath the Canadian lakes infuse the water and allow it to remain liquid, says Anja Rutishauser, a glaciologist at the University of Alberta in Edmonton. On Mars, salts known as perchlorates might be making the brine; in 2008, NASA's Phoenix spacecraft found perchlorates in soils near the planet's northern polar ice.

Mars might have had many similar lakes

in the past, when heat rising from deep in the planet melted some of the ice covering its polar regions, says Stephen Clifford, a planetary scientist who proposed the idea<sup>4</sup> in 1987 and now works for the Planetary Science Institute in Houston, Texas. If life once thrived in ancient subsurface lakes, he says, the latest finding "raises support for the idea that life could still persist on Mars".

With liquid water and the right chemical elements available to supply energy, a buried martian lake would have the ingredients needed to sustain life — as long as it's not too salty, says John Priscu, a biogeochemist at Montana State University in Bozeman. But exploring it won't be easy. Priscu leads a team that aims to drill into Antarctica's subglacial Lake Mercer later this year; hauling tonnes of equipment and fuel there required weeks of traversing the Antarctic ice sheet with tractors. "There's no way you're going to get all that to Mars," he says.

But there are ways to learn more with spacecraft already in play. Green notes that NASA's InSight probe, which is scheduled to land near the martian equator in November, will measure heat flow in the top 5 metres of the surface there. Scientists can use those data to extrapolate how much heat might be rising from beneath the south polar cap, melting the ice and potentially creating more lakes.

Orosei says his team has glimpsed other bright reflections, but isn't ready to say whether or not they are lakes. More studies using MARSIS, as well as the radar on board NASA's Mars Reconnaissance Orbiter — which has looked at Planum Australe and not seen the reflections — could help to reveal whether these are actually liquid water or something else, Plaut says. ■

1. Orosei, R. *et al. Science* <https://doi.org/10.1126/science.aar7268> (2018).
2. Plaut, J. J. *et al. Science* **316**, 92–95 (2007).
3. Rutishauser, A. *et al. Sci. Adv.* **4**, eaar4353 (2018).
4. Clifford, S. M. J. *Geophys. Res.* **92**, 9135–9152 (1987).

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PUBLIC HEALTH

# China vaccine scandal unlikely to dent immunization rates

*Vaccines are compulsory for children starting school in China, and enjoy public support.*

BY NICKY PHILLIPS

Problems with two Chinese-made vaccines — one of which was distributed to clinics and possibly injected into hundreds of thousands of children — have led to arrests and made international headlines.

But researchers who study vaccination in China don't expect a major effect on the country's high immunization rates.

Widespread support for immunization programmes, combined with strict vaccine requirements for children starting school, means that most parents will continue

vaccinating their children, they say.

"I don't think there'll be an appreciable drop in vaccine coverage but it could impact when people get vaccines, and where the vaccines come from," says Abram Wagner, an epidemiologist at the University of Michigan in Ann Arbor who has interviewed Chinese parents