

# New Scientist

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## Space

# Exoplanet shows signs of having a habitable atmosphere

Matthew Sparkes

THERE are promising signals that one of the planets in the TRAPPIST-1 star system, which lies about 40 light years from Earth, has an atmosphere capable of supporting life. But scientists will need to image it 15 times more to make sure.

TRAPPIST-1 is a small red dwarf star with at least seven planets. It was discovered in 2016 and immediately became a target of astronomers hoping to detect extraterrestrial life because three of these worlds lie within the so-called Goldilocks zone, where water remains liquid.

However, subsequent imaging of three of its exoplanets, including two of the three within the Goldilocks zone, left the field disappointed when no atmosphere was detected around any of them. But Ryan MacDonald at the University of St Andrews, UK, and his colleagues have focused on TRAPPIST-1e, right in the middle of the Goldilocks zone, and believe

they have reason for optimism.

MacDonald and his team used the James Webb Space Telescope to scan TRAPPIST-1e in 2023 and have been working since then to extract a better picture of the world. Astronomers gather information on whether a distant exoplanet has an atmosphere by capturing images of the world as it passes in front of its star. Analysing subtle alterations to the starlight can reveal which chemicals are present in any atmosphere – and whether they include those that may be conducive to life.

But because TRAPPIST-1 is a red dwarf, it is much cooler than our own sun, making the readings more complex. For instance, chemicals like water that could indicate a hospitable atmosphere might actually be present in the star itself, meaning that signatures from TRAPPIST-1e's atmosphere had to be disentangled from those of the TRAPPIST-1 starlight that was shining through it. This

demanding new models and years of work. The preliminary results suggest TRAPPIST-1e has a life-friendly, nitrogen-rich atmosphere, potentially marking a significant moment in the search for life beyond Earth (*The Astrophysical Journal Letters*, doi.org/p5gd).

**"If it is habitable, just imagine what's happened on that planet for the last 7.6 billion years"**

"Of all the spectra we have obtained so far of the planets in the TRAPPIST-1 system, this is the one that's the most promising, that's pointing towards there potentially being something there," says MacDonald.

"Obviously, I'm hoping that the planet right in the middle of the habitable zone of this star has an atmosphere, because that would have incredible implications for astrobiology, our search for life and habitability."

MacDonald says that if the presence of a nitrogen-rich atmosphere is confirmed with subsequent data, the next step would be to look for gases like methane or carbon dioxide and work out using climate models what the temperature at the surface is likely to be and whether that would allow for liquid water.

But the researchers stress more data is needed. So far, they have data from four JWST observations, but over the next year, they hope to carry out 15 more.

Matthew Genge at Imperial College London says that there is no shortage of exoplanets being discovered, but that astronomers are keen to find any that have the right conditions for life.

"If [TRAPPIST-1e] is habitable, just imagine what's gone on on that planet for the last 7.6 billion years," says Genge. "The older the planet is, then the more likely that I would say it is for intelligence to actually evolve." ■

## Archaeology

## Sculpted head may reveal a unique ancient hairstyle

A MINIATURE statue from northern France dating back 27,000 years may give us clues to how ancient hunter-gatherers styled their hair.

The statuette was unearthed in 2021 from an open-air site about 140 kilometres north of Paris called Amiens-Renancourt 1, but has only just been described by scientists.

It has long hair that appears to be braided with a gridded pattern, which could represent hair netting or a unique hairstyle. This differs from statuettes found across central and eastern Europe, where the hairstyle or headpiece is shorter



STEPHANE LANCELOT/INRAP

and covers most of the head, says Olivier Touzé at the University of Liège in Belgium, who wasn't involved in the study.

"This could be a cultural particularity that would never have been highlighted other than through these rare human representations," says team member Clément Paris at

France's National Institute of Preventive Archaeological Research.

Radiocarbon dating of rock layers at Amiens-Renancourt 1 suggests the figurine is around 27,000 years old, making it part of the Gravettian period, which lasted from 33,000 to 26,000 years ago across Europe (*Journal of Archaeological Science*:

This statuette, discovered in France, depicts a person with long, braided hair

*Reports*, doi.org/p5gg).

Other excavations at the site unearthed several scrap fragments and more than a dozen additional figurines, including Venus figurines that represent women. "It appears that the site had a workshop dedicated to [statuette] production," says Touzé.

But questions remain about the statuette and the people who made it. "Thoughts and myths from prehistoric times leave few traces," says Paris. "And when we do have traces, such as this statuette, their meaning remains enigmatic." ■  
Taylor Mitchell Brown