New Scientist

WEEKLY 10 February 2024

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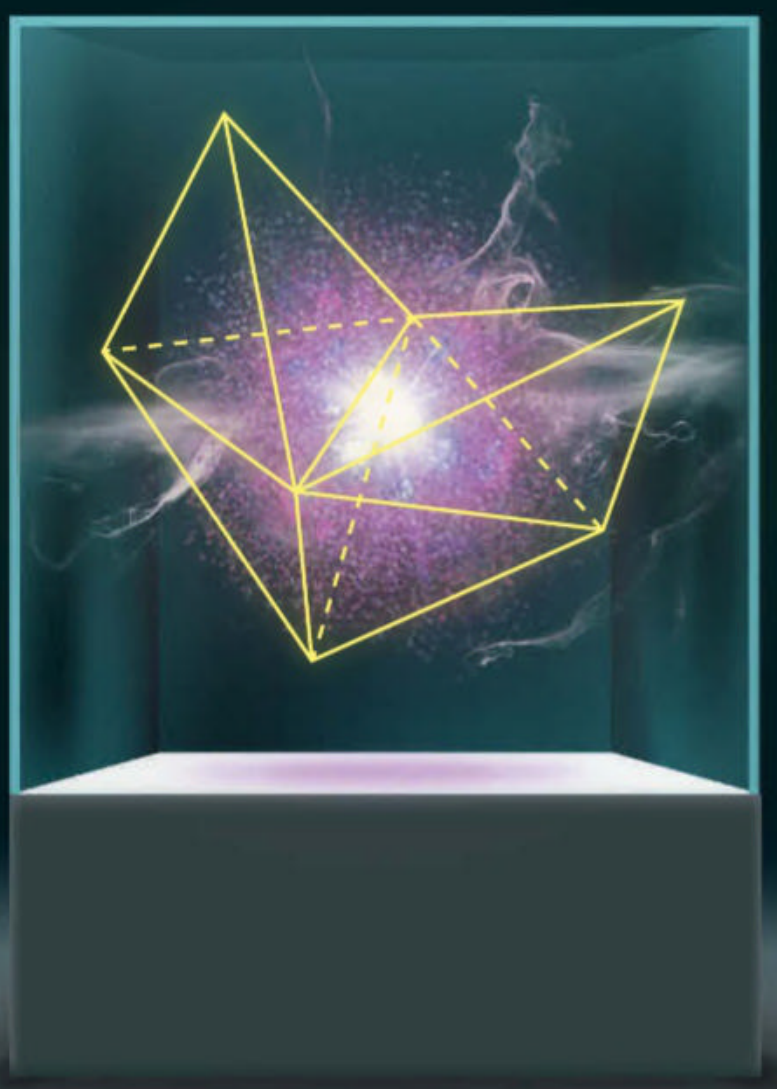

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Space

NASA's Mars helicopter ends its mission but leaves strong legacy

Leah Crane

THE Ingenuity helicopter's flying days are over. After an astonishing 72 flights over the course of nearly three years, NASA's drone has sustained damage to one of its rotors and can no longer take to the Martian skies.

After it landed on Mars along with the Perseverance rover in 2021, Ingenuity's mission was to make five flights over about one month, to a maximum altitude of about 5 metres.

The goal was simply to prove that it was possible to fly a powered aircraft on another world, and because this difficult feat had never been attempted before, it was expected that the mission would end in a crash landing as its operators at NASA pushed the craft beyond what it was designed for. But Ingenuity exceeded expectations to an astonishing degree.

"Ingenuity absolutely shattered our paradigm of exploration by introducing this new dimension of aerial mobility," said Lori Glaze at NASA's Planetary Science Division in Maryland in a press conference on 25 January. It travelled about 17 kilometres, which was more than 14 times further than originally planned, acting as an aerial scout for the Perseverance rover.

Over the course of its 72 flights, Ingenuity reached a top altitude of 24 metres and

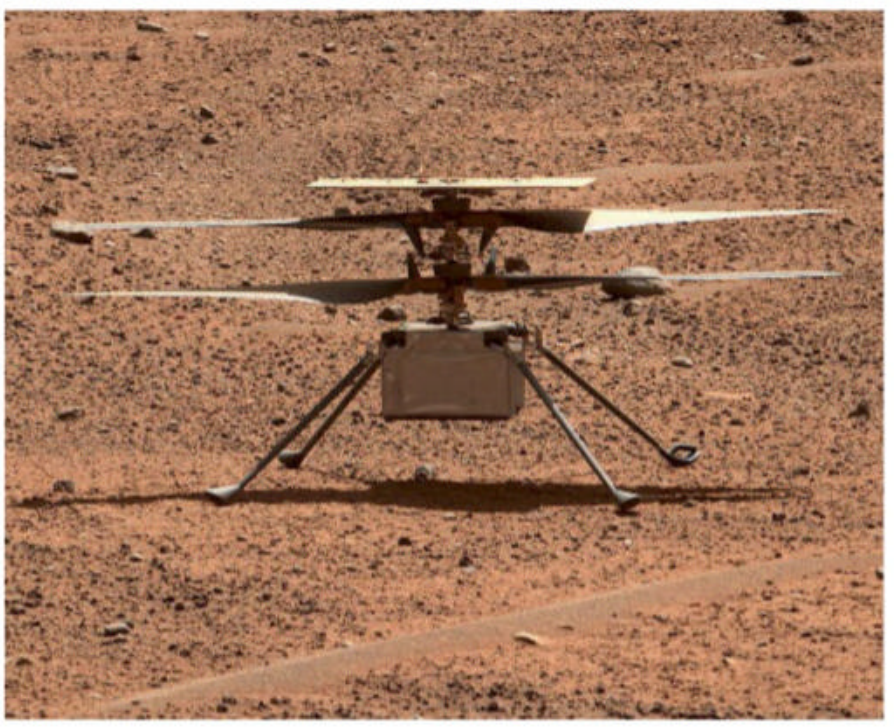
5

Number of flights originally planned for Ingenuity on Mars

72

Number of flights the drone actually managed

a maximum flight duration of nearly 3 minutes. Both of these dramatically outperformed all of the predictions that were made about the helicopter's capabilities. This proved beyond a shadow of a doubt that drones are a viable way to explore areas on Mars – and maybe other worlds as well – that are difficult or impossible to reach with traditional rovers.



NASA/JPL-CALTECH/ASU/MSSS

The Ingenuity helicopter on Mars, seen from the Perseverance rover

But on its penultimate flight on 6 January, Ingenuity had to make an emergency landing, only the third one during its entire mission. This was the beginning of the end.

On 18 January, the craft performed what would turn out to be its final flight, a simple vertical hop to determine its precise location after the emergency landing.

As it descended back towards the ground, it briefly lost contact with the Perseverance rover and controllers on Earth. When it regained contact and settled on the ground, one of its rotors was badly damaged. It isn't clear whether the communications loss led to the rotor damage or vice versa, and we may never know. Either way, the result is the same: Ingenuity has made its final flight.

But it will not be the last aircraft to fly on another world. There are plans to send similar small craft to Mars to help retrieve the samples that Perseverance has collected and stashed on the surface, and a much larger one called Dragonfly is scheduled to launch to Saturn's moon Titan in 2028.

"These missions lay the foundation for a bright future," said Laurie Leshin at NASA's Jet Propulsion Laboratory in California during the press conference. "It's so critically important that we continue to look for places, look for opportunities, to fly these things, to get that flight experience." Ingenuity was a small aircraft, but it leaves behind a huge legacy. ▮

Marine biology

Anglerfish may be so diverse because of the way they mate

Christie Taylor

A UNIQUE sex strategy may have enabled the diversity of anglerfish species that thrive today.

Chase Brownstein at Yale University and his colleagues reconstructed the evolution of the 160-plus species of deep-sea anglerfish, or ceratioids. Known for their large jaws and bioluminescent lures, ceratioids are a subgroup of the bigger order of anglerfish, which also includez bizarre bottom-dwellers like sea toads and batfish.

Using genetic sequencing, the team found that ceratioid ancestors walked on pectoral fins on the floor of the deep sea. But 55 million

DOUG PERRINE/ALAMY

A deep-sea anglerfish called the black seadevil

years ago, some began swimming in the ocean's vast bathypelagic, or "midnight", zone. There, they became much more genetically diverse than their seafloor-dwelling cousins over just 5 million years.

Brownstein's team found this rapid diversification may be due to a parasite-like reproductive strategy: a tiny male will use his jaws to attach to a much bigger female until she is ready to mate. In some species, the two even fuse. The method may give anglerfish an advantage over other deep-sea denizens that could struggle to find a mate in the bathypelagic zone.

The analysis revealed that the traits needed for this parasitism – size disparities between the sexes and an immune system that doesn't attack attaching males – predated the move to the deep ocean (bioRxiv, doi.org/mfg5). ▮