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A BIRD'S-EYE VIEW OF MARS

Ingenuity takes its fifth flight while Perseverance prepares for its main mission.



LEARNING TO FLY. During Ingenuity's third flight on April 25, the Perseverance rover captured this image of the hovering helicopter with one of its navigation cameras.

NASA/JPL-CALTECH

» It's been mere months since NASA's latest Mars rover, Perseverance, dramatically landed on the Red Planet's surface. And boy, has it been busy. Since touching down Feb. 18, Perseverance has tested its systems, recorded audio of its surroundings, captured thousands of images, spotted several possible science targets, and even proved it can pluck oxygen out of Mars' thin air — an invaluable option, should humans ever venture there.

Yet, if we're being honest, the car-sized rover has so far been overshadowed by a tiny, 4-pound (1.8 kilograms) helicopter that simply hitched a ride to the Red Planet to test out some new

tech. That high-flying show stealer is none other than Ingenuity.

Ingenuity was born as an experimental tagalong mission slated for a 30-day run shortly after Perseverance's landing. After a slight delay, on April 19, Ingenuity successfully climbed to an altitude of 10 feet (3 meters) above Mars' surface, where it maintained a stable hover for 30 seconds. That's an impressive feat, considering the Red Planet's atmosphere is only 1 percent as dense as Earth's. What's more, that flight cemented Ingenuity as the first self-propelled aircraft to ever fly on another world.

"We don't know exactly where

Ingenuity will lead us," said acting NASA Administrator Steve Jurczyk at a press conference after the maiden flight, "but today's results indicate the sky — at least on Mars — may not be the limit."

Within three weeks, Ingenuity logged a total of five flights. Its second (April 22) flew higher for longer and included sideways movement. The third (April 25) saw Ingenuity zip 164 feet (50 m) downrange, reaching a top speed of 4.5 mph (7.2 km/h) — some 450 times faster than Perseverance's top speed. During its fourth flight (April 30), it pushed the boundaries even further, making a longer round trip that also scouted new potential



PERCY WATCHES BELOW. During Ingenuity's third flight, the helicopter took this image of Perseverance (upper left) and its wheel tracks. Ingenuity was hovering at an altitude of 16 feet (5 m) and was located roughly 279 feet (85 m) from the rover at the time. NASA/JPL-CALTECH

landing sites. And based on what it saw, Ingenuity's fifth flight (May 7) served as the craft's first one-way trip, traveling 423 feet (129 m) in 108 seconds to forever leave behind the Red Planet's first airfield.

Next, Ingenuity's team plans to push the craft's limits even further, as well as explore what the nearby environment has to offer. At the same time, Perseverance's team is kicking off the rover's mission in earnest. Percy is currently plodding south to the region where it will begin its scientific and sample collection efforts. Fortunately for Ingenuity, the rover's slow, methodical pace means it can continue acting as a communications relay to the helicopter, at least in the short term.

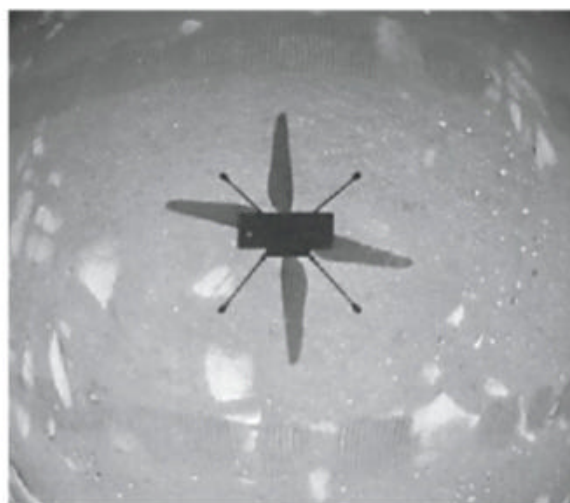
"The plan forward is to fly Ingenuity in



DELIVERY DROP-OFF. Ingenuity has its legs deployed in this photo, ready to drop from the belly of Perseverance, where it stowed away during its journey to Mars. NASA/JPL-CALTECH/MSSS

a manner that does not reduce the pace of Perseverance science operations," said Ingenuity's chief engineer, Bob Balaram. "We may get a couple more flights in over the next few weeks, and then the agency will evaluate how we're doing. We have already been able to gather all the flight performance data that we originally came here to collect. Now, this new operations demo gives us an opportunity to further expand our knowledge of flying machines on other planets."

A tweet from May 11 on the rover's Twitter account shows Perseverance is ready to go, too: "The time has come: I'm switching from on-scene photographer to science investigator. Did this ancient lakebed ever have life? The tools I brought will help begin the hunt. I'm a bot on a mission." — JAKE PARKS



SHADOW SELFIE. Ingenuity snapped this shot of its own shadow while hovering on April 19, as it became the first powered craft to successfully fly on another world. NASA/JPL-CALTECH

REUSABLE RIDE

SpaceX's Crew-2 launch on April 24 ferried four astronauts — two American, one European, and one Japanese — to the International Space Station (ISS). It was the company's third crewed flight and the first to reuse a rocket and crew capsule that had flown before.

LIGHT FINDS A WAY

Recent data from the Atacama Large Millimeter/submillimeter Array show baby stars being born less than 1,000 light-years from the Milky Way's center. Scientists had thought star formation was extremely difficult in the galaxy's central zone due to turbulence and strong magnetic fields.

SMATTERING OF ANTISTARS?

Astronomers have identified 14 stars that could be made of antimatter, based on their gamma-ray emissions, which resembles predictions of matter-antimatter annihilation. Although standard cosmology holds that nearly no antimatter remains in the universe, an experiment mounted to the ISS potentially detected antihelium in 2018 — which, if confirmed, could be stray antimatter from antistars.

OUT OF CONTROL

China successfully launched the first module of its Tiangong space station April 28. The Long March 5B rocket booster remained in orbit until making an uncontrolled reentry near the Maldives on May 9, prompting NASA administrator Bill Nelson to criticize China for "failing to meet responsible standards regarding their space debris."

GENDER GAP

If current trends continue, the percentage of women in Australia's astronomy workforce will not break 30 percent until 2080, according to a study published April 19 in *Nature Astronomy*. The authors recommend retention and hiring targets to bring that timeline forward. — MARK ZASTROW