

# Fungal experiment to launch as Artemis I payload

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A U.S. Naval Research Laboratory (NRL) experiment prepares to launch as part of NASA's scheduled Artemis I mission to orbit the moon Aug. 29. The NRL experiment will use samples of fungi to investigate effects of the deep space radiation environment outside of Earth's protective magnetosphere. Credit: U.S. Navy illustration by Sarah Peterson

An experiment prepared by the U.S. Naval Research Laboratory (NRL) will launch as part of NASA's scheduled Artemis I mission to orbit the

moon Aug. 29.

The NRL experiment will use samples of fungi to investigate effects of the [deep space](#) radiation environment outside of Earth's protective magnetosphere.

"We're interested in factors that affect eukaryotic survival in space," said Jennifer Yuzon, postdoctoral scientist for NRL's Laboratory for Biomaterials and Systems. "For our experiment fungus is our model organism, specifically *Aspergillus niger*, which is found in all human environments including spacecraft."

In addition to being found in human environments, fungi are notable for their natural mechanisms to protect and repair DNA damage caused by radiation. The experiment seeks to understand fungi's radiation protective qualities, as well as generally studying how [biological systems](#) adapt to deep space.

The project's experimental setup has four different strains of the fungus. Samples include one wild type strain and three mutated strains that were genetically engineered in the laboratory. Two of the mutated strains are deficient in DNA repair pathways, while the other mutated strain is defective at melanin production.

"Looking at the impact of melanin and DNA repair pathways in the samples with the effects of both cosmic radiation and microgravity will increase our knowledge for how humans may be impacted at the Moon and beyond as we continue to explore further," said Zheng Wang, NRL microbiologist and the principal investigator on this project. "We also hope to gain knowledge for the development of new ways to protect astronauts and equipment during [space travel](#). As the fungi adapt to the space environment they may also produce novel biomolecules that could have therapeutic potentials."

While NRL has a long history in [space exploration](#), stretching back to the V-2 rocket test in the late 1940s, this experiment marks a first in space for the Lab. The fungal experiment will become the first biological project performed at NRL to be launched to space.

After the Orion spacecraft completes its mission the fungal samples will be returned to NRL for a thorough analysis.

"The mission is about 42 days in lunar orbit," Yuzon said. "Then we'll process our samples for survival, genomic and metabolic changes."

The NRL experiment is one of four space biology investigations selected for Biological Experiment 01 (BioExpt-01) mission aboard the Orion spacecraft by NASA's Space Biology Program. During the Artemis I mission, the fungal samples will be stored in a specialized Biological Research in Canisters system within the crew compartment of NASA's Orion capsule. According to NASA, all of the investigations aim to study DNA damage and protection from radiation, which for Moon missions experience approximately twice as much radiation exposure as levels on the ISS.

NASA supported NRL's project as a Space Biology research opportunity. The Space Biology Program is managed by the Space Life and Physical Sciences Research and Applications Division in NASA's Human Exploration and Operations Mission Directorate at the agency's headquarters in Washington, D.C.

Artemis I will be an uncrewed flight test in NASA's mission to extend human presence to the Moon and beyond. The mission will demonstrate the performance of the Space Launch System rocket and test the Orion spacecraft's capabilities over the course of about six weeks as it travels about 40,000 miles beyond the Moon and back to Earth.

While the NRL research team anticipates Artemis I launch day, they are already preparing for other experiments that will investigate their research questions. One planned future mission is a collaboration with DoD's Space Testing Program, International Space Station (ISS) National Laboratory and NASA Kennedy Space Center to send fungal samples to the ISS. Wang's research group has also been selected by NASA to study how melanized fungal cells adapt to Mars-like conditions using NASA's Antarctic balloon platform.

"These three programs will give us a full picture of how eukaryotes like fungi perform in diverse space conditions," Wang said. "Then in the future we can develop better strategies to help astronauts explore deep space."

The Artemis I mission is scheduled to launch Aug. 29 from Kennedy Space Center located in Florida after 8:30 a.m. within a two-hour window, according to a NASA briefing.

**More information:** More on NASA's Space Biology Program: [science.nasa.gov/biological-ph ... ograms/space-biology](https://science.nasa.gov/biological-ph...ograms/space-biology)

Provided by Naval Research Laboratory

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