

NASA says its plan to bring Mars samples back to Earth is safe, but some people are worried

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Since September, the Perseverance rover has been picking along an ancient river delta on Mars, its robotic arms reaching out with whirling steel drill bits to core rocks, scoop soil and suck small amounts of the red planet's atmosphere into titanium tubes.

The plan, under NASA's Jet Propulsion Laboratory, calls for a sci-fi symphony of technology that includes launching another vehicle to Mars to bring the unsterilized samples back to Earth, drop land the samples in Utah, and shuttle them to a yet-to-be built secure facility by 2033.

There scientists will start testing for signs of ancient microbial life from about 35 samples weighing in total about one pound. The goal is also understanding the planet's geology and climate, as well as preparing for people to one day step foot on the red planet.

But the plan gave some members of the public who attended an open hearing on the plan a bit of intragalactic agita, especially in light of the recent pandemic. That includes a retired Federal Aviation Administration engineer from South Jersey who wonders what problems an unsterilized microbe from Mars might present.

NASA is conducting its Mars Sample Return Mission with the European Space Agency and calls it one of the most meaningful missions it has undertaken.

"We also believe this to be the next logical step in our quest to eventually land humans on the surface of Mars," Thomas Zurbuchen, an astrophysicist and head of science at NASA, said during a virtual public presentation in May. The samples collected from the ancient river delta Jezero "are thought to be the best opportunity to reveal the early evolution of Mars, including the potential" for life, Zurbuchen said.

Read: [NASA explains the mission to bring samples of Mars soil, rock and atmosphere back to Earth](#)

'Low likelihood of risk'

Some members of the public have wondered about the remote possibility

that something in those samples could be alive or present a biohazard. They also wonder whether China, which has announced a similar project, and private companies will have as rigorous safeguards as NASA. Elon Musk has been enthusiastic about plans by his company Space X to explore Mars, though there is no time frame.

Public comments on NASA's initial presentation are now closed, but a draft of an environmental impact statement on the mission is expected in the fall with another chance for the public to weigh in.,

The environmental impact statement will examine implications for both Earth and Mars regarding "recovery efforts with respect to natural, biological and cultural resources" and "impacts to the human and natural environment associated with loss of containment of Mars sample materials."

'Even if the risk is minimal'

Some people are nervous because NASA can't say with 100% certainty it won't bring back something alive or dangerous. Some of the 170 commenters in May identified themselves as scientists, doctors, or professionals. Others remained anonymous.

One commenter wrote that any samples should be "studied off-world and remotely due to the risk of planetary contamination. Even if the risk is minimal, nothing above a 0% chance should be brought back to Earth."

Another wrote that "NASA should NOT bring samples back from Mars until we know more about how said samples will impact our safety on this planet. Test first for possible bacteria that will adversely affect our health."

Thomas Dehel, of Gloucester Township, Camden County, was one of

the scores of commenters. Retired from the Federal Aviation Administration, Dehel has a master's degree in electrical engineering as well as a law degree. Though not affiliated with the mission, he is a Mars aficionado and operates a website devoted to the mission.

He wants NASA to proceed, but he, too, has concerns.

"We won't know if it's sterile or not," Dehel said. "That's my biggest point. We should know if we bring something back to Earth whether it's sterile or not, to do some sort of crude test up front to see if there's any kind of biological life."

NASA counters that sterilizing samples first could destroy valuable information, such as biosignatures of past life. Others ask why the samples can't be brought to the International Space Station first and examined. NASA says the space station, which is set to be decommissioned in 2031, does not have the sophisticated equipment needed for testing.

Dehel is curious why NASA put notices announcing the May hearings in only two newspapers, one in Florida and one in Utah. The agency says those newspapers are in two key areas where the mission will take place—liftoff and landing. Regardless, Dehel said the public was largely unaware, leading to low turnout in two public virtual presentations in May.

Dehel and others cite the work of Gilbert Levin, a scientist who worked as a principal investigator for a life detection experiment during NASA's Viking mission to Mars in 1976. Levin was also named as an investigator for the Mars Sample Return Mission but died in 2021 at age 97.

Levin long maintained that tests were positive for life after Viking landers injected a nutrient solution containing radioactive carbon-14 into

the Mars surface. The belief was that any living organism would emit the isotope as part of the digestion. Levin said that did occur in two locations, 4,000 miles apart.

Dehel wonders about the chance of bringing back a pathogen humans aren't prepared to defend.

NASA, however, countered that Levin found "a substance mimicking life, but not life." Indeed, scientists say there are other explanations for Levin's results given that they know much more now about the chemical and mineral composition of Martian soil.

'Remnants of past life'

Mars has a thin layer of atmosphere composed mostly of carbon dioxide and is viewed as hostile to life. But it was much different in the past when it's believed water flowed on its surface and a thicker atmosphere would have kept the surface warmer than the current average temperature of -81 degrees, with dips to -220 degrees.

Nathan Yee, a Rutgers professor who teaches a course in astrobiology and who has worked with NASA, agrees that's it's unlikely anything is alive at or near the surface where Perseverance is collecting its samples.

Yee said intense UV radiation bombards Mars. UV radiation kills microbes by breaking apart their DNA. Indeed, UV sterilizers are used on Earth to kill bacteria in aquariums and drinking water. You can buy portable UV sanitizers for home use.

And unlike Earth, Mars lacks magnetic fields capable of deflecting solar winds that also carry particles with dangerous amounts of radiation.

Overall, Yee said it would be very hard for life to survive those

conditions. And NASA contends meteorites from Mars have landed on Earth "without any adverse effects to our biosphere."

Lee said that even if microbes were found alive, it's doubtful they would pose a threat.

"There has to be a long, long time of evolution for microbes to learn how to interact and attach onto animal cells, enter [animal cells](#), and use the machinery of an animal cell to replicate," Yee said. "That's a very complex choreographed dance."

However, Yee said it's possible samples could contain "remnants of past life." He also said recent data suggest that the deep subsurface of Mars contains liquid water and might harbor life.

More intriguing, Yee asks: What will NASA do in the slim chance it does find life in a sample?

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