

Hitchhiking Microbes

A foggy window

On a 1988 mission aboard Russia's Mir space station, cosmonauts grew alarmed as their navigational window became increasingly cloudy. They soon realized that not only was a fungus growing on the super-strong quartz glass, it was degrading it. The fungus had infiltrated the rubber seal between the glass and the titanium window frame and snuck onto the window itself [1].

Dust in the air

In a 2015 study, scientists identified bacterial and fungal species from astronauts' skin in the HEPA filter on the International Space Station (ISS) and in dust vacuumed from around the station [2].

In the pipes

Cosmonauts on Russia's Salyut-6 space station found fungi growing on piping and on equipment behind panels. Scientists also found small patches of the bacteria *S. aureus* growing near the fungi [1].

Crawling over cables

During its time in space, Russia's Salyut-7 space station housed a variety of fungi and bacteria. Cosmonauts found mold growing on sections of cables, electrical connections, and insulation tape. Scientists later identified the opportunistic pathogen *Staphylococcus aureus* on the rubber sections of the hatch locks [1].

With every launch, spacecraft carrying humans into space bring along a few uninvited guests.

Humans are home to trillions of microbes: bacteria, fungi, archaea, and protozoa to name a few. They colonize our skin, gut, and numerous organs in between, helping us digest food and regulate our immune systems. While we might want to avoid bringing microbes into space, we can't exactly help it.

Scientists and engineers do their best to reduce the numbers of microbes travelling into space by requiring astronauts to quarantine prior to launch and by implementing rigorous cleaning procedures for everything on board. But there's no way to get rid of all of the microbes on and in the human body.

From cozying up to electrical cables, eating away at windows, to floating on dust particles, microorganisms have made their homes in some unexpected places in space.

“Wherever we go, we shed our microbes; it is part and parcel of life.”

Kashuri Venkateswaran

Astrobiologist at NASA Jet Propulsion Laboratory

A ball of water

In 1998, NASA astronauts joined Russian cosmonauts on Russia's Mir space station to survey the variety of microbes living on board. When they opened a rarely accessed service panel on the Kvant-2 Module, they found a basketball-sized orb of water floating behind it [4]. The astronauts brought a sample of the water back to Earth and found it teeming with microbes: bacteria, protozoa, dust mites, and spirochetes [5].

Fuzzy towels

After exercising on the ISS in 2004, Russian cosmonauts hung towels to dry on a rack against a wall. The damp towels created a wet patch on the fabric that coated the wall. When they removed the towels later, they found the wall covered in patches of green fuzzy mold [3].

All over the surface

One of the most common species of fungi found on surfaces aboard the ISS is *Aspergillus niger*. This species of fungus helps produce citric acid and enzymes, making it an important fungus in the biotechnology industry [6].

Inside valves

Biofilms can be particularly dangerous to encounter in space. They are more resistant to antibiotic treatment than single bacterial cells, and they can degrade the surfaces they grow on. Scientists found biofilms in valves in the water processing systems on the ISS [5]. Engineers and scientists are actively developing more biofilm-resistant materials for future space missions [7].

References

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