

PLANETARY PROTECTION CENTER OF EXCELLENCE

BIOLOGICAL MATERIALS ARCHIVE

The Jet Propulsion Laboratory follows strict cleanliness requirements levied by NASA when assembling spacecraft. A mission of JPL's Biotechnology Planetary Protection Group is to archive microbes that may remain on spacecraft associated surfaces after cleaning. Because these microbes can survive in the harsh conditions of space, information regarding such hardy microbes is of importance to space flight science and engineering.

The JPL Biological Materials Archive demonstrates how NASA & JPL are committed to preserving and documenting microorganisms that may be of significance in understanding planetary exploration.

Our archive collection consists of organisms as well as organic materials collected from spacecraft associated surfaces that have been preserved from previous missions dating back to the Viking missions in the 1970s. Microbial cultures are preserved following sampling events in which spacecraft are verified for microbial cleanliness. The spacecraft and cleanroom environments are both unique and harsh, typically dominated by hardy microorganisms, creating a one-of-a-kind collection.

The archived microbes and knowledge gained may ultimately lead to the development of technology and new approaches to prevent the contamination of other worlds.



Why is Archiving Important at JPL?



Preserved organisms at JPL's Space Microbiology Lab.

Archiving is important because it allows us to preserve past mission artifacts and learn more as we scientifically advance. There are also organisms that are from human flora - possibly due to the high volume of activity in cleanrooms prior to launch. Extremophiles - microbes that tolerate extreme conditions - are also found in our collection and may help to understand how microbes may exist on other planets. JPL currently has thousands of isolates which are stored in a microbial library from eight Mars missions. Using Matrix Assisted Laser Desorption Ionization - Time of Flight (MALDI-TOF) Mass Spectrometry (MS), a customized database is being developed to identify spacecraft-associated microorganisms.

Potential Contaminants

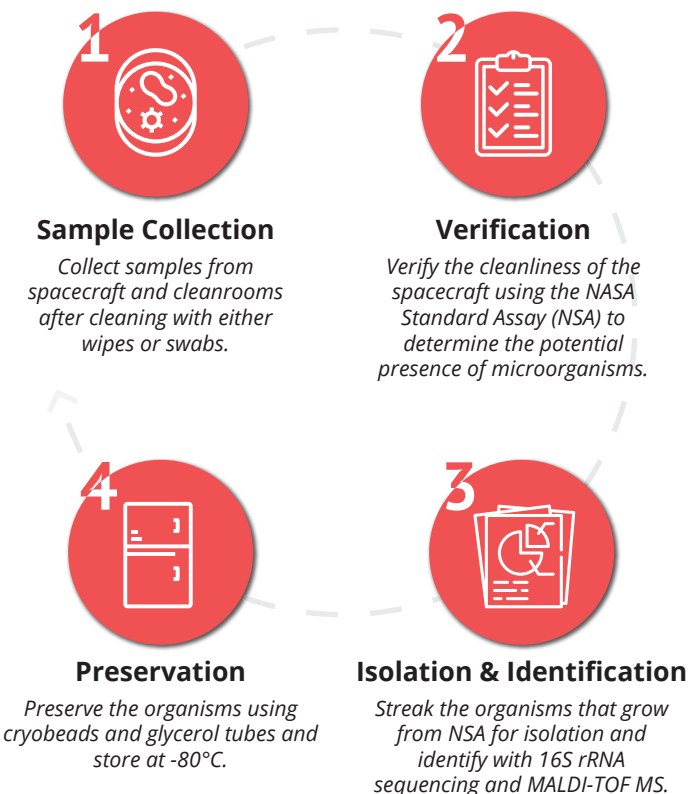


Examples of cultures from organisms from the microbial archive collection from spacecraft associated surfaces.

One of the sources of such contaminants are microbes embedded in solid non-metallic materials. Microbes inside of these materials could survive the space journey and, in

principle, could be released into the environment of the destination planet or moon. An additional concern is that these embedded microbes typically have greater tolerances to routine cleaning and sterilization efforts such as heat microbial reduction, vapor phase hydrogen peroxide (VHP), or radiation exposure. Thus, another advantage in having an archive is that the information collected for each isolate could provide useful clues in how the microorganism can withstand sterilization techniques.

Microbial Archiving Process



More About Archiving

The Space Microbiology Lab located at JPL is home to the biological materials archive and provides state-of-the-art equipment and research opportunities for the Biotechnology and Planetary Protection Group staff, postdocs, and students. We are committed to working to identify, document, and preserve, microorganisms as well as create a long-term capability for access and research. If you would like to know more about biological materials archive, then visit our website for further information.



Find out more about us!

**NASA Jet Propulsion Laboratory
Planetary Protection Center of Excellence**

<https://planetaryprotection.jpl.nasa.gov/>

The research was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.