

Understanding how microbes thrive in extreme space-like environments

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Abstract

The question of whether life exists outside our planet has captivated our attention for decades. In order to understand whether life could thrive in extraterrestrial environments, researchers turn to unique locations on Earth. Analogue sites – places resembling extraterrestrial environments – can help answer questions about what types of life could live in space. A recent project – Mars Analogues for Space Exploration (MASE) – examined microbes inhabiting representative space-like environments. Researchers isolated microbes from sites including permafrost, salt mines, acidic lakes and rivers, and sulfur springs and using metagenomics, they evaluated the proportions and characteristics of these unique microbes. They successfully identified 15 high-quality genomes, pinpointing specific microbial functions enriched in MASE sites. Compared to more moderate environments, MASE-residing microorganisms expressed genes that allowed them to withstand physical and chemical pressure. A group of 34 extremely resilient microbes were found to thrive in all of the sites examined, suggesting that these microbes may be ideal model organisms for studying adaptation and resistance properties in extreme environments. These results provide novel insight into the properties required for extraterrestrial life helping to shed some light on what kinds of life might exist outside Earth.