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PRESS RELEASE

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Researchers identify a single bacteria that grows 60 percent better on the International Space Station than on Earth

Bacteria from citizen science study sent for growth on the International Space Station

Researchers at the University of California, Davis grew microbes collected from sports teams, historical monuments, museums, spacecraft, and schools and sent them to the International Space Station (ISS) for growth in space. The microbes were collected in collaboration with the public, as part of a nationwide citizen science project called Project MERCCURI. While most of the microbes looked similar on Earth and in space, one type of bacteria actually grew much better in space.

Project MERCCURI (www.spacemicrobes.org) is a collaboration between UC Davis and a number of other organizations including Science Cheerleader (www.sciencecheerleader.com/) which is a collection of current and former professional cheerleaders pursuing careers in science and math. Most of the sampling events were organized by Science Cheerleader and provided an opportunity to engage thousands of people with microbiology and research onboard the ISS. Two other aspects of the project involved the collection of microbial samples by astronauts on the ISS, and work examining the microbes present on the shoes and cell phones of people at the events.

This study, titled "Growth of 48 Built Environment Bacterial Isolates on Board the International Space Station (ISS)" was published today, March 22nd, 2016, in PeerJ, a peer-reviewed open access journal (https://peerj.com/). The researchers concluded that most of the microbes collected are, in fact, normally found on the ISS and that the vast majority of them behaved similarly on Earth and space. The one exception, a bacteria called *Bacillus safensis*, was originally isolated from a Mars Exploration Rover at JPL, before launch in 2004. This bacteria grew 60% better in space than on Earth, for reasons currently unknown. The genome sequence of this bacteria has recently been determined, and may contain clues as to why this strain behaved so differently in space.

“A lot of people ask us *why* we sent microbes into space,” said lead author Dr. David Coil, a microbiologist at UC Davis. “Understanding how microbes behave in microgravity is critically important for planning long-term manned spaceflight but also has the possibility of providing new insights into how these microbes behave in human constructed environments on Earth.”

“This initiative is not just about significant research,” said Darlene Cavalier, Founder of Science Cheerleader and an author on the study. “It’s about engaging the public in that research. Microbes that they collected are taking a ride on the International Space Station. They’re the subject of research by microbiologists and astronauts. We hope this inspires youngsters as well as adults to become more aware of and involved in science.”

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Media: Zip file of the high resolution images, and a PDF of this press release: http://static.peerj.com/pressReleases/2016/1842-media.zip

Caption: Study author Darlene Cavalier sampling Benjamin Franklin’s foot

Caption: Study author Darlene Cavalier swabs the crack of the Liberty Bell
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Caption: Science Cheerleader Kayla sampling Candlestick Park (SF 49ers)
Credit: Gold Rush Cheerleaders

Caption: Science Cheerleader Kelsey sampling Candlestick Park (SF 49ers)
Credit: Gold Rush Cheerleaders

Caption: An annual Pop Warner Youth Cheer gathering where the authors presented information on Project MERCCURI and announced which youth cheer teams had contributed microbes that were going to the space station.
Image Credit: Darlene Cavalier CC BY 4.0

Caption: The mission patch

Caption: One of the bacteria send to the ISS for growth, collected from a doorknob in New York.
Photo Credit: Alex Alexiev, UC Davis (CC BY 4.0)

Caption: The Dragon spacecraft and Falcon 9 rocket carrying the project
Photo Credit: David Coil, UC Davis (CC BY 4.0)

Caption: Retrieving the swabs after splashdown.
Photo Credit: Russell Neches, UC Davis (CC BY 4.0)

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PDF of this Press Release: http://static.peerj.com/pressReleases/2016/Press-Release-Coil.pdf

Link to the Press Preview of the Original Article (this link should only be used BEFORE the embargo ends): http://static.peerj.com/press/previews/2016/03/1842.pdf Note: this is an author proof and so may change slightly before publication.

Link to the Published Version of the article (quote this link in your story – the link will ONLY work **after** the embargo lifts): https://peerj.com/articles/1842 - your readers will be able to **freely** access this article at this URL.

Citation to the article: Coil et al. (2016), Growth of 48 built environment bacterial isolates on board the International Space Station (ISS). **PeerJ 4:e1842; DOI 10.7717/peerj.1842**

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About:

Project MERCCURI was coordinated by Science Cheerleader, SciStarter, and UC Davis, in conjunction with the Argonne National Laboratory. The project was made possible by Space Florida, NanoRacks, and the Alfred P. Sloan Foundation.

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Media Contacts

For the authors: Claire LaBeaux, claire@prclaire.com, +1 925-337-0244

F*or PeerJ:* email: press@peerj.com , https://peerj.com/about/press/

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Abstract (from the article)

Background. While significant attention has been paid to the potential risk of pathogenic microbes aboard crewed spacecraft, the non-pathogenic microbes in these habitats have received less consideration. Preliminary work has demonstrated that the interior of the International Space Station (ISS) has a microbial community resembling those of built environments on earth. Here we report results of sending 48 bacterial strains, collected from built environments on earth, for a growth experiment on the ISS. This project was a component of Project MERCCURI (Microbial Ecology Research Combining Citizen and University Researchers on ISS).

Results. Of the 48 strains sent to the ISS, 45 of them showed similar growth in space and on earth using a relative growth measurement adapted for microgravity. The vast majority of species tested in this experiment have also been found in culture- independent surveys of the ISS. Only one bacterial strain showed significantly different growth in space. *Bacillus safensis* JPL-MERTA-8-2 grew 60% better in space than on earth.

Conclusions. The majority of bacteria tested were not affected by conditions aboard the ISS in this experiment (e.g., microgravity, cosmic radiation). Further work on *Bacillus safensis* could lead to interesting insights on why this strain grew so much better in space.