BRIC carries big science in small canisters

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Seedlings of *Arabidopsis thaliana* were grown in microgravity in the BRIC system on STS-131. Note the skewing of the root system. Credit: J.Z.Kiss

Four tiny canisters which arrived to the International Space Station April 20 are carrying scientific experiments that could lead to better prevention and treatment of antibiotic-resistant bacterial infections, and make it easier to grow plants in space.

The experiments are housed in Biological Research in Canisters (BRIC) containers that were delivered to the space station on the Space Exploration Technologies (SpaceX) Dragon spacecraft. The company's Falcon 9 rocket sent the cargo ship to the orbital complex on SpaceX-3, the third flight to the space-based laboratory under the company's Commercial Resupply Services contract with NASA.

"These are four little bread box-sized, aluminum containers," said David Flowers, a payload manager with the International Space Station Ground Processing and Research Project Office at NASA's Kennedy Space Center in Florida. "The science specimens are in petri dishes grouped within each canister."

The BRIC-18 payload on SpaceX-3 comprises two very different scientific investigations.

Evidence suggests that spending time in microgravity can weaken astronauts' immune systems. At the same time, bacteria appear to become more virulent and antibiotic resistant in space. With the BRIC-18-1 experiment, the University of Florida in Gainesville, Fla., will try to grow antibiotic-resistant versions of two common bacteria: Bacillus subtilis, common in soil, and Staphylococcus epidermidis, often found on the skin. These will be compared to control samples on Earth.

Bacteria that have mutated while in space will be studied, giving scientists an opportunity to better understand how such mutations occur.

Terry Tullis, a QinetiQ North America mechanical engineer, prepares the Biological Research In Canisters, or BRIC, 18-1 and 18-2 experiments. This investigation launched to the International Space Station aboard a SpaceX Dragon spacecraft on April 18. Credit: NASA/Kim Shiflett

"From this, they may be able to tell whether certain antibiotics will be less effective over time, and determine more effective ways to treat infection," said Flowers.

In the second experiment, BRIC-18-2, the Michigan State University in East Lansing, Mich., is focusing on how plants manage to survive the stresses of the space environment.

"Plants key in on gravity for one of their main signals. But in space, that connection isn't there, and the movement of fluid within the plant is changed," Flowers explained, adding that vibrations from launch also can affect plants.

If scientists can learn how plants react to these stressors, it could enable the development of plants that are better suited to producing food, oxygen and clean water while in space. Such understanding also could lead to improvements in sustainable agriculture and management of natural resources on Earth.

Station crew members will remove the BRIC payloads from the Dragon spacecraft and move them into the U.S. Laboratory Module. The experiments are not powered, so there's no need for interface verification testing or power connections. They'll be reinstalled in the Dragon for the return trip to Earth.

Provided by NASA