



Rodent Research Hardware System

Studying Animals in Space

Aboard the International Space Station

The Rodent Research Hardware System provides a research platform aboard the International Space Station for long-duration rodent experiments in space. Such experiments will examine how microgravity affects the animals, providing information relevant to human spaceflight, discoveries in basic biology, and knowledge that can help treat human disease on Earth.

Rodent spaceflight experiments have contributed significantly to our understanding of the effects of microgravity on biological processes that are directly relevant to humans in space. Rodent studies provide information of the whole biological system, including the effects of microgravity on the structure and function of the sensorimotor, musculoskeletal, nervous, cardiovascular, reproductive and immune systems. Specific research questions are defined in the National Research Council's 2011 Decadal Survey Report, "Recapturing a Future for Space Exploration: Life and Physical Sciences Research for a New Era."

Historically, short-term rodent experiments have been transported into Earth's orbit aboard various vehicles, including Russian biosatellites and NASA's space shuttle. The International Space Station is the first essentially "permanent" orbiting science laboratory that offers the opportunity for longer-term experiments in space. In 2011, NASA's Ames Research Center in Moffett Field, Calif., was authorized to develop the Rodent Research Hardware System to enable rodent studies aboard the space station. This

hardware development project leverages the experience gained from 27 prior flight experiments with rodents using a space shuttle-based system. Advanced capabilities of the new system include housing for longer duration studies than the previous system permitted. In the post-shuttle era, the hardware also must support safe transport of rodents on the commercial resupply service vehicle SpaceX Dragon.

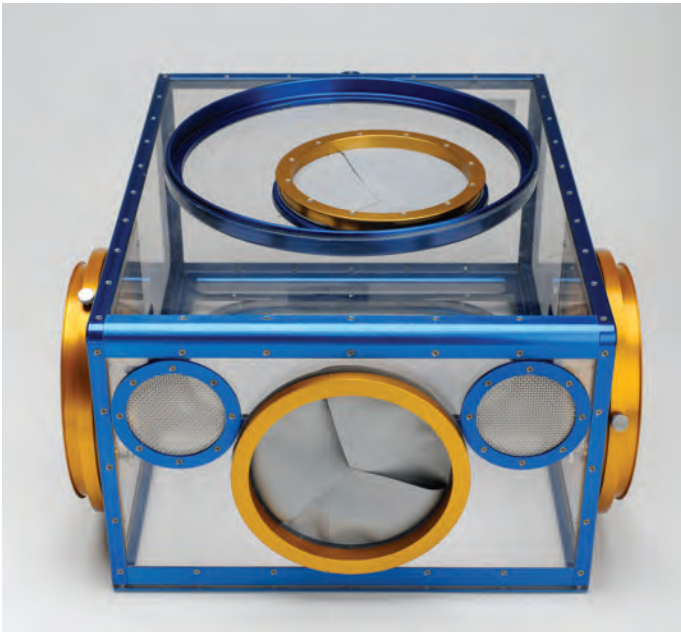


Rodent Transporter - for transportation to the International Space Station.

Image credit: NASA / Domic Hart

The new system has three major components: the Transporter that will safely transport rodents from Earth to the space station; the Animal Access Unit that will be used to transfer the rodents upon arrival at the space station from the Transporter into the Habitat unit; and the Habitat that will provide long-term housing for rodents aboard the station.

Rodent Habitat Aboard the International Space Station



Animal Access Unit – for rodent transfer aboard the space station. Image credit: NASA / Dominic Hart

The maiden voyage of the system, Rodent Research-1, launched aboard SpaceX-4 in 2014. Hardware performance and critical research operations were successfully validated during this month long study aboard the space station. NASA and the Center for the Advancement of Science in Space (CASIS) are developing spaceflight investigations that will use the Rodent Research Hardware System. Ultimately, NASA and the International Space Station U.S. National Laboratory will conduct rodent studies as long as six months in duration.

Under the direction of the International Space Station Utilization Office and the Space Biology Project, the Rodent Research Hardware System was developed at Ames, benefiting from the expertise within the Space Biosciences Division.

National Aeronautics and Space Administration

Ames Research Center
Moffett Field, CA 94035
www.nasa.gov/centers/ames

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Rodent Habitat – for long term housing aboard the space station, shown here with one of the access doors open. Image credit: NASA / Dominic Hart

For more information, visit:

www.nasa.gov/ames/research/space-biosciences

Or contact:

Janet Beegle
Project Manager
NASA Ames Research Center
janet.beegle@nasa.gov

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