SpinSat and things that slither splashdown with end of sixth SpaceX mission

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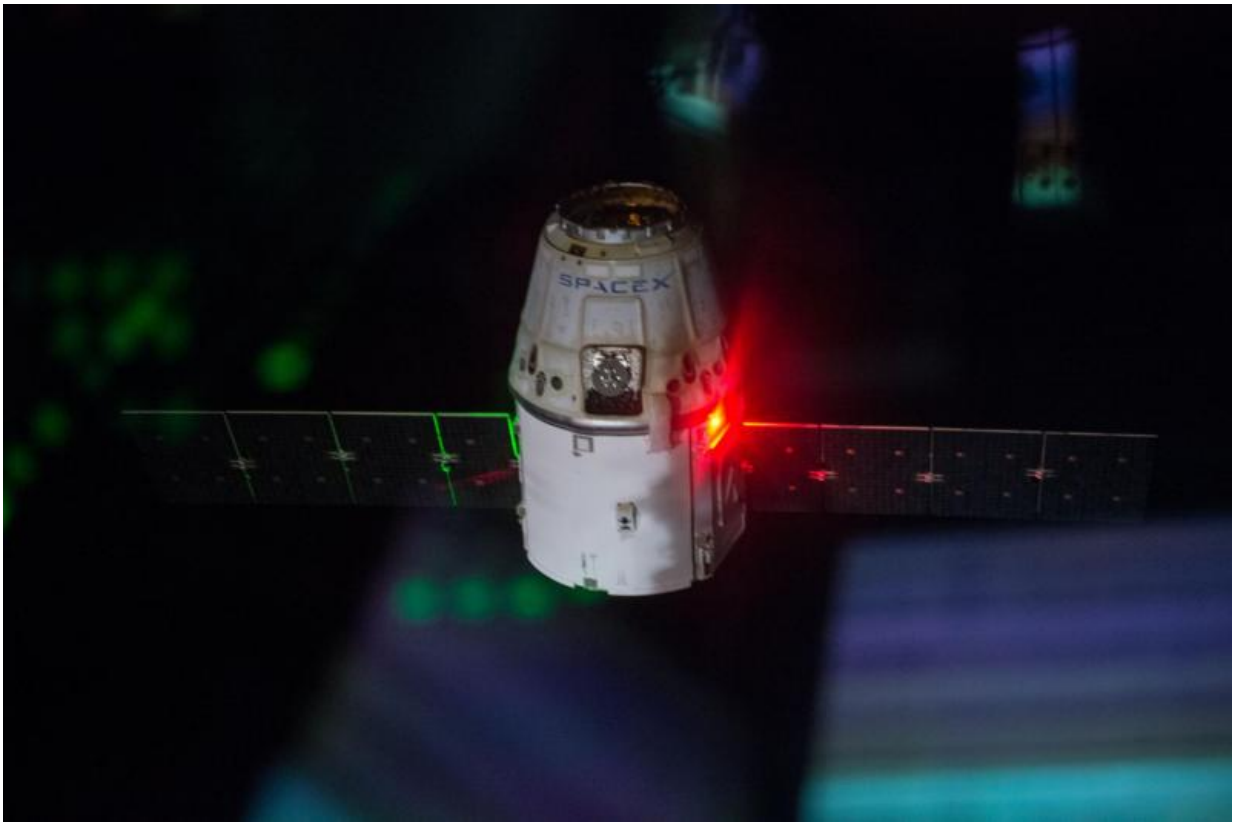

A view of SpaceX Dragon CRS during undocking. Photo was taken during Expedition 41. Credit: NASA

The International Space Station had worms. Roundworms to be exact, but those and several other samples, hardware and data are now returning

aboard the completed sixth SpaceX contracted resupply mission. The Dragon spacecraft originally delivered research equipment for physical science, biology, biotechnology, human research and a myriad of technology demonstrations to the station on April 14.

A variety of biological and biotechnology studies are returning on the Dragon. The Space Aging study examines the effects of spaceflight on the aging of roundworms, or *Caenorhabditis elegans* (*C. elegans*). This roundworm is widely used as a model for larger organisms. By growing millimeter-long roundworms on the space station, researchers can observe physiological changes that may affect the rate at which organisms age. This can be applied to changes observed in astronauts, as well, especially to help create countermeasures prior to long-duration missions.

"Spaceflight-induced health changes, such as decreases in muscle and bone mass, are a major challenge facing our astronauts," said Julie Robinson, NASA's Chief Scientist for the International Space Station Program Office at NASA's Johnson Space Center in Houston. "We investigate solutions on the station not only to keep astronauts healthy as the agency considers longer space exploration missions, but also to help those on Earth who have limited activity as a result of aging or illness."

A second study that specifically observes the muscle fibers of roundworms in response to microgravity, called Alterations of *C. elegans* muscle fibers by microgravity (Nematode Muscle), is returning on the Dragon, as well. Some astronauts experience weakened muscles, reduced bone density and changes in metabolism, so researchers are using the roundworms as models to try to clarify how and why these changes take place in microgravity. Results from this study could help scientists understand the molecular mechanisms responsible for muscle atrophy and other spaceflight-induced changes.

Caenorhabditis elegans -- a millimeter-long roundworm with a genetic makeup scientists understand -- is central to a pair of Japan Aerospace Exploration Agency investigations into muscle and bone loss of astronauts on the International Space Station. Credit: NASA

Samples will return from another biological study, the Osteocytes and Mechanomechano-transduction (Osteo-4) investigation. Researchers with Osteo-4 will observe the effects of microgravity on the function of osteocytes, which are the most common cells in bone. Osteocytes sense mechanical forces, like weight-lifting, as they are applied to the skeleton. They transform these forces into biological responses, signaling other cells to make or remove bone.

Understanding the effects of microgravity on osteocytes will be critical as astronauts plan for future missions that require longer exposure to

microgravity, such as to deep space or Mars. The results derived from this study could also have implications for patients on Earth in the treatment of bone disorders related to disuse or immobilization, as well as metabolic diseases such as osteoporosis.

"If we can figure out bone loss in the extreme conditions of space, we could figure out how to make more bone or counteract bone loss in astronauts," said National Institutes of Health grantee Paola Divieti Pajevic, M.D., Ph.D., principal investigator of the Osteo-4 study and associate professor at the Goldman School of Dental Medicine at Boston University. "This has applications to millions of people on Earth who are affected by osteoporosis and related fractures."

The Special Purpose Inexpensive Satellite (SpinSat) gets readied for deployment from the International Space Station. Credit: NASA

Finally, equipment and data from the Special Purpose Inexpensive Satellite (SpinSat) investigation will return. The SpinSat study tested how a spherical satellite measuring 22 inches in diameter moves and positions itself in space using new thruster technology. SpinSat launched into orbit from the space station through the Cyclops small satellite deployer, also known as the Space Station Integrated Kinetic Launcher for Orbital Payload Systems (SSIKLOPS). Learn more about Cyclops in this video.

Researchers can use high-resolution atmospheric data captured by SpinSat to determine the density of the thermosphere, one of the uppermost layers of the atmosphere. With better knowledge of the thermosphere, engineers and scientists can refine satellite and telecommunications technology.

The conclusion of this sixth SpaceX mission to the space station is helping NASA and its international partners to "round out" their research with roundworms, bone cells and spinning satellites.

Provided by NASA

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