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Worms in space

Contact:
Bob Johnsen, [Phone removed], [Phone removed] (lab), bjohnsen@sfu.ca
Carol Thorbes, PAMR, [Phone removed], cthorbes@sfu.ca

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To say that Bob Johnsen will be over the moon when he picks up 60 grams of worms at Cape Canaveral in Florida on June 19 is putting it mildly. Once he has his cargo in hand, the Simon Fraser University associate researcher will be heading straight for the SFU lab he shares with David Baillie. The SFU professor of molecular biology and biochemistry is also a Canada Research Chair in genomics. Johnsen expects to be back June 26.The worms (C. elegans) are coming back from a stay aboard the International Space Station (ISS). Orbiting the earth since 2000, the ISS is continually inhabited by humans and other creatures, but none has been there long enough to produce several generations. Six months at ISS was enough time for these worms to produce 25 generations.

Thanks to a system that he co-developed as a grad student under Baillie, Johnsen will be able to tell how much the worms have mutated. The device, called eT1, enables scientists to capture and analyse accumulations of mutations, similar to the way scientists analyse growth rings on trees. Normally, worms lose their genetic mutations as they grow.

'Only by analyzing the extent of their genetic mutations will we be able to understand the impact of lengthy exposure to radiation in space,' says Johnsen. 'Before we can mitigate the impact of radiation we have to understand the biological changes it causes.

' NASA scientists are anxious to know how they can mitigate the impact of radiation because they hope to send a manned crew to the moon by 2020 and to Mars by 2035. Current research indicates that one in eight travellers taking a round trip to Mars could die from radiation poisoning and the rest would likely be very ill.

Note: Bob Johnsen is a Chilliwack resident.

Backgrounder: Worms returning from longest space trip- The ISS is orbiting within the Earth's magnetosphere that protects it from the level of radiation exposure that would occur further out in space. However, these worms will have had six months to produce 25 or more generations. That will provide better data on the long-term impact of radiation exposure than previous worms in space trips. One trip was for a few days; another was for 11 days.

- The C. elegans is the perfect organism to determine the impact of radiation exposure on humans in space because it is the simplest multi-cellular organism with a completely known genomic DNA sequence. Like humans, C. elegans has about 20,000 genes. About 4,500 of these genes are effectively doing the same jobs in worms as in humans.

- Worms also make an efficient subject for these experiments because they are only as long as a grain of salt is wide. Being so small helps scientists keep down the costs of their experiments in space. It costs about $22,000 a kilogram to send cargo up into space. The total mass of these worms in space is 60 grams.

- So why the need to set foot on Mars? 'It's about expanding the human frontier,' offers Johnsen. 'Six hundred years ago, we would have asked why do humans need to go to North America? The answer is the same as it was then: to find new resources, to give us more options for places to exist and to satisfy human curiosity.

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