

To Infinity & Beyond – Additional Questions

Below are the outstanding questions from the webinar. Dr. Landsman was able to answer the first one. For the remaining, I've included some links to some information that hopefully helps to answer the question.

- 1) I've read that regolith can be very sharp (since those bodies do not have the same erosion mechanisms Earth does). How do you work to get the pointy bits right?
 - a. We do work to keep the particles angular rather than smooth and rounded. The rock crushers we use are percussive, so they “smash” the rocks into powder rather than grinding them up. This makes the powder particles angular and sharp. We check the particle shapes using Scanning Electron Microscopes.

- 2) Is there a way to know if bacteria/protists/archaea are in regolith samples and is there a way to engineer similar life in labs?
 - a. <https://www.frontiersin.org/articles/10.3389/fmicb.2017.01918/full>
 - b. <https://www.jpl.nasa.gov/news/signs-of-life-on-mars-nasas-perseverance-rover-begins-the-hunt>
 - c. <https://www.jpl.nasa.gov/news/how-to-find-hidden-oceans-on-distant-worlds-use-chemistry>
 - d. <https://astrobiology.nasa.gov/research/life-detection/>

- 3) I'm currently working on a research project about air filtration(of VOCs) conducted by houseplants. What are some methods that astronauts use to filter the air in zero gravity environments?
 - a. <https://www.science.org/content/article/international-space-station-home-potentially-dangerous-bacteria>
 - b. Activity: <https://www.jpl.nasa.gov/edu/teach/activity/the-air-up-there-making-space-breathable/>
 - c. <https://www.nasa.gov/content/life-support-systems>

- 4) To Dr Landsman: Have there been any studies, experiments, or articles in regards to how water interacts with lunar regolith?
 - a. <https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2019JE006147>
 - b. <https://link.springer.com/article/10.1007/s11214-021-00846-3>
 - c. <https://www.livescience.com/64965-water-bounces-across-moon.html>

- 5) How does zero- gravity environments affect bone density? Does it change depending on how long spent into the environment or how far away from Earth one travels?
 - a. <https://scopeblog.stanford.edu/2020/01/22/mars-bound-astronauts-likely-to-develop-brittle-bones-new-study-suggests/>
 - b. <https://letstalkscience.ca/educational-resources/stem-in-context/spaceflight-and-bone-loss>

Additional Interesting Articles:

- <https://www.nasa.gov/feature/scientists-probe-how-long-term-spaceflight-alters-immunity>
- Growing Plants in Space: <https://www.nasa.gov/content/growing-plants-in-space>
- NASA's Twin Astronaut Study: <https://www.smithsonianmag.com/science-nature/nasas-twins-study-creates-portrait-human-body-after-year-space-180971945/>