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TAKING OUR (BACTERIAL) CULTURES INTO SPACE

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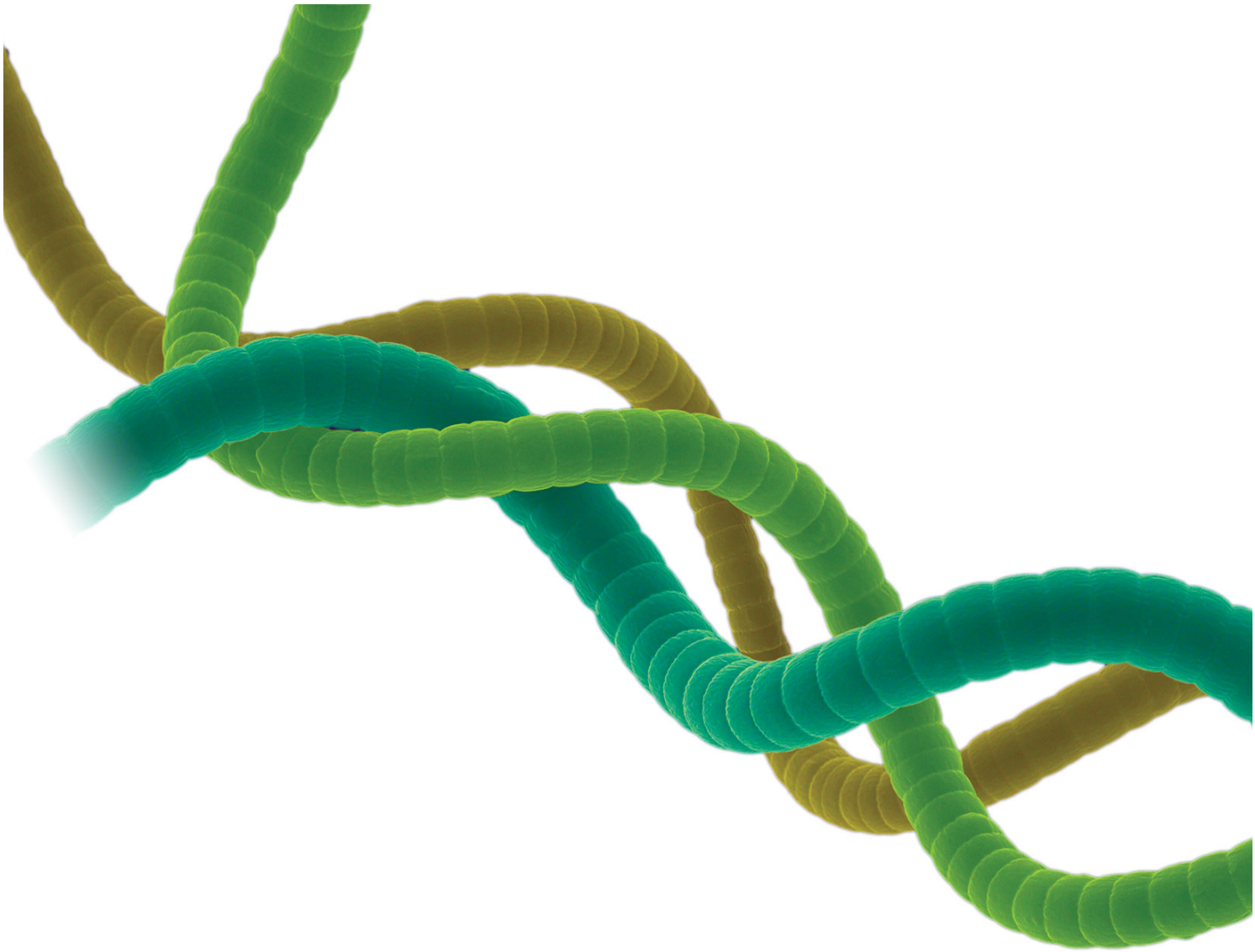

Imagine packing for a three-year journey—a round-trip voyage to Mars, through the inhospitable void of space. You'll be packing all of the food, fuel, and building materials you need to survive—making for a very heavy load. Rather than launching everything from Earth to Mars and back again, postdoc Amor Menezes and Professor Adam Arkin of **UC Berkeley** **(http://www.berkeley.edu/)**, along with **NASA** **(http://www.nasa.gov/)** collaborators, envision a future in which microbes manufacture materials in space.

NASA's current approach to fuel production takes advantage of raw materials present on Mars, like carbon dioxide, to make methane and oxygen. However, Menezes and colleagues have shown that using bacteria to produce methane could be more efficient than the current chemical processes, reducing the mass that must be launched from Earth. Using solar energy and carbon dioxide, other types of microbes could generate biomass for nutritious food, biopolymers for 3D printing human habitats and furniture, and pharmaceuticals like acetaminophen. These strategies could reduce the weight of materials launched from Earth by an estimated 38-85 percent.

"The next step," says Menezes, "is to put the microbes into simulated space environments here on Earth, and the next step after that is to try it on the **International Space Station (https://www.nasa.gov/mission_pages/station/main/index.html)**. That's when we might get some of the effects, like radiation, that we can't replicate in a simulated space environment." Additional tests will measure how much of the desired material the bacteria produce, and how to best contain them to prevent extraterrestrial contamination. If these approaches turn out to be as promising as the numbers suggest, we may be harnessing the powers of Earth microbes when we go to Mars.

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