

What will humans eat on Mars?

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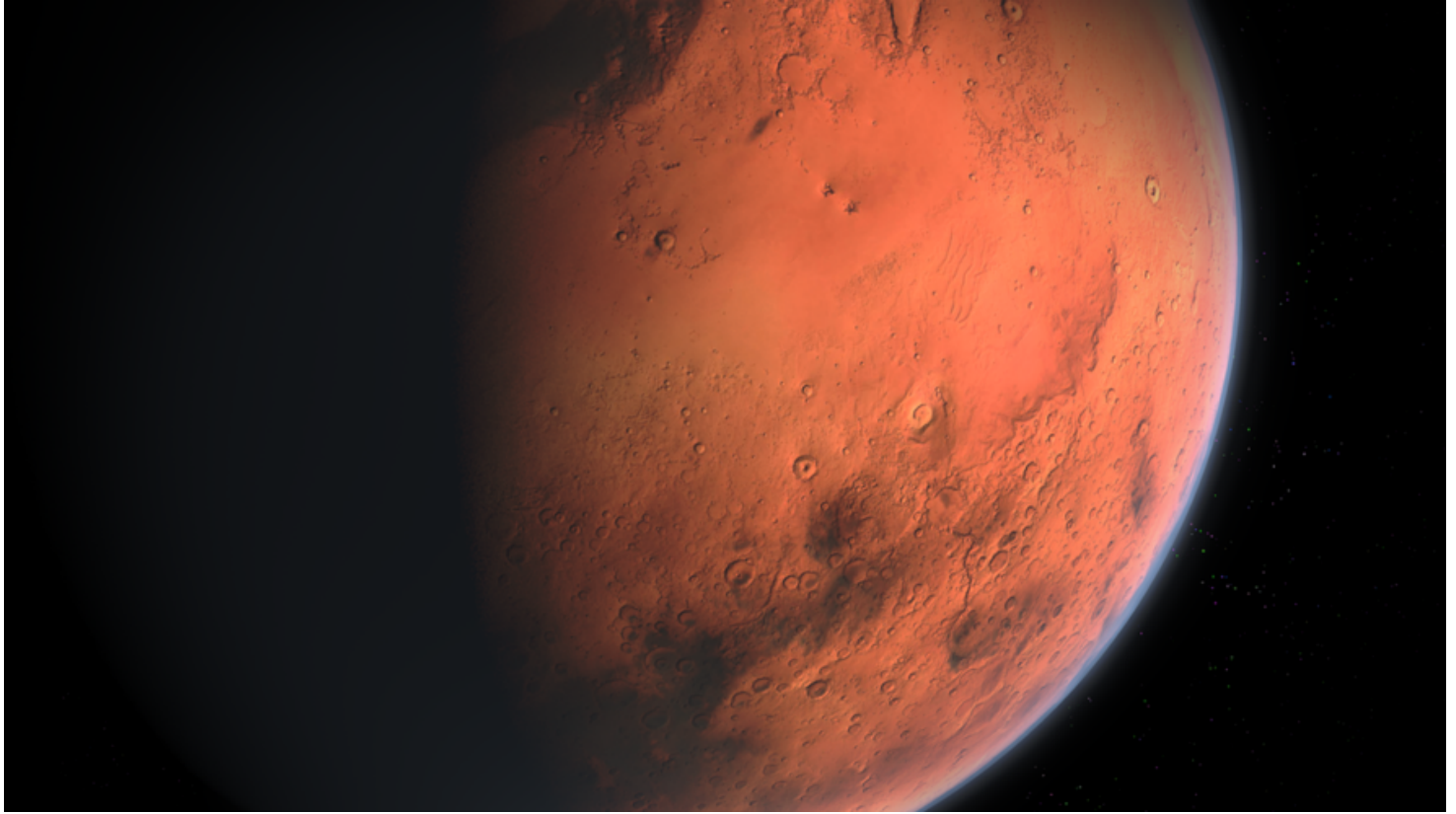


Image 1. Scientists at the University of Central Florida have modeled a path toward self-sufficiency for one million settlers of Mars over the course of 100 Earth years. Image credit: Aynur Zakirov/Pixabay

In 2002, entrepreneur Elon Musk founded a private space transportation company called SpaceX. In 2019, Musk said that space travel could be a reality very soon. He also thinks a self-sustaining city on Mars is not far off.

Meanwhile, scientist Kevin Cannon and his team at the University of Central Florida are studying how to feed humans if they settle on Mars. In their recent paper, Cannon and Daniel Britt created a model. They predicted how one million Mars settlers would support themselves on the planet for 100 Earth years. Smithsonian magazine spoke to Cannon about their vision.

What inspired you to consider feeding one million people on Mars?

I have been working on a lot of projects related to space resources. We're interested in using local materials on the moon or Mars to develop space. For humans to settle on Mars, you'd need oxygen, water, construction material and food. Food is one of the most challenging things to produce on Mars.

What practical factors did you consider when thinking about food production on Mars?

An important factor is the amount of land that you require. On Mars, when you think about land, you're talking about building a structure that's closed off to the outside world. You have to make sure the pressure, heat and light inside are just right. This structure would protect you from the harsh environment on Mars. There is almost no atmosphere, and it's also very cold.

How did you determine which food sources would be well-suited for life on Mars?

We started with plants. We went a bit beyond that to some protein sources and arrived at insect-based foods. These foods turned out to be very efficient for Mars. We are also exploring cellular agriculture.

How does cellular agriculture work?

Cellular agriculture is the production of meats and other products from cell cultures. First, you extract cells from an animal. Then, you grow them in a nutrient solution. You build the cells in a supporting structure. It gives you the texture of different meats. It's a sustainable way of producing animal protein. Cellular agriculture is more ethical -- it does not involve raising animals in questionable conditions.



Could you elaborate a bit more about insect protein?

Insect protein is not really a part of culture or diet in North America or Europe. However, two billion people eat insects as part of their diet on a regular basis. It turns out to be a very good source of protein. It is also sustainable, which means it does not require a lot of land or a lot of water. Insect protein makes good use of resources.

Of course, there is a little bit of a gross factor involved in eating insects. But people can grind up crickets into flour and put them into cookies or chips. This way, you can hide them and get away from just chomping down on whole insects.

What kind of fruits or vegetables would be on the menu?

Right now in space, the astronauts have a little garden. They're able to grow things like lettuce, tomatoes and peppers. But you're not going to be able to feed a large population on those very low-calorie vegetables. Other crops, such as corn, wheat and soy, have enough calories to support a growing population.

What kinds of technologies did you find were best suited for food production on Mars?

Food production needs to be as automated as possible. It would free up people's time to do more important things. A lot of companies are trying to include robots in farming and insect production.

Another technology that would be useful on Mars is genetic modification. It involves changing the genes of a plant to get certain desirable features. It's important for improving crops and making them more resilient in the harsh Martian environment.

What are some other challenges posed by the conditions on Mars?

Whenever you see an artist sketch of a Mars base, you see greenhouses everywhere. But this is not entirely accurate -- you just don't get enough sunlight at the surface of Mars because it is farther away from the sun. A greenhouse might actually not make sense on Mars. You might be better off growing the plants and producing other foods in tunnels underground.

Where would the water come from?

We have a better understanding about the water on Mars. It is mostly locked up as ice underground. It's also found in certain minerals like clays and salts. The water is actually held within the mineral structure, so you could heat the minerals up and evaporate the water. Once you remove that water, it is pretty easy to reuse that water over and over.

Based on the results of the study, would you advocate for a human settlement on Mars?

Elon Musk's space transportation company, SpaceX, is already building the ships that are going to take cargo and then people to Mars. We are already set down that path, and the question is going to be: Who gets to go? Is this going to be space agencies or tourists? How is a settlement or a city going to build up? It is definitely possible in the near future.

How could this knowledge apply to life on Earth?

The conditions on Mars -- the lack of atmosphere, the cold -- force you to produce food in a way that is more sustainable than the way we do it on Earth. So, that means moving away from factory farming and large scale production of dairy and animal protein.

It also means thinking about alternatives like insects and cellular agriculture. These alternatives are more sustainable than what we are currently doing on Earth. Developing these practices for Mars could help us move to a more responsible way of producing food here, too.

Quiz

- 1 Read the section "Could you elaborate a bit more about insect protein?"
Select the sentence from the section that suggests that consuming insect protein is efficient.
- (A) Insect protein is not really a part of culture or diet in North America or Europe.
 - (B) It is also sustainable, which means it does not require a lot of land or a lot of water.
 - (C) But people can grind up crickets into flour and put them into cookies or chips.
 - (D) This way, you can hide them and get away from just chomping down on whole insects.
- 2 Which sentence from the article shows the MAIN problem Cannon is trying to solve?
- (A) Food is one of the most challenging things to produce on Mars.
 - (B) But you're not going to be able to feed a large population on those very low-calorie vegetables.
 - (C) Food production needs to be as automated as possible.
 - (D) It is mostly locked up as ice underground.
- 3 What is MOST likely the reason the author included the information about sustainable farming in the final section?
- (A) to argue that farming on Mars could be unsuccessful
 - (B) to suggest that animals could be transported to Mars
 - (C) to show how ideas about farming on Mars could benefit Earth
 - (D) to emphasize that colonies on Mars will require large scale production

- 4 Read the selection below.

Elon Musk's space transportation company, SpaceX, is already building the ships that are going to take cargo and then people to Mars. We are already set down that path, and the question is going to be: Who gets to go? Is this going to be space agencies or tourists? How is a settlement or a city going to build up? It is definitely possible in the near future.

Why did the author include information about Elon Musk?

- (A) to introduce Elon Musk and his goals to the reader
- (B) to suggest that Elon Musk is a visionary inventor
- (C) to reveal when Mars colonization might begin
- (D) to develop an idea about who will help colonize Mars