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How To Make A Mars Colony

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Humans are finally at a point in our historical trajectory where space travel is a reality, and colonization of other planets may even be possible. On Mars, we can imagine white domed structures with little gardens inside, contrasting with the stark red landscape. There are movies nowadays, like The Martian or Interstellar, that showcase semi-accurately what space travel or extraterrestrial colonization might be like. However, I hope that the rash enthusiasm these films elicit does not blind the public to the realities of these missions. They would require tremendous amounts of planning and research to carry out. If we will be traveling to places like Mars and setting up human settlements, we need to minimize the potential risks to human life, and make certain that work conducted there can be truly useful. NASA is experimenting with rovers and simulations to work through the potential problems with colonization, which include obtaining water, creating oxygen, or farming food. Solutions to these problems are essential for a colony to survive when the next help or resupply mission is years away. The experiments that NASA and other organizations are conducting give us a glimpse into how scientists are preparing to go to space as safely as possible and with the greatest benefit to the scientific world.

Some of the human-centered tests are currently done aboard the International Space Station (ISS), which most Internet-users probably associate with videos of mustachioed men playing Bowie and astronauts drinking little globules of water. The ISS's experiments test how humans survive in space and what consistent space travel does to a person, both physiologically and mentally. NASA scientists have found that bone loss happens at a faster rate in lower gravity, which is problematic if a person wants to go bouncing around on the Martian surface. The loss of bone mass will even affect the astronaut's ability to walk when they return to Earth. On the ISS, there is a special treadmill (named after Stephen Colbert, thanks to a mass write-in campaign) that astronauts have to use for around 8 hours a day to slow this decay. There is still more work that can be done to see if this deterioration can be slowed even further for multi-year trips. Space travel also has a social aspect to it: are people going to be able to live with each other in very close conditions for the two years or more that long-distance space travel would take? NASA has recently started their third HI-SEAS experiment wherein 6 candidates live in extreme close quarters for one year to test their viability as a team.

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The team live in a 1000-square-foot simulated colony on the Mauna Loa volcano in Hawaii. This group has to get used to restricted water access (they are only allowed to shower 7 minutes per week, max) as well as a diet consisting only of dehydrated food. NASA has to make sure that these team members can live with each other in these circumstances, and still work well together. It is a difficult task-- as Zak Wilson, a member on the last experiment, told Newsweek, "Six people is not enough to make you feel like you are part of a community or a society." The team spends most of their time in one another's company, and have precious few moments alone with their own thoughts. These kinds of experiments must be conducted before sending anyone into space for years at a time. If the team is already halfway to Mars and everyone hates each other, how can they possibly work together to conduct the research they need when on the surface?

NASA has also shown how helpful rovers can be for human space travel and extraterrestrial colonization. These little robots (sometimes not so little: the Curiosity rover weighs around 1 ton!) will be extremely useful in the future establishment of human development on Mars. Curiosity is currently examining Martian soil, climate, and landscape to learn about Mars' past. There is a proposal being reviewed by NASA for a future Mars rover to conduct tests to determine how viable Martian soil is for human agriculture. A small amount of soil will be pushed into tubes, sealed off and exposed to water, some microbes, and algae. The contents of the tube will then be tested to see whether the microorganisms are able to thrive in the Martian soil. If this soil is conducive towards life, the microorganisms can be farmed en masse right in the colony and, in the future, be used to make oxygen, food, or even building supplies in the right circumstances.

Other experiments are planned that will help Martian colonies to be as productive as possible. One of the more necessary projects on the next rover, dubbed MOXIE, will figure out how to make oxygen from the sparse Martian atmosphere. The next rovers will also be capable of finding the locations with the best soil and water prospects to establish a colony. Having these provisions would make human settlements much easier to start so everyone can get right to work and not worry about their living situation. Rovers will allow the scientists to take advantage of the limited time they have on Mars to learn as much as they can before their shuttle goes back to Earth.

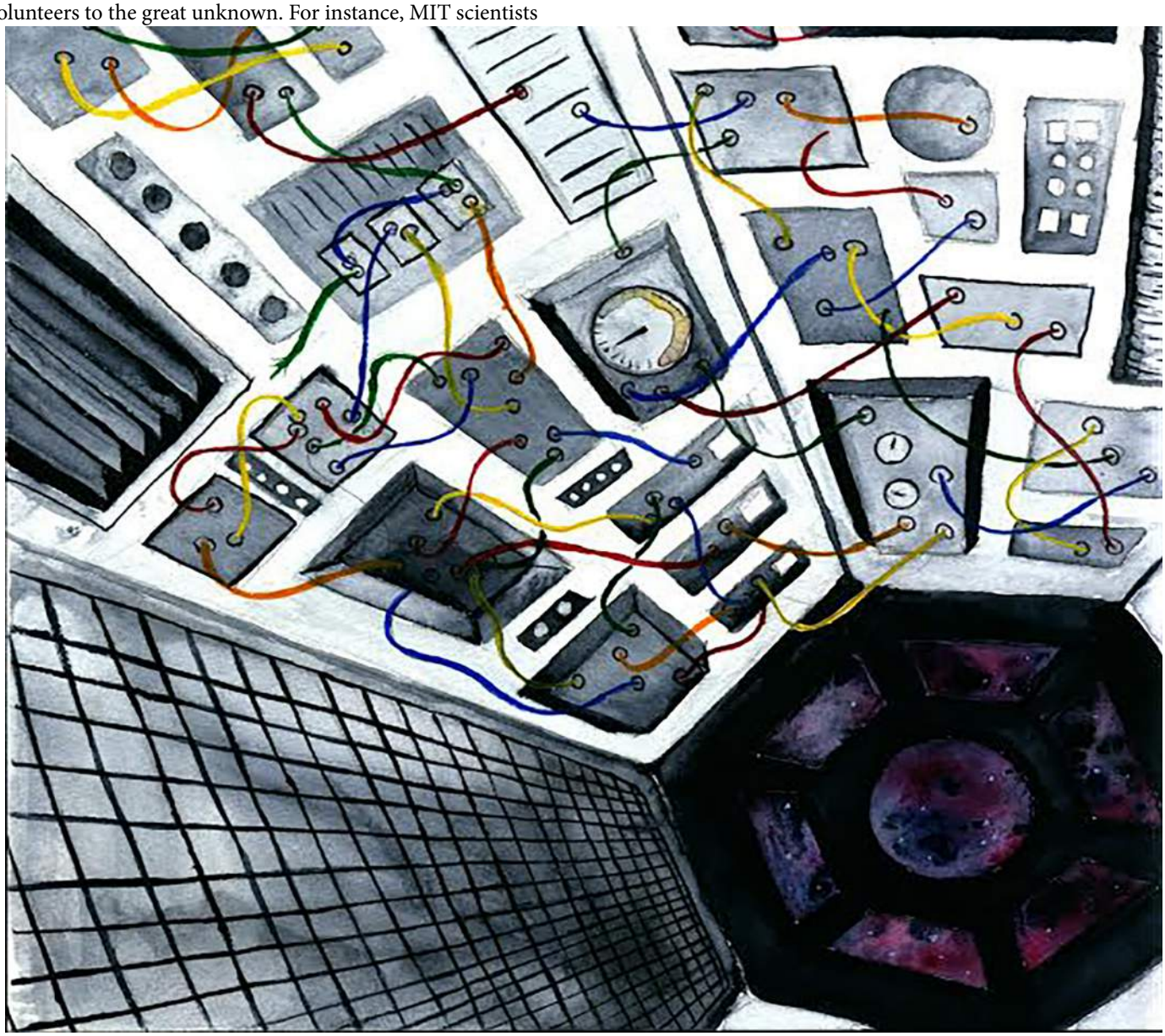
With NASA's recent discovery of highly salinated water on Mars, there are even more contingencies to prepare for on future missions. On Earth wherever we find water we find life. Therefore we must take the possibility of finding Martian life into consideration when exploring these regions. As exciting as it is to be so close to actually seeing alien life, human ventures must be careful so that these potentially life-filled areas are not infected by our own microbes. We wouldn't want to find that the most important discovery of our lifetime was corrupted due to improper sterilization. Examining new life on Mars could give hints about how life on Earth developed, or what signs to look for on other planets when searching for life. Even the Curiosity rover has not gone through anywhere near enough sterilization to approach the suspected water sites. NASA has specific procedures when they want to send someone or something to investigate sources of alien life. These procedures include sterilization or, in a worst case scenario, listing all the bacteria that are left on the object so that they can compare any new life found to the bacteria on the list. All of these precautions will allow the scientists to study this exciting new life in the most secure way. Hopefully ending with novel discoveries!

With this threat of contamination, why send humans at all? Humans are basically just bags of bacteria, so there seems to be a big threat of contamination. One of the main reasons for humans

to be there is because of our ingenuity. We are extremely good at responding and adapting to new scenarios. When communications with Earth take ten minutes to travel, being able to respond to a pressing concern is vital. Even though rovers can accomplish many tasks, if supplemented with a human companion they could accomplish a lot more. The human can scout locations and sort through samples at a much faster rate, giving the rover only the most interesting items to analyze. Activities like drilling or construction are also only really suitable on a large scale if carried out by humans who can react and change their routine based on how the land around them is changing. All of these reasons, along with the general excitement of seeing someone run around on "the red planet", are why the benefits outweigh the risks of sending humans to Mars.

The problem of contaminating native Martian life is one of many problems that could arise without due preparation. If we are spending billions of dollars and risking the lives of these scientists, wouldn't we want to put as much preparation into preserving their lives as possible? This is why I am highly skeptical of Mars One and their motives. Mars One is a Dutch company that plans to send people to Mars by 2024, and establish a colony a few years later. They are currently selecting the final crews that will be sent there, but there are a lot of problems that Mars ONE should deal with before sending the volunteers to the great unknown. For instance, MIT scientists have estimated the amount of time before the Mars One colony will collapse is 68 days. It will take just over two months until their wheat plants reach maturity, and so much oxygen is released that a major fire hazard will develop in the colony. The same MIT scientists also have found that the Mars One planners have severely underestimated the readiness of the technology they plan to use to create oxygen and water on the surface of this red planet. The Mars One mission must go through much more serious consideration, and perform more experiments before sending their ambitious volunteers to a faraway planet where there is so much that can go wrong.

There are always uncertainties when planning space travel. You cannot plan for every possible permutation or problem, but what you can do is prepare well enough that your astronauts have a chance. Not only should these people have a significant chance of survival, but they should be able to live comfortably enough that they can perform experiments and build an understanding about their new environment in order to make these trips worthwhile. There is something to say for exploring for the sake of exploration, but serious preparations need to be done (and in most cases are being done by NASA) so that these space missions will be safe and produce important discoveries. Revolutionary scientific findings are waiting for us, but only if these astronauts have a chance to do their work.



Mikaila Hoffman