TEXT: Will We Ever Colonize Mars?

Integrated Science (H)

# A. Preview the text: title, source, date, hook; relate to own experience; number the paragraphs

# B. Closely Read, marking up as follows:

*• Circle and find synonyms for all new vocabulary*

*• Underline sources of information: experts, affiliations, publications, dates, etc*

*• Highlight text that shows: the author’s position (thesis); reasons used to support this position;*

 *compelling evidence for each reason. Use the left column to identify each, and to paraphrase.*

Mars. It’s a pretty unforgiving place. On this dry, dessicated world, the average surface temperature is -55 °C (-67 °F). And at the poles, temperatures can reach as low as  -153 °C (243 °F). Much of that has to do with its thin atmosphere, which is too thin to retain heat (not to mention breathe). So why then is the idea of colonizing Mars so intriguing to us?

There are many interesting similarities between Earth and Mars that make it a viable option for colonization. For starters, Mars and Earth have very similar [lengths of days](http://www.universetoday.com/14717/how-long-is-a-day-on-mars/). A Martian day is 24 hours and 39 minutes, which means that plants and animals – not to mention human colonists – would find that familiar.

Mars also has an axial tilt that is very similar to Earth’s, which means it has the same basic [seasonal patterns](http://www.universetoday.com/14719/does-mars-have-seasons/) as our planet (albeit for longer periods of time). Basically, when one hemisphere is pointed towards the Sun, it experiences summer while the other experiences winter – complete with warmer temperatures and longer days.

This too would work well when it comes to growing seasons and would provide colonists with a comforting sense of familiarity and a way of measuring out the year. Much like farmers here on Earth, native Martians would experience a “growing season”, a “harvest”, and would be able to hold annual festivities to mark the changing of the seasons.

Also, much like Earth, Mars exists within our Sun’s habitable zone (aka. “[goldilocks zone](http://www.nasa.gov/vision/earth/livingthings/microbes_goldilocks.html)“), though it is slightly towards its outer edge. Venus is similarly located within this zone, but its location on the inner edge (combined with its thick atmosphere) has led to it becoming the hottest planet in the Solar System. That, combined with its sulfuric acid rains makes Mars a much more attractive option.

Additionally, [Mars is closer to Earth](http://www.universetoday.com/14824/distance-from-earth-to-mars/) than the other Solar planets, except for Venus. This would make the process of colonizing it easier. In fact, every few years when the Earth and Mars are at opposition – i.e. when they are closest to each other – the distance varies, making certain “launch windows” ideal for sending colonists. For example, on April 8th, 2014, Earth and Mars were 92.4 million km (57.4 million miles) apart at opposition. On May 22nd, 2016, they will be 75.3 million km (46.8 million miles) apart, and by July 27th of 2018, a meager 57.6 million km (35.8 million miles) will separate our two worlds. During these windows, getting to Mars would be a [matter of months rather than years](http://image.gsfc.nasa.gov/poetry/venus/q2811.html).

Also, Mars has vast reserves of water in the form of ice. Most of this water ice is located in the polar regions, but surveys of Martian meteorites have suggested that much of it may also be locked away [beneath the surface](http://www.universetoday.com/14719/does-mars-have-seasons/). This water could be extracted and purified for human consumption easily enough.

In his book, The Case for Mars, Robert Zubrin also explains how future human colonists might be able to live off the land when traveling to Mars, and eventually colonize it. Instead of bringing all their supplies from Earth – like the inhabitants of the International Space Station – future colonists would be able to make their own air, water, and even fuel by splitting Martian water into oxygen and hydrogen.

Preliminary experiments have shown that Mars soil could be baked into bricks to create protective structures, which would cut down on the amount of materials needed to be shipped to the surface. Earth plants could eventually be grown in Martian soil too, assuming they get enough sunlight and carbon dioxide. Over time, planting on the native soil could also help to create a breathable atmosphere.

Despite the aforementioned benefits, there are also some rather monumental challenges to colonizing the Red Planet. However, over time, many or all of the difficulties in living on Mars could be overcome through the application of geoengineering (aka. terraforming). The challenges to creating a permanent settlement on Mars are numerous, but not necessarily insurmountable.

*"Will We Ever Colonize Mars?"* Universe Today. 31 May 2015. Web. 16 Oct. 2015.

TEXT: Lets Not Move to Mars

Integrated Science (H)

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IN the early years of the 20th century, zeppelins filled with flammable and explosive hydrogen were all the rage in Germany, a reckless infatuation that ended with the eruption and crash of the Hindenburg in 1937. Sometimes, technology is a triumph of wild-eyed enthusiasm over the unpleasant facts of the real world.

Today we are witnessing a similar outburst of enthusiasm over the literally outlandish notion that in the relatively near future, some of us are going to be living, working, thriving and dying on Mars. A Dutch nonprofit venture called Mars One aspires to send four people to Mars by 2026 as the beginning of a permanent human settlement. In the United States, the nonprofit Inspiration One has plans for a two-person team to fly within 100 miles of the planet, launching from Earth in January 2018. And the entrepreneur Elon Musk, who runs a rocket company called SpaceX, has said he hopes to send the first people to Mars in 11 to 12 years.

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Unfortunately, this Mars mania reflects an excessively optimistic view of what it actually takes to travel to and live on Mars, papering over many of the harsh realities and bitter truths that underlie the dream.

First, there is the tedious business of getting there. Using current technology and conventional chemical rockets, a trip to Mars would be a grueling, eight- to nine-month-long nightmare for the crew. Nine months is a long time for any group of people to be traveling in a small, closed, packed spacecraft. (We’re not talking about the relatively comfy confines of a habitable satellite like the International Space Station.) Tears, sweat, urine and perhaps even solid waste will be recycled, your personal space is reduced to the size of an S.U.V., and you and your crewmates are floating around sideways, upside down and at other nauseating angles.

Crew members are in microgravity for the entire trip, with consequent health problems: Your bone mass wastes away, your teeth become more susceptible to cavities, your body’s muscles, including your heart, and even the small muscles that control your eye movements, atrophy and lose mass, and your immune, digestive, vascular and pulmonary systems function at impaired levels. In addition, there will be persistent mechanical noise and vibration, sleep disturbances, unbearable tedium, trance states, depression, monotonous repetition of meals, clothing, routines, conversations and so on. Every source of interpersonal conflict, and emotional and psychological stress that we experience in ordinary, day-to-day life on Earth will be magnified exponentially by restriction to a tiny, hermetically sealed, pressure-cooker capsule hurtling through deep space.

To top it all off, despite these constraints, the crew must operate within an exceptionally slim margin of error. As with any cutting-edge technology, there will be continuous threats of equipment failures, computer malfunctions, power interruptions and software glitches.

And getting there is the easy part. Mars is a dead, cold, barren planet on which no living thing is known to have evolved, and which harbors no breathable air or oxygen, no liquid water and no sources of food, nor conditions favorable for producing any. For these and other reasons it would be accurate to call Mars a veritable hell for living things, were it not for the fact that the planet’s average surface temperature is minus 81 degrees Fahrenheit. Given the hostile conditions on the Martian surface, human inhabitants would have to produce all of the necessities of life for themselves. Consider the challenge of producing something as basic as an air supply. Since the atmosphere of Mars is 95 percent carbon dioxide, and since indefinitely large stocks of air cannot be brought from Earth, air must be synthesized from a collection of separate ingredients, as in a chemistry lab or factory.

Oxygen on Mars exists as a constituent of water — the O in H2O. Thus, one way to get this essential component of air is to first obtain an adequate store of water. However, there being no proven liquid water reserves on Mars, water, too, must be produced from raw material sources, specifically from the soil. One plan calls for digging up the soil and placing it into a heater that will evaporate off any water within it. The water vapor is then condensed into a liquid. Oxygen, in turn, can be separated from the hydrogen in the water by means of electrolysis, and then stockpiled. The nitrogen component of air could be “mined” from the thin Martian atmosphere. With these two constituents in hand, and then combined, we finally have a breath of air (although not “fresh” air).

These are only a few of the many serious challenges that must be overcome before anyone can put human beings on Mars and expect them to live for more than five minutes. The notion that we can start colonizing Mars within the next 10 years or so is an overoptimistic, delusory idea that falls just short of being a joke.

Regis, Ed. "***Let’s Not Move to Mars."*** The New York Times. The New York Times, 20 Sept. 2015. Web. 13 Oct. 2015.

<http://www.economist.com/news/science-and-technology/21707915-elon-musk-envisages-human-colony-mars-he-will-have-his-work-cut-out>