

# Mars: The Renovation of Earth

Richard Wessels

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## 0.1 Abstract

When the British decided to colonize parts of America, do you think their main focus was the potential greatness of the future American people? I guess not. Their main focus was likely their potential profit in having a hand in the rich American land. This has been somewhat different in our discussions about the potential colonization of Mars. We often speak of the future Martian society, and how prosperous it could be. We also speak about man's innate desire to explore the edges of his reach. This all makes sense, but in the ears of a politician, it is usually ignored. This is not to insult politicians, however, their roles are usually to improve the lives of the people that elected them. Therefore, they usually focus on more concrete concepts, such as healthcare over our desire to explore. This article plans to give more focus on the potential benefit to Earth, rather than merely speak about Mars. Much of this article is speculation and doesn't contain much data. It is written to further discussions, not to receive praise from statisticians. This article also focuses on Mars, but this is not to disregard other potential bodies, such as Titan and Europa. Some topics deal specifically with Mars (such as deuterium mining), however, topics such as politics could apply to all. This is a look at how the colonization of other celestial bodies can improve life on Earth.

## 0.2 Innovation

What causes innovation? I'd argue there are two main causes: some fella is interested in a certain field, and as this person plays around new things are invented (such as the Linux kernel); the other is an extrinsic force, such as war, that encourages innovation. If we look at WW2, you can see numerous technologies developed. As fun as Turing's adventures in code-breaking were, I'm sure the extrinsic force is still largely to thank for breaking the Enigma Code. This is great, but sponsoring war as a way to bring about innovation isn't tempting, so let's look further. Exploration is another extrinsic force, whether we're looking at the sails to the New World or the Race to the Moon, these adventures pushed people to innovate. There's a whole Wikipedia page about NASA Spinoff Technologies<sup>1</sup>. Obviously, the moon wasn't an independent focus, there was also the primary motivation to stick it to the commies that pushed the program. Even with the Cold War behind us, I'm sure that a program to Mars can still be viable. There is a fair amount of public interest and as a potential program develops, more people may become captivated by it. This increased public attention can cause major corporations, such as Google, to sponsor the movement, whether financially or by providing technologies. There are myriad problems that need to be addressed before jumping on a rocket to Mars, and these problems may bring about solutions that can be applicable to Earth. Limited area for agriculture on Mars, let's solve it by running an optimization program on a quantum computer that can yield a new system of agriculture. Mars has been given plants and Earth has fewer hungry people. Who knows what technologies are waiting just over the horizon that we need a slight push to develop. These technologies may be revolutionary or just make life more comfortable. Either way, we don't know what will come of it if we don't try. For the sake of brevity (and potentially a lack of imagination), I won't go through all the potential ways a Mars trip can lead to technologies that are applicable to life on Earth. Needless to say, the probability that a trip to Mars will produce at least one useful technology for Earth is very high.

## 0.3 Potential Discovery of Life and it's Implications

Maybe, life didn't start on Earth. This might sound wild, well, welcome to the Panspermia Hypothesis. This is the idea that life came to Earth by some external agent (usually an asteroid). One popular idea is that life originated on Mars (since the environment was drastically different back then) and was deposited to Earth by asteroids. We have rocks from Mars on Earth, so the exchange of materials between the planets is known, it's whether these rocks contained any life forms that needs to be answered. Obviously, a goat wouldn't fare well on a 150 million mile mission through the vacuum of space to visit Earth. However, there are life forms, such as the Tardigrades, that could survive the perilous journey. As much fun as this theory is, what could this mean for Earth. Well, if life truly did originate from Mars, we can potentially look further back in the evolution of life, maybe even find the point when chemistry became biology. This could lead to ground-breaking discoveries in how we view life. If we learn all this new stuff about life, we might be able to artificially create forms of life for our own benefit (queue the simulation theory), such as the structures found in bacteria that now make up CRISPR technology. Maybe these new forms of life could lead to unique engineering feats to cure diseases or otherwise enhance our living. Needless to say, this isn't a great selling point since it all hinges on the idea that life began on Mars. However, even if we don't find any convincing evidence that life started on Mars, we can still find traces of life on Mars. Sadly, Mars rovers aren't experts in excavation so a human crew will likely be dispatched to dig up some soil and try to make reasonable progress towards finding evidence of life on Mars. This discovery could show the fundamental differences in the development of life on Earth and Mars (provided the Panspermia Hypothesis is wrong). Again, we could exploit this. Some organisms are tough to fight since they've had millennia to develop fighting strategies, but what happens when a new, unknown opponent enters the ring, "Years of academy training wasted!" This could prove very dangerous, however. Introducing a foreign species to fight a formidable foe could backfire by killing off the whole species - a species that may have had an important role in our lives. This area should obviously be strongly regulated to prevent such mishaps, but having access to such an organism could be used safely in a lab to fight off certain bacteria or viruses. At this point, it is just speculation, but (as with the Innovation section), if life is discovered on Mars, I think it is quite probable that this could lead to some practical advancements in biology.

## 0.4 Resources

Now that I have the attention of the US government, let's look at the potential import of resources from Mars. First off, space travel is expensive. Transporting heavy rocks from Mars would not be cheap, so unless you're bringing back holy stones that promise immunity to all in its presence, it won't be worth the trouble. However, hitching a few stones on the back of a return flight for humans is likely practical. Due to the limitations of return cargo, these stones will likely be used for research rather than exploitation. Does that mean that there is nothing to import from Mars? There is one major resource that could be imported, or more realistically be used heavily on Mars - deuterium, an isotope of hydrogen that is commonly used for fusion reactors. Since fusion is the future (for the past 60 years), Mars could act as a testing ground for nuclear reactors. Mars has approximately eight times as much deuterium as Earth<sup>2</sup>. Since deuterium isn't as heavy as iron, it could be brought to Earth in useful loads that could power the development, and hopeful adoption, of fusion reactors. On the topic of innovation, the advent of useful fusion reactors may be hastened by the push to go to Mars; this added with the abundance of deuterium could help make fusion reactors commonplace. For the most part, I don't think mining materials on Mars and sending them to Earth will be a common practice. That doesn't mean that Mars is useless in the resource department. As said, deuterium could be imported at a high cost, and there will likely be some Martian rocks to sell on Earth.

## 0.5 Politics

Since deuterium mining is a very controversial and heated speaking point, let's move onto the more light-weighted topic of politics. There are two main models when it comes to how a mission to Mars will look in terms of politics: the Sagan model and the Kennedy model. The Sagan model pushes for a worldwide collaborative effort. Different nations collaborate and therefore are brought together. An example of this is the International Space Station (hence the 'International'). Such an effort is favorable as resources can be pooled and it can provide a way to ease tensions between countries (such as the United States and China at the moment). One small issue is that a mission to Mars involves some pretty powerful rockets that need to be developed, and if worldwide collaboration is done, then information about the rocket's manufacturing process wouldn't be too hard to come by and therefore can be used by the wrong people. This is a minor point because only a portion of the mission consists of rocket technology, the rest involves habitation, life support, etc. A global collaborative effort may also be far slower than its competitive counterpart, the Kennedy model. This model relies on a national effort that is fueled by patriotism. This model was very useful back in the Moon Race because of the Cold War. Many patriotic citizens greatly supported the space missions because they considered it a point of pride for their democratic and capitalist country. This gave immense motivation that moved space travel advancements by leaps and bounds. Although great for our desire to get to the moon, I don't think the Moon Race helped relations between America and the USSR. If this model is used today with America and China, tensions may dip for the worse. The Kennedy model may not be the best model for the 21st century because it pushes us away from globalism. Since I mentioned the Cold War, let's move to ideologies. This is a very important, yet sensitive, topic. Will the colony of Mars be strongly democratic fueled by capitalism, or will it be another try at communism (or maybe even anarchism). Such extremes aside, I think the Mars colony will begin as a democratic base, with capitalism at its core. With the ongoing innovations in the field of automation, we could see the work done by the settlers as less useful, therefore, socialist measures will seem likely. Depending on the advancements of automation, we could even see a communist Mars (I mean, it is the red planet). This is very radical currently, but if the work done by humans on Mars is insignificant compared to technology, they may not even have to work. They can go play in the decreased gravity and enjoy the fruits of prosperity without having to work an hour a week. This could be great, or terrible. However, I think it is a possibility, and not one to ignore, as radical as it may be. If a mission to Mars is done within the next 20 years, I believe that Mars will be similar to the United States, albeit with less bureaucracy and a more efficient system due to the significantly smaller populace. This is because the first human mission to Mars will likely be done by the United States, so it would make sense that the system on Mars reflects the system that got humans there. This may result in a portion of Mars becoming a territory of the United States, such as Puerto Rico. Maybe China also sends some people to Mars and colonies form, some democratic, others communist. What does all this talk have to do with Earth? Well, it will surely draw attention to the most basic assumption we have about the societies in which we live. This attention may lead many to disagree with some aspects of our societies which could lead to reform. Obviously, we want the best society possible, so reforming our society to better suit the people may become one of the key contributions that Mars has on Earth.

## 0.6 Interest

Why bother with art. Take away movies, music and poetry. Life suddenly isn't as fun, is it? I don't think we should constantly look for what will provide us with practical advantages, but also consider the interest factor. Reading a novel may not provide you with insight into the stock market, but it sure can be fun to read. Instead of only looking at Mars as this journey that could provide us with a bunch of technologies and potentially improve world peace, let's also consider how exciting it is. As humans venture into space, you can be sure that there will be lots of fiction books that follow - biographies of crazy adventures, and poems of the red landscape. We even have a pseudo-biographic film, *The Martian*, only this time it could be based on a true story (and hopefully involve less risk to the protagonists). This wave of entertainment fueled by exploration may motivate people to pursue passions that could enrich their lives (think of how many people grew an interest in STEM after seeing Sputnik). All of these new developments can keep the world interesting. All the practical benefits that come from Mars will sure be welcome, but I'm sure the entertainment that's inspired will be somewhat similar in significance. I stated in the abstract that I wouldn't dwell on the "desire to explore", but I think it could be a captivating journey, for those going to Mars and for those on Earth.



## 0.7 Bibliography

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2. <https://www.nytimes.com/2015/03/06/science/mars-had-an-ocean-scientists-say-pointing-html>