

Is NASA going to Mars? Or the Moon? Or nowhere?

December 19 2016, by Tabitha M. Powledge



A map of Curiosity's travels from its landing November 26, 2011 (top of the trail, near Yellowknife), through sol 1536, just a few days ago in Earth time. The blue circles indicate drill sites. Credit: Credit: NASA/JPL-Caltech/University of Arizona



Let's take a deep hopeful breath and look forward, shall we? People have discovered that it's pretty difficult to move to Canada. So there's a lot of talk about going to Mars.

The determination to find evidence of life on Mars is almost touching. Some of it emanated from the 2016 American Geophysical Union Fall Meeting in San Francisco, just concluded.

For example, reporting at GeoSpace on a paper describing finger-like rock structures on Mars as possible evidence of previous life, Yasemin Saplakoglu said, "Based on rock samples collected from hot springs in Chile, a team of researchers now hypothesize that photosynthetic microorganisms entombed within the rock may have created the unusual structures."

Not everyone is convinced.

Curiosity's travels

The highest-profile project in current Mars ventures by the National Aeronautics and Space Administration is the Curiosity rover. It landed at Gale Crater on Mars more than 4 years ago and has rolled over about 9 miles of the planet, studying its minerals. "According to Curiosity, Mars was once a wet world with <u>much of the chemistry required for life</u>," says Eric Berger at Ars Technica.

It has found no direct evidence of life, of course; you would have heard about that for sure. But the rover has recently found boron, which Berger says is an indication of past habitability. Curiosity's scientists are speculating that about 3.8 billion years ago, around the time life was originating on Earth, conditions on Mars were similar to those here: temperate with plenty of liquid water. (The only water on Mars now appears to be ice.)



At D-brief, Shannon Stirone quoted one scientist as saying the <u>Curiosity</u> <u>data is "a jackpot,"</u> and another noting that the researchers have "consistently seen these habitable conditions over time and in different locations across Mars." Stirone says the water in Gale Crater Lake might even have been drinkable.

But by whom, 3.5 billion years ago?

If you want to get down in the (metaphorical) weeds on Curiosity's doings, the place to go is this post at Emily Lakdawalla's blog at the Planetary Society. <u>Everything you ever wanted to know</u> about what Curiosity has been up to between sols 1489-1547. (<u>A sol is a Mars day</u>, about 24 hours 40 minutes, only about 2.7% longer than an Earth day.)

Going to Mars

Meanwhile, people are dreaming of going to Mars and transforming it. Elon Musk's ambitious plans for his SpaceX rocket and Mars colonies are already well known. You can <u>view his 2-hour session</u> describing them on You Tube or read the transcript at Business Insider.

Hibernation is, theoretically, a good strategy for manned space exploration, including to Mars. It would save a lot of money because hibernating astronauts would require less food and produce less waste. At Scienceline, Cici Zhang tells us that every extra pound of payload adds over \$40,000 to the cost of a mission. Hibernation would also prevent boredom and maybe make astronauts more resistant to radiation.

But Homo sap is not a hibernating mammal, and achieving the required body temperature of 86-90 degrees F. will not be easy. Still, Zhang declares, scientists are getting toward the desired chilling rate. Even so we could probably never do what hibernating animals do, stay cold and stop eating for long periods and reduce our metabolic rates by 80%.





What Mars's Gale Crater Lake, measuring 150 km across, maybe looked like 3.5 billion years ago. Credit: NASA/JPL-Caltech/ESA/DLR/FU Berlin/MSSS

But it might be possible to get humans to hibernate for a series of short sessions. Like hamsters. One scientist working on a hibernation project forecasts human trials in 3-5 years.

And once we got to Mars, fully rested from hibernation, then what? Well, there are plans for settlement, too. Billions of years ago there were temperatures high enough for flowing water and maybe even life on Mars, but today it's a very cold desert. (Average surface temperature -60 degrees C.)



NASA scientist Christopher McKay has a plan for dealing with that, which he disclosed at Nautilus. He points out that warming a planet is something Homo sap has proved all too talented at doing, and foresees that we would be capable of <u>warming Mars to 15 degrees C. within a century</u>. "The most efficient technique would be to produce supergreenhouse gases such as chlorofluorocarbons or, better, perfluorinated compounds," he says.

He's a little vague on just how to do that.

But for him it's a praiseworthy goal. "Presumably," he says, "Martian life would be grateful for a terraformed world that restored the planet to what it once was."

Assuming we figure out how to make Mars warmer, full of life and a breathable oxygen atmosphere, how could we build things there?

Jacqueline Ronson describes one possibility at Inverse: <u>Put genetically</u> <u>engineered bacteria into the soil</u> and get them to form a sort of concrete. She describes a couple of preliminary efforts at persuading microbes to make building materials here on Earth. And she notes that Earth applications would be more immediate and practical than microbial buildings on Mars.

Microbe expert Jonathan Eisen mulled over Ronson's post at MicroBEnet and was <u>a bit intrigued</u>. He concludes, "Certainly very interesting. Not sure if it is feasible. Or ethical. . . "

The reality show here on Earth

The fact is that what NASA will be doing in the next 4 years is pretty much, um, up in the air.



It seems likely to nearly everybody that the TrumPets will try to get rid of NASA's work on climate change, given that Trump has declared it to be a Chinese hoax and surrounded himself with fossil fuelers.

But what will they do about space? Sending a (successful) manned mission to Mars would probably Make America Great Again. But it couldn't be carried out in the lifetime of a Trump administration. Going back to the moon is probably what a Clinton administration would have wanted to do, and the likelihood of international cooperation on a moon project seems strong. But others say the moon is booooring. Been there, done that. Seven times.

NASA Watch's Keith Cowing told The Guardian, "They [NASA] do not know what the budget is going to be, whether Earth science is being carved out of Nasa or the journey to Mars is being cancelled. They are just sitting there waiting to be told, and this may go on for months."

Looks like we'll have to count on Elon Musk.

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