http://chapters.marssociety.org/youth/

The Martian Chronicles

February 2000
Issue 1

Contents

Dear Reader,

this is the first issue of the **Mars Society Youth Newsletter**. With this publication we hope to inspire youth about Mars exploration and humans settling the Red Planet within the near future. It is our generation that will be the first to step on Mars!

Please distribute freely!!! If you would like to regularly receive this publication, please send your e-mail (preferred) or postal address to Margarita Marinova <mmm@mit.edu>. Please also send your submissions for the Newsletter!

Hope you enjoy The Martian Chronicles!

Sincerely,

Margarita.

Does Mars have the right stuff for Life

Dr. Chris McKay, NASA Ames Research Center

Billions of years ago Mars had water, a thick atmosphere and possibly life. One of the dreams of space exploration is the idea of making Mars once again a home for life. But to accomplish this requires the basic materials needed to make a biosphere. These are water, carbon dioxide, and nitrogen. What about oxygen you might wonder: Oxygen is in the carbon dioxide. Plants take up carbon dioxide and release oxygen. This happened on earth and it would happen on Mars once life was established there. The need for water is clear. A planet with life needs oceans, rivers, and lakes. These are important not just as places for life to live but also to allow for cycles of rain and runoff. A living planet needs nitrogen for two reasons. First, nitrogen is an important fertilizer and plants use nitrogen in building up proteins. In addition, a breathable atmosphere cannot be made only of oxygen. There must be another gas as well. This gas must not be poisonous or burnable. Nitrogen is the only good choice that is likely to be present in large enough quantities.

We don't know how much water, carbon dioxide, or nitrogen there is on Mars. We know the the present martian atmosphere contains hardly any of these. We believe that early in martian history there was enough water and carbon dioxide to make a habitable planet. There was probably enough nitrogen too. But these important compounds may have escaped into space. Or they may be hidden beneath the surface of Mars. The water is likely to be hidden as ice, frozen into the cold ground and in the polar caps. The carbon dioxide could be trapped as carbonate rocks or simply absorbed into the soil. If there is nitrogen in the soil it might be in the form of nitrate salts. If there is enough ice, absorbed carbon dioxide, and nitrate salt to provide for a biosphere, then Mars is all set for terraforming! So one of the important next steps in determining if Mars can be made habitable is to determine the amounts and locations of ground ice, carbon dioxide absorbed in the soil, and nitrate salts. To do this we will have to dig and drill in many places on Mars. The sooner we get started the better!

A terraformed Mars with an ocean

The Mars Society is an international non-profit organisation committed to furthering the goal of robotic exploration and human settlement of the Red Planet. www.marssociety.org

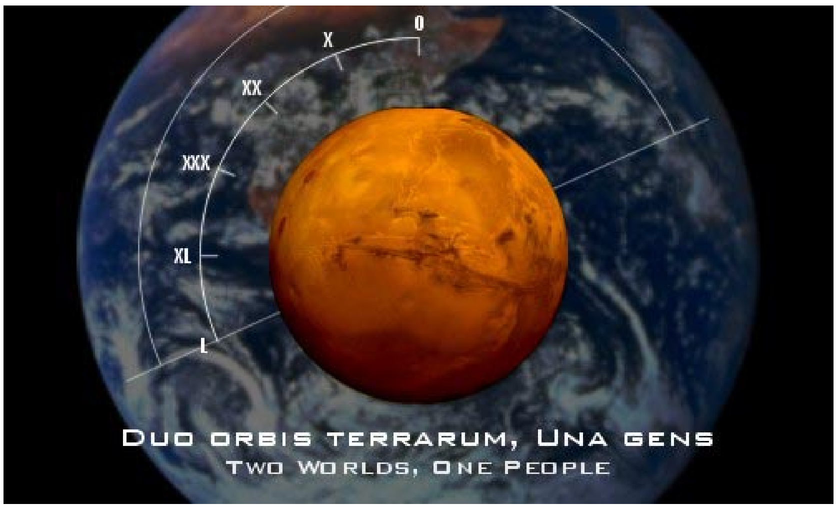
A Future History

Adrian Hon

Thank you. I'd like to begin by saying how honoured I am by Port Burroughs' invitation to speak here on your fiftieth anniversary. On the past two occasions I've been here as a guest speaker, I was asked to talk about the future; something that wasn't too difficult for me, as a futurologist.

Yet on such a momentous day as this, fifty years since the establishment of the third colony on Mars, rather than looking forward, I think it would be fitting to talk about the past. You'll have to forgive me, though, for making the odd prediction or two – it's a hard habit to slip out of.

When you think of the most outstanding events of the last fifty years, the first that comes to mind is probably the Tear asteroid disaster. Certainly it changed many things – not only did that singular event kill thousands and halt all research into both artificial intelligence and nanotechnology, it shocked the solar system out of its pervasive complacency.



Perhaps in that regard, we have not realised all the dreams of our ancestors who thought their children would be conversing with computers and creating diamonds out of coal, though it is true that we have made startling advances in biotechnology – we were all surprised by the news of the sapience uplift of dolphins.

Yet I'd like to think that rather than the 21st century being remembered for technology, as the 20th was, our descendants will think of our era as the one where the human race grew up, and left home. I know that the people here at Port Burroughs are a disarmingly modest bunch, but believe me when I say that the Martians were the people who kicked off this process of maturation.

You see, when the first settlers came to Mars, they had to be flexible, they had to be willing to be different. These weren't essential characteristics back on Earth – but on an alien world possessing the harshest environment humans had ever tried to live in, either you were flexible and survived, or you were on the next ship home. Only there weren't any ships home, so you had to shape up.

Most people today recognise the Martian's flexibility in the form of the various technological breakthroughs the first colonies produced – the black silicon solar arrays, biological ore refiners and total waste recycling system, to name a few. The most significant – and subtle - change however was still to come.

Along with being open to new ideas, the first colonists were open to new concepts of how to live. In the cramped spaces of their tin-can habitats, there was no centralised government. Each colony had to get along as best as it could, and they couldn't afford the time or energy to set up a formal bureaucracy. So they improvised – taking the much-discussed but never implemented concepts of transparent societies and electronic voting, they single-handedly revolutionised the notion of 'democracy'.

Instead of democracy being the ability to vote for a representative who would have to balance your views with ten thousand others, along with being exposed to the temptations of misusing the over-large power bestowed to them, it became the method by which people could have a say in all decisions.

True, there were teething problems, notably at New Toronto in 2032, which resulted in the complete shutdown of their hydroponics bays due to the wrong people having the wrong information at the wrong time. But those problems were far outweighed by the fact that the Martian way allowed people to really feel they could make a difference in their world. That's something we take for granted these days.

At the end of the twentieth century though, politics was treated with complete apathy by many sections of the population. To take an example from the United Kingdom, almost half of all young voters would not vote, or did not know who to vote for, at elections. Political commentators at the time merely said that politics bored the youth. We know now that this reluctance to vote was not just apathy, it was the fact that the youth simply did not believe that their vote could make a difference.

You can't blame them, when the media was constantly talking of corrupt politicians and disastrous mistakes made by 'back-room committees.' They didn't think anyone would listen to what they said, so they stopped speaking.

This state of affairs continued for over a decade until the first humans arrived to live on Mars permanently. That youth, now grown up, realised that on Mars they couldn't afford to ignore anyone's opinions or ideas – those ideas might quite literally make the difference between life and death. So the generation that had collectively lost its voice began to listen to each other again, and they taught their children how to speak. That generation created the world we live in today.

On my way to Port Burroughs, I was asked to unveil a statue at Asimov Point, up north on the banks of the Valles Marineris. I'd never seen anything quite like it before – it was composed of two spheres, the inner being a brass globe of Mars, and the outer a transparent globe of Earth. It had a simple inscription on it:

'Duo orbis terrarum, Una gens.'

Translated from the Latin, it means 'Two worlds, One people.'

It's heartening to see that in these prosperous times we still remember where we came from, and those who made it possible for us to be here now. No matter how far we travel, into space and into the future, we will always have come from Earth. It's a testament to those people that in the dark beginnings of the twenty-first century, they had the confidence to believe that they could make a difference, and convince the world that Mars was more than a star in the sky. It's to them we owe our existence here.

Speaking of individuals making a real difference, the one example that comes to mind is the incredible sacrifice of the first female on Mars, Astronaut Harris. Which is the other prime candidate for the most important event of this century so far, coincidentally bringing us back full circle.

But I don't need to remind you about *that* story; every child on this planet knows what happened on the nearly disastrous first manned Mars landing back in…

What Makes Mars Special

Daniel D. Slosberg

Why is Mars so attractive? What makes us want to go there more than to any other planet? Mars is close, sure, but so is the moon. What makes Mars so special? The same thing that makes the Earth so special: it has water.

Space probes have sent us pictures of dew formed in the early morning on Mars, just like on Earth. But there is one important difference: on Earth, we thinkof water as a liquid, in oceans, streams and rivers, as rain and from the tap. On Mars, water is a solid or a gas, but never a liquid. The "dew" on Mars is frost, like on your window panes in winter. On Mars it's cold, so the water is always frozen. If all the water in the atmosphere snowed out, there wouldn't be enough snow to make a footprint! The thin atmosphere can hold one tenth of a millimeter of water, max.

There's more water in the ice caps. Mars has two polar caps, just like Earth. Unlike on Earth, however, they are mainly carbon dioxide - dry ice. Have you ever seen dry ice? If you pour water on it, the dry ice sublimates: that's like boiling, but it's a solid boiling, not a liquid. (Dry ice is used on stages to create smoke.) Dry ice freezes at far below zero degrees Centigrade, so the water freezes first and can be found underneath the dry ice.

There is still one more place water can be found: in the soil. The dust on Mars acts like a giant sponge, soaking up the water from the air. Take a dry sponge, and just touch a tip of it in a large pool of water, like your bathtub at home. Even though you just touch the tip of the sponge in the water, the sponge soaks the water up higher and higher until most of the sponge is wet. On Mars it works the same way: the soil touches the air and draws water out of it. The soil continues to draw water out of the air until it can't hold any more. Then it's said to be in equilibrium.

Scientists think that this crater was once the bottom of a big lake.

We've seen that Mars has water: in the air, on the ground, in the soil, and in polar ice caps. What can we do with the water? Well, we can drink it. We can use it to grow plants. We can even make rocket fuel out of it. Can you think of more uses for water?

Meet the Scientist

DR. PASCAL LEE

Haughton-Mars Project Principal Investigator

Dr. Pascal Lee

Credit: Greg Clark

Q How did you get interested in science? What did you study in school?

A I got interested in science and space exploration, as a kid by reading comic books and watching sci-fi TV. In high school I majored in science (physics, math, chemistry). In college, I majored in physics and I took as much astronomy as I could. In graduate school (University of Paris) I studied geology and geophysics (M.E.). I then took a year off to go to Antarctica where I served as a geophysicist at an antarctic station. I went for more graduate school (Cornell Univ.) to study astronomy and space science. I majored in planetary science (M.S., Ph.D.).

I should add that I've always found doing science difficult. It never came easy. It took hard work. Science is about exploring the unknown, and learning how to explore takes dedication and effort. But I have always found it rewarding and worth it.

Q What does your work as a scientist involve? What's your favourite part of the job?

A My job as a scientist involves writing proposals to obtain grants to do research, carry out the research itself, and then write reports about any findings. My favorite part is doing the research itself, which involves a lot of field work in some pretty wild places (the Arctic, Antarctica, Mars-like deserts).

Q Why do you want to go to Mars?

A I think humans should go to Mars because we will then be in the best position to explore and understand Mars thoroughly. Getting humans there ASAP to do the best possible field work should be a priority. I would be very excited to go to Mars myself but the odds of that are formidable and I'm not counting on it! But just working towards the goal of sending humans there is already very exciting.

Q Where is Haughton Crater? How is the weather there?

A Haughton crater is the highest-latitude meteorite impact crater known on land on Earth. It is located at 75°N, on Devon Island, Nunavut, in the Canadian high Arctic. Devon Island is the largest uninhabited island in the world. The environment there is cold, relatively dry, windy, and only very sparsely vegetated. It's a magnificient rocky polar desert, somewhat akin to Mars.

Artist's rendition of the Mars Arctic Research Station

Q What will we learn from Haughton Crater about Mars and Mars exploration?

A There are not just one but a wide variety of geologic features (for example networks of valleys and canyons) and biological attributes (life in an extreme environment) at the Haughton crater site and in its surroundings that resemble in specific ways what we see, or might have seen, on Mars. An important goal of our work at Haughton is to try to understand the extent to which this resemblance is meaningful: is it merely a coincidence or do the similarities relfect fundamentally common processes? While exploring Haughton (doing genuine field work, not a simulation), we are also learning how humans might one day soon explore Mars. We are using the opportunity of ongoing field research to study the technologies, strategies and human factors that will help humans explore planets better, in particular Mars.

Q What's your favourite thing about the Arctic?
A The Arctic's pristineness and the stark beauty of its land are very attractive to me. Especially on Devon Island, there is the sense that you're almost on another world.

Q What was it like to winter over in Antarctica, with 6 months of darkness?
A Wintering over in Antarctica is an incredible experience. That's like another world too. Because of the prolonged winter night, there is less to do outdoors and so life turns inwards, more to indoor activities. When the longer days come back, you can go out again to explore. Antarctica is one of the wildest, strangest and most beautiful places I have seen. Although the place needs to be protected, I hope every human gets to see Antarctica at least once in their life.

Puzzle of the Week

by Kathleen Bohne

In the clues, **A** means across and **D** means down. 4-**D** refers to clue number 4 Down.

Kathleen and her father Mark attended the Second Mars Society Convention in August 1999. They paid close attention to the details!

1.	2.	■	3.	4.	■
5.		6.	■	7.	8.
■	9.		■	■	10.
11.	■	■	12.	13.	■
14.	15.	■	16.		17.
18.		19.	■	20.	

Across
1. 5-**A** divided by sum of 3-**A** and 11-**A**.
3. Number of UFO sightings in Roswell last night.
5. 18-**A** minus 3-**A**.
7. Square of 10-**A**.
9. 3 times 6-**D**.
10. Mars is the ____ planet from the sun.
11. Number of leftover "Mars or Bust" pins.
12. Words per second in Dr. Zubrin's opening remarks.
14. Number of people who tried to sit next to Buzz Aldrin.
16. Number of times Mark asked for Buzz Aldrin's autograph.
18. Sixth power of 11-**A**.
20. Number of people who tried to sit next to James Cameron.

Down
1. 10-**A** squared.
2. Half the sum of 11-**D** and 1-**A**.
3. Difference between 10-**A** and 19-**D**.
4. Square of 19-**D**.
6. Number of planets in the Solar System times 2; then minus 3.
8. Cube of 10-**A**.
11. Half the sum of 5-**A** and 11-**A**.
12. Digits of 7-**A** reversed.
13. 14-A times 15-**D**.
15. Number of desserts Mark had at the banquet times 3.
17. 3-**D** times 15-**D**.
19. Number of stars Great Uncle Wilbur wished upon tonight.

Answers on Youth Website.

Artificial Gravity in Space and on a Mars Mission

by Rich Reifsnyder

After 40 years of manned space travel, including year-long tours of duty by Soviets and Americans on the Mir space station, we aware of many of the effects of zero gravity on the body. The muscles weaken from lack of effort in moving around, the bones lose calcium and become brittle.

There is evidence that a routine of heavy exercise slows down the body's decay, but doesn't prevent it. However, even if a permanent cure for the zero-G syndrome doesn't exist, there's another solution that could work well on space colonies and on interplanetary spaceships.

If you tie a weight to the end of a rope and swing it very fast in a circle, the weight exerts a pull. That pull is centrifugal force. If a spacecraft starts to spin, the furniture and crew inside will fall toward the outer hull due to centrifugal force. Many designs for large space colonies are donut-shaped, with people walking on the hull; "up" is toward the central axis. Habitats like this are shown in movies such as *2001: A Space Odyssey*. The International Space Station, the future center for scientific research in orbit, will have a small "centrifuge," a spinning platform for science experiments and a possible way to give the crew more exercise.

There are some problems with a small rotating spacecraft. If the ship spins too fast, every time a person walks around the direction of overall velocity will change, altering the direction of gravity. This is called a Coriolis force, and on the rotating Earth, it causes hurricanes and other circular weather patterns. Coriolis forces would be disorienting and make the crew nauseous. They can be minimized with a large, slowly rotating ship. For a ship that rotated twice a minute and simulate Earth gravity, it would need to be about 450 meters long (1500 feet); to simulate Mars gravity it would need to be 180 meters (600 feet). But no Mars spacecraft could be built that big.

The most practical solution is to use a long tether connecting two halves of the spacecraft. The crew habitat is at one end of the tether and another component, like a used-up rocket stage, is at the other end. The tether has multiple strands on the off chance that one or two are cut by meteoroids.

With a tether system for artificial gravity, the crew could spend almost the whole trip standing, sitting, and walking around normally. This would ensure that the problems of muscle and bone decay would not injure the crew as they set foot on the planet Mars for the first time.

The **Mars Society Youth Group** was created to facilitate the communicate of ideas between Youth to older generations and to provide a more effective outreach effort to other Youth.

http://chapters.marssociety.org/youth/

Youth Group picture from the Second Mars Society Conference, Aug. '99