THE ARESIAN

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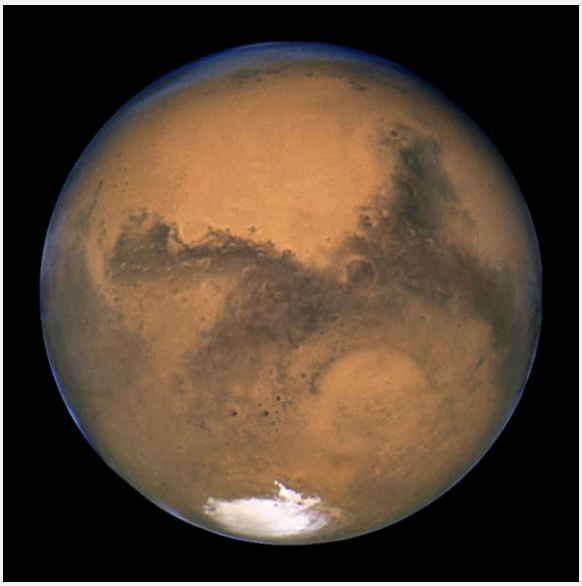
WELCOME TO OUR SECOND EDITION

***The Aresian's* first edition enjoyed a good reception. People seem to like the mix of news, well researched articles and features.**

Do continue to send in your views. Please respond via *Mars Futures Forum* with any views and suggestions.

We are looking for contributors. So, if you have any ideas for articles about any aspect of Mars colonisation please get in contact with us via *Mars Futures Forum.*

The Aresian makes Mars accessible.



Credit: NASA

Dining out on Mars – robots at your service.

By Mary Khan

The people of Mars will likely be eating out a lot more than the average person on Earth. After all, accommodation in the first city on Mars will be fairly basic to begin

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with. You might have a microwave but whether you have the full kitchen kit seems a bit doubtful. It will make much more sense for people to eat out or at least buy their food pre-prepared, not so very different from the way the population in Ancient Rome used to (they couldn't cook in their apartments so they would pay for a pie or other food cooked in their local bakery).

Mars is going to be employing a lot of people who are high earners and who are used to eating out frequently back on the home planet. My expectation is that they will want there to be restaurants available where they can eat out of an evening after a demanding work day (or *sol* I should say).

Of course, when you think about all the work that needs to be done on Mars – maintaining energy systems, providing water, mining, life support, agriculture and industry, to name a few – you may well conclude: *"Restaurants won't be a priority!"*

They certainly won't be a priority for labour allocation. But I think they will be a priority for the colonisation process. There are several reasons. Firstly, as I have already alluded to, it makes sense from a resource allocation perspective to keep the accommodation simple but provide opportunities for communal food consumption (a more utilitarian way of saying "eating out"). It also makes sense for Mars to be organised in a way which minimises household tasks. In World War 2, in the UK, this was the reasoning behind the setting up of "British Restaurants" to serve the general population, allowing them to work overtime on important war work and maintain their energy levels as they then didn't have to cook at home.

The principle will be the same on Mars but the restaurants will be a little different!

Firstly they won't be staffed in the same way as on Earth. Expect robots to be operating in all parts. In the kitchen, sophisticated robot chefs will be making up your meal and doing the washing up. This isn't sci-fi fantasy. There are already many robots at work in US restaurants. From my review of what robots can do, Nala Robotics seem to have a very good candidate for a Mars-based robochef.

Check out the Nala Robotics website (nalaronbotics.com). The Nala Chef is *"the world's first fully automated multi cuisine Robotic chef disrupting the culinary industry".* Meals prepared by the robot can be customised. It's capable of learning to cook thousands and more recipes (essentially, it can master a limitless number of recipes). Each meal it prepares is executed with precision and camn meet specific customer requirements. Nala notes it has incredible visual and sensory processing.

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In fact, every microsecond, it can check more than 1,200 parameters, enabling it to operate smoothly in a kitchen environment.

Pic: The Nala Robot Chef at work

Nala also manufacture a "Wingman" which I think of as a sous chef, helping prepare all the ingredients, the sauces and so on.

These robots are already at work in the field. There are three robots working in three separate restaurants in a food court in Naperville, Illinois in the USA.

A multi-recipe robochef will be a real boon to human civilisation on Mars. Just one robot can serve up to 40-50 people every two hours. So one of these robots could be at the heart of a small restaurant or several of them could be working out of the same kitchen space to provide something more like a refectory service at a university.

Those responsible for providing restaurant services on Mars will likely need to expand the role of robots on the Red Planet, to substitute for human labour. Delivery robots will of course bring provisions to the rear entrances of restaurants, having first sourced them from central warehouses (in response to automated ordering from the restaurant). There will need to be mobile robots in the restaurant that bring these supplies into the kitchen space. They will be able to handle foodstuffs, open simple packages, store food in fridges and freezers and so on.

We should remember that food on Mars will be very fresh. It will be rare for foods such as vegetables to be less fresh than within 24 hours of picking. Moreover food on Mars will be produced to a very high standard – really the equivalent of the best organically farmed food.

With a robochef capable of drawing on a wide range of cuisines using the freshest ingredients, we can anticipate the Mars pioneers will be eating really well.

You can expect food to be brought to your table by another set of mobile robots – robot waiters. There will be no need to catch the eye of a waiter (one thing I definitely hate about the restaurant experience!). Instead you can summon a

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waiter to your table with the press of a button.

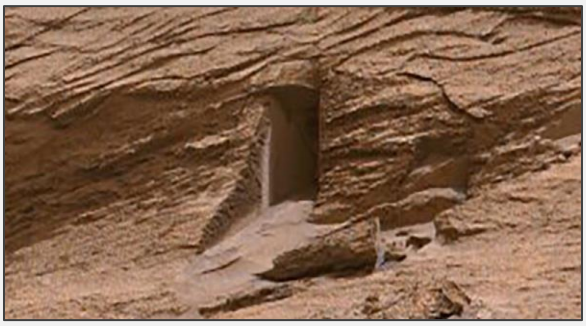
There's no reason why restaurants on Mars shouldn't be as interesting, relaxing and restorative as restaurants on Earth. With music, nice pictures and elegant fixtures and fittings, eating out will be a very pleasant experience. You won't have to hang around waiting for the bill. I expect you will pre-order with your reservation from price-bracketed foods. So there might be 3 or 4 price ranges. If you decide to have a starter or desert that will be added to your bill automatically.

What's not to like? I guess some people rather like the sense of social superiority that goes with having people running around cooking your food and bringing it to you at your table but for most people – for me certainly - it's really about the food and the ambience.

Robots will ensure food safety on Mars. Automated food testers will scan food supplies and cooked food for harmful microorganisms. Robots will maintain a clean environment in the kitchen and restaurant: firstly by washing dishes (check out *Dishcraft* technology). The internal environment will be made robot-friendly so robo-cleaners can move easily when scrubbing down and cleansing equipment. A quality experience guaranteed all round!

PICK OF THE PICS

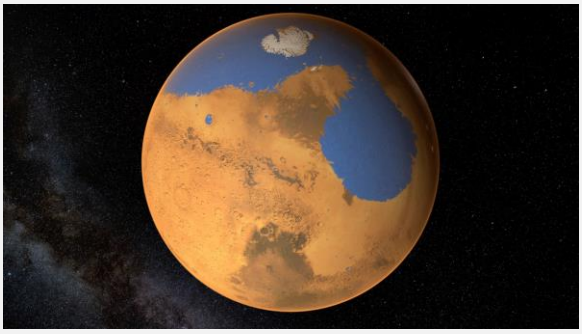
Danny P. says: "I find this pic really intriguing. I know some experts have said it's really small and it's probably a fault-line caused by seismic activity. But it looks like a doorway, even if it is tiny. There are so many weird images from Mars. I can't wait for people to get to Mars and start investigating everything close up with their own eyes."



Credit: NASA

***The Aresian* team agree it's intriguing! Even if it's all just geology – it's still interesting geology!!**

OCEANS ON MARS



The past or the future?

See next month's issue.

Industry on Mars – the priorities

By Steven Ellis-Johns

What will be the priorities for industrial development on Mars? Here's my top ten.

1. Energy. Producing energy will be the first priority. Whether this means rolling out the solar panels or starting up a nuclear reactor, you will need energy to keep people alive and to undertake the many tasks.

2. Mining. Humans need water. Crops need water and industry needs water. The first independent industry (after unloading of an energy system from Earth) will be mining, and specifically mining of water ice. Thankfully the water ice should be only a metre or two below the surface if we have the right landing location in which case we can easily dig it out with robot diggers rather than having to sink mine shafts. Mining will expand as the years go by: iron ore, precious metals, basalt and hundreds of other materials will come to be mined. If Mars lacking anything, people will explore the asteroid belt to locate a source.

3. Propellant Production. Nearly all modern proposals for human missions to Mars prescribe propellant production as a requirement on the first mission. For Space X this would involve producing methane and oxygen by splitting water into hydrogen and oxygen and making methane via the Sabatier Reaction process.

4. Steel and other metallurgical industries. We know that steel is at the heart of industrial applications on Earth. The ability to make steel on Mars will be a high priority. We can expect it to be done on a much smaller scale to begin with – almost like a small forge, a real "cottage industry". But the output will be a high quality material. Other metals will follows after steel.

5. PV Panel manufacture. Energy requirements will be expanding at an exponential rate on Mars. The sooner Mars can produce its own energy systems, the better. Photovoltaic (PV) panel manufacturing facilities are highly robotised these days – perfect for Mars. And Mars has an abundance of the silicon used in their manufacture. Some of the rarer chemicals also used to produce PV panels may initially need to be imported from Earth until sources are located on Mars. Once Mars can produce its own PV panels, there is nothing to hold back Mars industry.

6. Auto manufacture. The people of Mars will be highly dependent on mobile robots which will be used in hundreds of contexts. Fortunately electric vehicles are relatively simple to manufacture. Vehicles may of course be tracked or wheeled and steel

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wheels rather than rubberised versions may be favoured.

7. Farm tools and equipment. Getting Mars self-sufficient in food will be a major priority but that in turn means Mars need to be able to produce the tools and farm equipment required - everything from trowels to propagation trays to iirigation pipes to harvester robots. 3D printers will make a huge difference, enabling the Mars colony to manufacture a range of tools and equipment without having to produce huge product runs.

8. Rockets. Mars will be part of a space-faring civilisation. We know rocket science and rockets themselves are complex but once again 3D printing means pipes, valves and all the other necessities of a rocket can be produced on Mars with relative ease. The company *Rocket Lab* are already using 3D printing to make rockets. "Rocket hoppers" have been built by amateur enthusiasts. There's no reason why a Mars colony couldn't knock up these pretty simple craft (basically a series of pressure tanks held together within a steel frame).

9. Chips please. If Mars is going to be self-sufficient that means it must have an advanced economy and that in turn means it must be able to produce items like silicon chips. If necessary a Mars colony may have to reach an agreement with Earth-based companies to import the expertise and manufacturing capability.

10. Construction. Mars will urgently need to develop its own construction industry using ISRU materials like Mars concrete and Mars bricks (possibly compressed rather than fired). It can also use materials like basalt found across the Red Planet. For internal construction, Mars colonists will use fast growing timbers and bamboo that they can grow within their agricultural facilities. Glass can easily be made on Mars and glass panels and glass bricks are very useful for internal partitioning.

Well, I hope you have enjoyed this brief survey. There are many other contenders for the top ten priorities but I think this list is pretty much on target.

READERS COMMENTS

Danny P. says: *"Great idea! Really enjoying reading all your articles. Mars is the biggest thing ever but it's frustrating how the media ignore it."*

We couldn't agree more Danny! Our media seems to be brilliant at ignoring big stories!

Marsgirl 2022 says: *"Congratulations. I hope The Aresian is really successful. The mainstream media is so negative about Mars's potential. I don't know why!!"*

Hopefully we can reverse the trend and spread the word about how full of potential Mars is.

NASA Has A Problem says: *"Great to see people putting out a positive message on Mars. Let's get there. Let's farm, build and make stuff. It's not rocket science."*

We appreciate the irony as it is only rocket science that will get us to Mars! Lol

Duke Days says: *"I like the bite-size pieces on the weather and stuff. Not so sure about long articles. Save those for the Forum website."*

Point taken. We're gathering feedback on what people want from *The Aresian* and the *Forum*.

MARS FACTSHEET

1. Mars's atmosphere is less than 1% as dense as on Earth.
2. Buildings on Mars will hold heat much more efficiently than on Earth due to the low density atmosphere.
3. The atmospheric density at the bottom of Hellas Basin on Mars is about twice that of the average for Mars.

In the News

The Mars Insight Lander recorded seismic activity following the impact of a meteorite on Mars. This suggested the presence of a "hitherto unknown layer of molten rock" that surrounds the liquid metallic core that is now thought to be smaller and denser than previously envisaged. ***(The Independent – 26 October 2023)***

Researchers examining data from NASA's Curiosity rover at Gale crater, a huge impact basin on the Red Planet's surface, have found more evidence that river systems were once very common on Mars. Geoscientist Benjamin Cardenas of Penn State University in the USA is reported as saying: *"We're finding evidence that Mars was likely a planet of rivers."* This is good news for those of us who have always thought Mars was far more Earth-like in the past than generally accepted. Cardenas went on to say: *"It offers a vision of Mars where most of the planet once had the right condition for life."*

(Space.com, 25 October 2023)

MARS WEATHER UPDATE

Here's the latest on Mars' meteorological record (relate to Elysium Planitia).

25th October 2023: Sol 681 Oct.h: 24° F Low: -139.8°

High: - 4.4 *degrees Celsius*

Low: - 95.4 *degrees Celsius*

Would you like to write for The Aresian?

If you've got a great idea for an article in *The Aresian* get in touch with via Mars Futures Forum. Just head up your email **"For The Aresian"**

MARS QUOTE

"A blade of grass is a commonplace on Earth; it would be a miracle on Mars. Our descendants on Mars will know the value of a patch of green. And if a blade of grass is priceless, what is the value of a human being?

CARL SAGAN

Do you have a favourite Mars quote?

Let us know!

FIRST WORDS ON MARS

By Owen Louis David

Neil Armstrong set the bar very high with his famous (and self-composed) line: *"That's one small step for (a) man, one giant leap for mankind."* In case you're wondering, the "a" got lost in transmission and *"mankind"* would likely be replaced by *"humanity"* or *"humankind"* today. But still, it's a very hard act to follow!

It's interesting to speculate what will or should be the first words on Mars – it's a game you can play with friends and family. Maybe a simple comment would suffice: *"We're here, at last."* Or perhaps Elton John's *"Rocket Man"* song should be challenged: *"It's a perfect place to raise some kids and we haven't felt cold since we got here."*

The Mission Leader may well be a woman. In which case something like: *"A woman makes her mark – stepping foot on Mars."*

Send us your suggestions! We'd love to hear them.

Maybe your words will be the first spoken on Mars (but then again, no guarantees lol!)