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PUBLICATION OF *MARSWORLD* CONFIRMED!

Owen Louis David, Director of Mars Futures Forum and Editor of *The Aresian*, has a big announcement. His book, titled *Marsworld* - a wide-ranging survey of everything to do with human colonisation of Mars – is due to be published next month, in July.

Owen says: *"I had been a little unsure of what date to select for publication. But I learned recently that Robert Zubrin, the great prophet and proponent of Mars colonisation down the decades was going to be publishing his own general survey of Mars colonisation in August. So I felt I ought to publish now before Zubrin's opus appears. I think my book will be both an antidote to the weird pessimism of the Weinersmiths' strange book, "A City on Mars" published last year. I hope it will be a kind of primer for those wanting to learn more about the colonisation process. I think even seasoned observers of Mars colonisation proposals will find a lot in it that is new and interesting."* ***See page 2***.

THE ASTEROID BELT - MARS'S SPECIAL POWER

Unlike Earth, Mars has a hinterland, the hugely bountiful asteroid belt. Find about what this involves and what it means for the colonisation of Mars. ***See page 4.***

IFT 5 next up.

After a successful fourth flight, find out what's being planned for IFT5. ***See page 6.***

MARSWORLD – MY BOOK INVITES YOU TO STEP INTO MARS'S COLONISATION FUTURE. BIG INSIGHTS!

By Owen Louis David

My interest in Mars really began in 2004 when Mars had a very close encounter with Earth and each night I could see this reddish-cum-orangey "star" hanging low over the horizon to the south. The idea that my eyes could give me this direct connection (via photons) to this planet so many millions of miles away was fascinating. That I could sense it was out there was a kind of minor miracle. So began my long voyage to Mars. I read books on the planet. I learned how it was really more like our cousin, a member of our family, rather than some weirdo planet like Venus or those big gas-bag planets in the outer solar system! Finding out that the length of Mars's day was so close to our own was a big breakthrough moment. I think that must have been when I became interested in the idea of potential human colonisation of Mars.

I joined various online groups dedicated to discussing how to get humans to Mars and how they might survive on the planet once they got there. I recall various debates from that period. I was always being told you couldn't have retro-rocket landings on Mars. I never believed that (why the obsession with parachutes?) and I am glad to see Musk and Space X agree with me!

It was soon after my interest in Mars began that Space X appeared on the rocket launch scene. I recognised the importance of the company immediately. I was a cheerleader for Falcon 1 and felt that, in Musk, Mars had found its champion. I am sometimes accused of being a "Musk fanboy" – a charge I reject! My interest in Musk extends only as far as he is making quick progress towards establishing a Mars colony would be my answer. I said for many years that the **Falcon 9 Heavy** was a costly detour. But eventually Musk and Space X came through with their master-work, the *Starship*.

As soon as you got your head around the concept you could see it made supreme sense. Here was a multi-functional rocket that could get us to Mars while earning Space X billions

along the way. I still have complete faith in the *Starship* concept. Whether it now takes 5 years, 10 years or 20 twenty years to get to Mars, this – for me – is the real thing. No one else has anything approaching it.

OK, well Space X and Starships are just one relatively small part of the Mars colonisation process. Mars colonisation is about the transplantation of human civilisation (I hope the best parts) from Earth to the Red Planet. That involves a lot more than just sophisticated rocket systems.

About 5 years ago I began sketching out ideas for a book that would cover the *whole* of the colonisation process. So - not just rockets but also economic development, social issues, cultural development, the political dimension, ethical challenges, prospects for a self-governing republic on Mars.

I began writing in earnest last year and recently finalised the text. It's been quite a long journey – not dissimilar to the one the first pioneers will endure on Mission One!

I had been thinking of publishing the book in early September but having heard recently that the doughty proponent of Mars colonisation Robert Zubrin was planning to publish a book with a similarly wide perspective, I thought I better get in first lest I be accused of plagiarism!

Details of my book's publication will appear in next month's edition of The Aresian.

The book has a very positive view of the prospects of Mars colonisation. In that respect you can call it the antidote the Weinersmith's strangely downbeat publication, "*A City on Mars"* which in any case was only partly about human settlement on Mars. All my years of analysis have led me to conclude that, once we have a reliable rocket technology to get substantial number of people and amounts of equipment to Mars at a reasonable price (and Space X's Starship system certainly fits that bill) then the future for a colony on Mars will be very bright.

My book does of course explain the importance of the Starship system and details how it will enable a colony to be established. However, *Marsworld* is about much more as well. It's about the politics and governance of Mars, its economy and its cultural development. Once you've read Marsworld you'll going to be so very, very successful.

The book gets into the detail of Mars's future economic development in ways I don't think any previous publication has ever done. It also explores how Mars's culture is likely to develop. The book is very supportive of an early creation of a planet-wide republic on Mars. It also takes a good long look at terraformation which I guess you could call the icing on the cake of Mars colonisation.

I hope our readers will be among the first to buy the book!

OUR ELDERADO – THE ASTEROID BELT

By Victor Samuels

Mars, once colonised, will be in the perfect position to make use of the resources in the asteroid belt. Those resources are phenomenal in both extent and ease of access.

So we need to understand what the asteroid belt is to ensure we tru;y appreciate what a superb opportunity it represents for the future population of Mars. The asteroid belt forms a kind of ring doughnut shape around the Sun, just beyond the orbit of Mars. It contains a vast number of solid, and mostly irregularly shaped bodies. The objects are referred to as asteroids or minor planets. Estimates of the number of objects varies between about 1.1 million and 1.9 million or more. You are probably imagining them being packed close together, but this is only true relatively. In reality the average distance between the objects (about 600,000 miles) is much larger than the distance between Moon and Earth.

The objects come in many sizes. However, despite the multiplicity of objects and the huge volume of space they cover, the total mass of the asteroid belt is surprisingly small. Some estimates put it at only 3% of the Moon's total mass. Moreover 60% of the belt's mass is found in just the four largest asteroids: Ceres, Vesta, Pallas and Hygeia. Ceres, about 950 kms in diameter is actually classified as a dwarf planet, along with Pluto.

You might now be thinking that there's not much there! But believe me there is!! The (relatively) small amount of mass is not a problem.

The asteroids are generally categorised as C-type (carbonaceous), S-type (silicate), and M-type (metal-rich). There are also hybrid types but let's not complicate things too much. It is the M-type asteroids that excite the most interest.

What makes the asteroid belt so desirable an asset is that (a) that there is a huge range of material resources on offer and (b) the smallish size of most objects means that they are easily accessible. There are minerals that you

don't have to dig down for a mile to find. What you want and what you need is right there at or near the surface.

The resources in the belt could serve a huge number of industries. Precious metals such as gold and platinum are of course in huge demand.

The belt's "customers" could come from Earth, from Mars or from other solar system locations. For instance,

Mars is the natural location from which to set about exploiting the belt's resources. Firstly, Mars is closer to the belt than Earth which means it has an obvious advantage. Secondly, because of Mars's substantially lower gravity well, all the equipment required for extracting the materials can be launched much more easily.

The "poster boy" of the asteroid economy is Psyche which is conservatively valued at $1000,000 trillion dollars. Yep – that's one billion trillion or - if you prefer - 1,000 quadrillion dollars. Clearly much of this supposed wealth is based on current market prices of various precious metals and if you brought Psyche into play, those markets would crash and the value of the precious metals would very quickly approach zero. It's the sort of thing we saw during the Covid emergency when the demand for oil dropped dramatically and the price plummeted accordingly.

What the Psyche valuation does show is that there is no doubt about the potential value locked up in the asteroid belt. The real issue is how to tap into it. Again, Mars will be much better placed than Earth to garner these resources. The Mars colony will have to develop a wide range of robotic processes in order to survive and to prosper. It will then have a mature technology in place that it can apply to the asteroid belt. One of the obvious aspects will be the use of robots in mining in extremely cold environments.

Initially the belt's riches will likely be used to enhance the colonisation process on Mars itself. Longer term, from Mars's standpoint, asteroids could be used to contribute to terraformation of the Red Planet.

As Earth-Mars transit technologies advance over the coming decades e.g. through the use of the UK-based Pulsar Fusion technology (which might cut journey times to a couple of weeks) we can envisage that the Mars Plus AB economy is going to become extremely dynamic. Mining costs are notoriously high and all sort of difficulties are associated with digging down, sometimes miles. If transit costs can be reduced to the equivalent of trans-oceanic transport costs on Earth, then everything becomes viable because the robot miners scouring the asteroid belt won't need to dig down. A vast range of materials will be available at the surface and easily accessible using nothing more than a rock drill in many cases.

The asteroid belt will also be able to provide those materials that are scarceon Mars to the growing colony.

Going forward, planning for the development of the Mars colony and the Mars economy, we should really think of Mars and the Asteroid Belt as being part of the same economy and resource system.

IFT 4 – A big but narrow success. What's next for IFT 5 – Mechazilla capture?

By the Editorial Team

The IFT 4 launch was a huge success but one that danced with disaster all the way! The flight test took place on 6th June. There was a single engine cut out (Engine 15 on Booster 11) immediately after launch – something of a nasty surprise as engine performance had been so good on the last two flights. No doubt some of the control room staff were having palpitations when they saw the engine was out. However, it was just the one and the Booster did the job as required.

The hot-staged separation of Ship 29 and Booster 11 was perfect. A novel feature of the test was that the hot staging ring on top of the Booster was jettisoned during the return – this was a first - so as to reduce the mass on top thus allowing for a more stable ride home. That all went fine but then after ignition of the inner 13 Booster engines, as part of the return procedure, Engine 8 exploded. However, the Starship system is nothing if not robust and the Booster continued on its way and successfully achieved what is called a "soft splashdown" in the Gulf of Mexico, as planned (having made contact with the ocean surface, it tipped over and sank – also part of the plan).

Starship 29 performed well on its sub-orbital trajectory.

Thanks to Space X's fantastically successful Starlink sateillite network we now enjoy live video of the Starship's re-entry. On this occasion it was a bit of a horror show as we saw the plasma build up and friction heat setting fire to one of the Starship's control flaps. It seemed impossible for the Ship to continue functioning as the flames got ever bigger and brighter, eating through the flap structure. But, somehow, Ship 29 made it all the way home, with an ocean landing, as planned.

So – a scary ride but a successful one. No doubt Space X are focused on avoiding a repeat of the flap burn- regarding the IFT 5?

Reports suggest Flight 5 will take place sometime next month, ie in July (towards the end of the month). Maybe there will be slippage of a few weeks as there often is. There is well-informed speculation that this time round, rather than have the Booster land in the ocean, Space X will attempt to catch the returning Booster in the "chopstick arms" of the structure dubbed "Mechazilla" at Boca Chica. That would be a huge step forward but obviously the FAA will need to be persuaded that there is no risk to human settlements that could arise from this first attempt to "catch" a rocket on dry land.

Space X are intent on succeeding with Mechazilla – it will really put the seal on rocket reusability, further shortening maintenance turnround times and driving down costs even more.

Credit: Space X

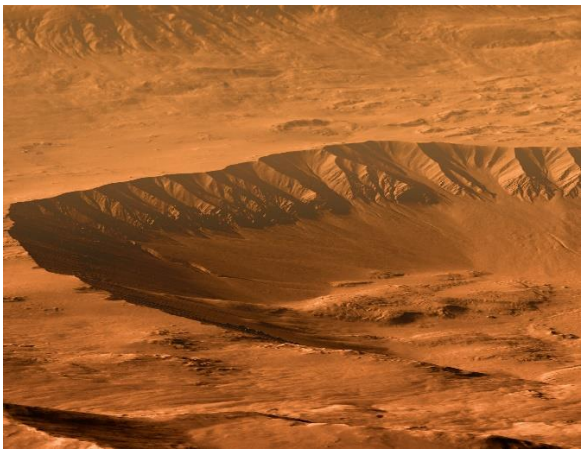
THE LATEST WEATHER ON MARS

Here's your update for the weather on Mars provided by the Curiosity Rover in Gale Crater.

For the nearest Sol to **24 June 2024** we have a *high* of minus 7.5 degrees Celsius (19 degrees Fahrenheit), a lot colder than the figure featured last month. However, it's still the sort of figure that hundreds of millions of humans live with across the planet during winter. The low, however, was decidedly chilly at minus 75 Celsius (or minus 103 degrees Fahrenheit),

Temperatures have been quite erratic recently. Daytime highs have reached 0 degrees Celsius (32 degrees Fahrenheit) on a couple of occasions but we have also seen a night-time plunge to minus 100 degrees Celsius (minus 148 degrees Fahrenheit).

PICK OF THE PICS



Credit:NASA

Craters always make for dramatic vistas and this view of the Intrepid Crater taken by the Opportunity Rover is no exception. We can only envy those explorers on Mars who, in just a few years' time, will be the first to investigate such features of the Red Planet's fascinating landscape.

Thanks to MarcusA for sending in this pic.

LET US KNOW WHAT YOUR FAVOURITE PIC IS AND WHY! WE ARE ALWAYS INTERESTED IN YOUR COMMENTS.

IN THE NEWS

Punchbag Mars: Mars is pummeled by space objects at a much faster rate than previously thought. It is thought there are between 180 and 260 impacts each year (that's probably an Earth year we expect). The largest typical object can be as big as a basketball which will create an 8 metre wide crater. *From Space.com 28.6.24*

Frosty The Marsman: Morning frost has been observed atop of the very high Tharsis volcanic mountain range – somewhere it was thought impossible for water to be found. It suggests that water ice is far more common across the planet than previously thought – and cannot now be conceived of as simply a polar phenomenon. (A good news story for Mars settlement of course!) *From The Independent 28.6.24*

The Hole Truth: A hole has been discovered by NASA's Mars Reconnaissance Orbiter! It's in the Arsia Mons region. The hole or pit is just a few metres across. May not sound like much but researchers are excited as they believe it may help in the establishment of a colony. Many commentators on Mars colonisation think that lava tubes – connected cave systems formed by volcanic activity could help colonists establish safe and secure accommodation on the Red Planet and this hole could be the opening to such a system. *From The Independent 31.5.24*