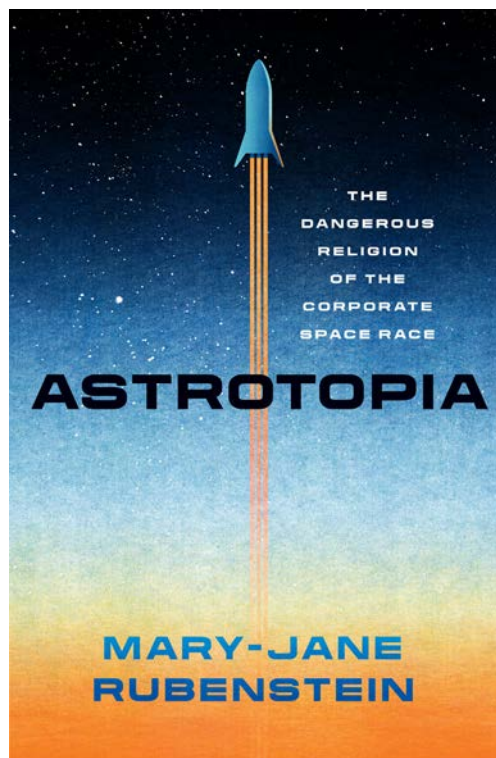


BOOK REVIEW: Astrotopia: The Dangerous Religion of the Corporate Space Race

Patrick Mahon

In *Astrotopia: The Dangerous Religion of the Corporate Space Race*, (The University of Chicago Press, 2022) Mary-Jane Rubenstein, Professor of Religion and Science in Society at Wesleyan University (mrubenstein.faculty.wesleyan.edu/), examines the corporate space race and its implications for our future. Do we want to "colonise the Solar System"? Can we put cosmic caretaking ahead of imperialism and profiteering? Here our deputy editor Patrick Mahon reviews the book.



1 Introduction

I imagine that most readers of Principium count themselves as members of the space advocacy community, and are therefore likely to think that the acceleration in the number of space missions over the last decade or so, not least because of the growth of the commercial space sector, is a good thing. If space exploration is a valuable activity, it follows that the more of it there is, the better.

Professor Mary-Jane Rubenstein.
Credit: /mrubenstein.faculty.wesleyan.edu/

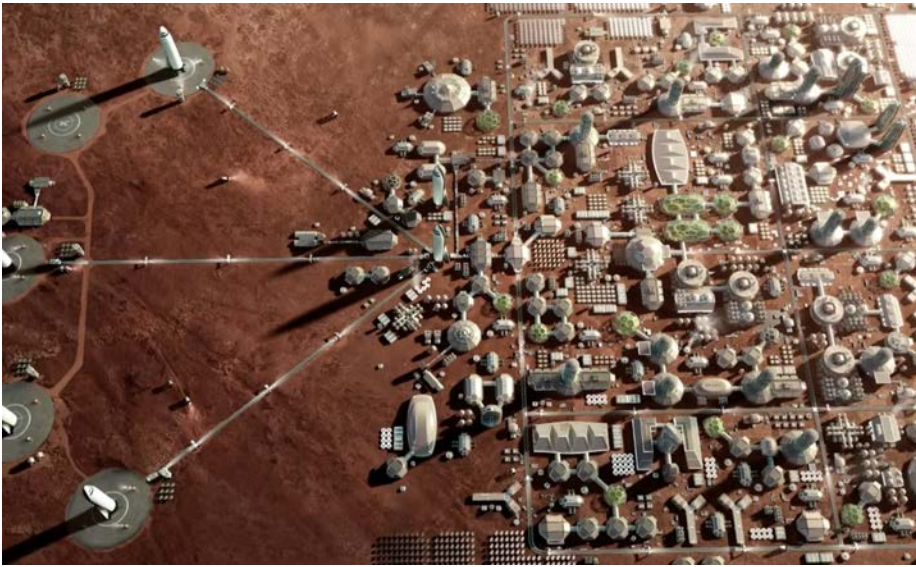


Of course, just like any other activity, not everything about space exploration is wholly positive. Rocket launches create atmospheric pollution, and most of them add to the ever-growing problem of orbiting space junk. The increasing militarisation of space - as highlighted by the creation by President Trump, in early 2020, of the US Space Force - would seem to run contrary to the declaration in the UN Outer Space Treaty of 1967 that space must only be used 'for peaceful purposes'. And the money spent on space exploration is not available to be spent on other activities, such as improving living standards or protecting the environment, which some people may see as a higher priority - particularly if the money in question ultimately comes from taxpayers. Although some space advocates (including Elon Musk, if his public pronouncements are anything to go by) have little time for such criticisms, I think that many would acknowledge that activities in space do have some downsides - just like everything else. On

balance though, they probably believe - as I certainly do - that activities in space do more good than harm, and are a valuable use of the money spent on them.

Professor Mary-Jane Rubenstein is *not* an advocate of space exploration - at least, not in its current guise. She likes space as a topic to inspire her children, and she seems to like the astronomy students that sometimes attend her classes. But when it comes to the *exploration* of space, she is particularly critical of the rapid recent growth in private space companies in the USA - the so-called *NewSpace* sector - and its two most well-known examples: Elon Musk, owner of SpaceX, and Jeff Bezos, owner of Blue Origin. *Astrotopia* explains her concerns, through the lens of her academic specialism, the study of religion.

You might well ask what religion has to do with space - and thus, what reason Professor Rubenstein has for thinking that she is qualified to critique the activities of the space sector. Rubenstein anticipates this question in the Preface and Introduction to the book. Her argument, in summary, is that much, if not most, of the current and planned activity of the *NewSpace* sector, as exemplified by Musk and Bezos, represents an off-planet repeat of capitalist projects of the past, tainted by the same colonialist attitudes that led Europeans to claim Africa, America and Australia for themselves, regardless of the views of those who already lived in those lands.

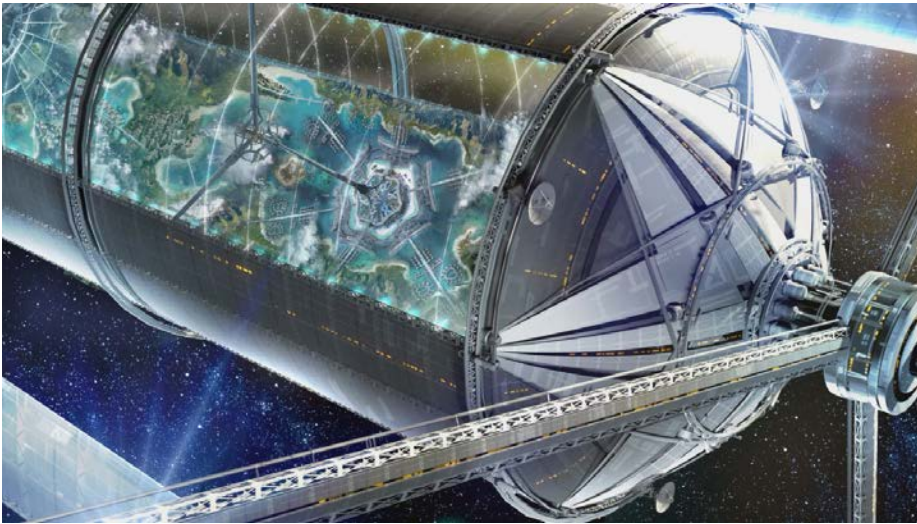


SpaceX vision of a Mars city. Note two SpaceX "Starship" vehicles on landing/launch pads on the left

Rubenstein's view is that, in an attempt to sidestep these criticisms, the vision and mission of *NewSpace* advocates - including NASA and the US Government - is stated in the same mythological and religious terms as were used for those previous projects. Space is America's 'manifest destiny', according to US Presidents from Kennedy to Trump, in just the same way that the settlement of North America was previously stated to be. And both Musk and Bezos insist that humanity has to move off Earth to avoid possible future catastrophes, which Rubenstein sees as a mythological justification as the probability of the disasters in question taking place is highly uncertain. As a result, Rubenstein sees a religious lens as precisely the one to use when critiquing what she believes many *NewSpace* advocates intend for our future in space. Professor Rubenstein doesn't only criticise others though. She also makes clear in the early pages that she plans to propose an alternate future for space exploration, based on ecological, humanist and decolonial principles. We'll look at her proposals later. The bulk of the book is structured into seven chapters. I will briefly summarise and discuss each of them in turn below.

1 Two Visions

Chapter One is titled 'Our Infinite Future in Infinite Space'. In it, Rubenstein uses Elon Musk and Jeff Bezos as her two key examples of what *NewSpace* is all about, and compares the approach of the two men. Using an analogy with science fiction on TV and in films, she sees Musk as *Star Wars* - flashy, loud, and showy - and Bezos as *Star Trek* - quieter, more thoughtful, and interested in the detail. She also contrasts their visions for the future: Musk wants to settle Mars, in order to make humanity a multi-planet species and reduce the risk of total annihilation of humankind if a planetary disaster afflicts the Earth. Bezos, on the other hand, has little interest in Mars, and is more focused on building the sorts of orbiting space habitats envisaged by Professor Gerard K O'Neill at Princeton in the 1970s, when Bezos was a student there. His rationale for getting off-planet is to move heavy industry away from Earth, both to reduce the pollution of our 'pale blue dot' and to take advantage of the potentially almost infinite supply of the materials and energy needed by an industrial society, once we're able to mine the asteroids.



The O'Neill colony as envisaged by Gerard K O'Neill and favoured by Bezos

Having established her view of what *NewSpace* is about, she suggests that this new industry is not well regulated, and indeed has been massively supported in recent years by the US Government, with NASA essentially privatising many of their more routine space launch activities, while Congress legislated in 2015 to improve the competitive position of commercial space launch operators. She finishes the chapter by noting that not only has there been economic and legislative support for *NewSpace* in the US, but also political support filtered through a theological lens, particularly from Mike Pence, Donald Trump's Vice-President between 2017 and 2021. Pence, an evangelical Christian, gave speeches asserting that it was America's 'manifest destiny' to conquer the stars in God's name, and quoting the Bible to support his point. This first chapter provides a useful introduction to some of Professor Rubenstein's key concerns. Her characterisations of Elon Musk's and Jeff Bezos's contrasting approaches to space exploration appear to be accurate. My only real concern is that she seems to believe that there is nothing more to the commercial space sector than the operations of these two men. While it is undoubtedly true that they dominate the

headlines, there are hundreds, if not thousands of other companies in this sector, not just in the USA but around the world, that are using space for very different purposes, including many - such as environmental monitoring - that she would seem likely to be supportive of. It's a pity that the book fails to acknowledge this broader picture of what the *NewSpace* sector does.

2 Creation and Conquest

In Chapter Two ('Creation and Conquest'), Professor Rubenstein reviews the influence of Christianity on the modern western worldview. Her contention is that the tenets of the Old Testament underpin much of our approach to politics, ethics and science, despite many western societies having become much more secular over recent decades. I took away two main points.

The first is that we have moved away from the worldview of many pre-Christian societies, which included animist beliefs in their religions, valuing and respecting other species and the natural world in which we live, and ascribing inherent value to them. These views have been replaced by one based on the first book of the Old Testament, Genesis, which states that

God created the entire Earth for mankind's benefit, that only humans have eternal souls, and that it is therefore right and proper for us to have dominion over everything else on the planet, whether animal, vegetable or mineral. It all exists entirely for our benefit, and has no inherent value of its own. This viewpoint underpins our subsequent relationship with the world around us, from the invention of farming to the industrial revolution and beyond, where exploitation of the planet's resources is the default position, and scientific research is not just about enabling us to *understand* nature, but supports the development of new technologies that allow us to *exploit* it more effectively.

The second point that Professor Rubenstein makes follows from the above, and from reading further into the Old Testament. At various points through the first six books, God tells his chosen people, the Israelites, that he has set aside Canaan - the 'promised land' - for them, and that he wants them to take it away from those currently living there, since they believe in different gods, not Him. Non-believers do not count, and should either be converted to the one true religion, or eliminated. This biblical story has been appropriated by others to justify colonialism, and is now being used by the US Government to justify America's right to expand into space. Given that religion is Professor Rubenstein's area of expertise, it's unsurprising that this chapter provides a clear and insightful statement of her position. As someone whose first degree was in physics, and who is broadly secular, I expected there to be little overlap between religion and our modern Western worldview. So it was a surprise to recognise the validity of the points she makes

here, particularly in relation to the way that Old Testament teachings on the primacy of humans over the rest of nature feed through to the ethical worldview that underpins much of science, technology and our approach to exploiting the world around us.

3 Promised Land - or Colonialism?

Chapter Three is titled 'The American Promised Land', and explains in more detail how the USA, from the founding fathers onwards, has seen itself as the inheritor of many of those Old Testament stories. Seemingly as an aside, she notes the activities of Dennis M Hope, a Californian who has made himself rich by setting up a business selling small plots on the Moon, Mars and elsewhere in the solar system to anyone who is silly enough to pay him \$25 for a certificate asserting that they now own a certain area. Obviously Mr Hope has no legal right to do this, and his customers don't actually 'own' the plots in question. But Rubenstein's point is that, although what Mr Hope is doing is clearly a scam, it's no more ridiculous than the fact that, in 1455, the then-Pope granted most of Africa to Portugal, and then in 1492, a later Pope gave Spain dominion over North America. In both cases this was done regardless of the views of the indigenous people. In the view of the 15th century Catholic Church, they didn't count because they weren't Christians. And this viewpoint came directly from the statements in the early books of the Old Testament, granting God's followers dominion over the entire Earth. Rubenstein notes that a direct consequence of this theological argument, explicitly recognised by the church, was that all the resources found in those lands - gold, precious stones, and

anything else of value - was also the property of the church, or the country they'd gifted it to. Unsurprisingly, this same argument was recycled in the mid-19th century by American settlers when they were debating whether to annex Texas, Oregon and California. The phrase 'manifest destiny' was coined at this time, and it became a shorthand for the American borrowing of the biblical argument: Christian Americans were claiming the land - and its plentiful resources - for God. The indigenous people, as non-Christians, had no say in the matter.

The chapter closes by noting that many *NewSpace* proponents, including the Trump administration, have adopted this same rhetoric of 'manifest destiny' when talking about America's role in space over the coming decades. And although space may not have indigenous people to worry about, it certainly has lots of resources to claim.

I found the historical detail of the Catholic church's direct involvement in colonialism

fascinating here, even if it was deeply disturbing at the same time. However, this chapter also raised one of my key concerns about this book. There is a lot of focus, here and in later chapters, on the damage caused by historic colonialism to the peoples who were subjugated. That is, of course, an extremely valid topic for discussion. However, this discussion is then transplanted wholesale to the issue of the future exploration of our solar system, without any proper acknowledgement of the massive difference between the two situations.

Rather obviously, there are no advanced, intelligent lifeforms - whether human or extra-terrestrial - on the Moon, Mars or, as far as we can tell, elsewhere in the solar system. It is possible that primitive life existed on Mars a long time ago, since it appears that liquid water once flowed on its surface. It is even possible that bacteria are still alive today in the sub-surface permafrost on Mars, just as this may also be true of the sub-surface oceans



A humorous but pessimistic view of the US space programme in October 1958 - complete with LGM labour driving Soviet tractors. The Vanguard launchers orbited just 3 satellites out of 11 launch attempts. The Juno I launchers were more successful. Credit: Carl Giles/Daily Express

"That wasn't a bad try, Comrade."

Daily Express, October 14th, 1958

of Jupiter's moon Europa and Saturn's moon Enceladus, or even in the clouds of Venus. But in all cases, we're talking microscopic bacteria. Not macroscopic intelligent beings who could be subjugated. The point is briefly alluded to, but almost immediately dismissed as a minor detail. And yet it seems to me to weaken the parallels between historical colonialism and the future exploration of the solar system very significantly indeed.

4 The Final Frontier?

In Chapter Four ('The Final Frontier'), Professor Rubenstein examines the USA's activities over the early decades of the space race, from Sputnik to Apollo. She notes the evident contradiction between the repeated demands of US politicians, in the aftermath of Sputnik-1, that America must 'win' the space race and 'control' outer space, and the many speeches from US Presidents which insisted that the US was acting 'for all mankind'.

Rubenstein then fast-forwards to Apollo 8's circumnavigation of the Moon in late 1968, and focuses on the fact that the crew chose, during their live broadcast back to Earth on Christmas Eve, to read the creation story from the first book of Genesis. She questions why they chose to read this, rather than a secular text, and concludes that it was part of the US mission to claim the Moon on behalf of Christianity - not least in opposition to a Soviet Union which was officially atheist.

The last part of this chapter notes that national defence has always been part of the rationale for the space programme, going right back to President Eisenhower's public pronouncements in 1958, shortly after Sputnik. However, the emphasis on defence has recently been brought to centre stage by President Trump's

creation in the last year of his administration, of the hilariously-titled 'Space Force'. But how does this increased focus on military activities in space square with the requirements of the 1967 UN Outer Space Treaty?

My main comment on Chapter Four is that I felt Professor Rubenstein might be at risk of the same fault here that is true of any of us with a particular specialism: that of having a hammer, and therefore seeing everything as a nail. It seems to me much more reasonable to explain how NASA and the US Government acted during the space race as a direct response to the global geopolitics of the Cold War and the reality that America was self-evidently the most powerful member of the Western Alliance - and the only one with the capability to launch humans into space - rather than to see it as some kind of imperialist plot to win space for Christianity.

"Earthrise" perhaps the most influential image from the entire Apollo programme.
Credit: NASA/Bill Anders



In a related vein, I was unconvinced by her assertion that the Apollo 8 crew read out the first lines from the Book of Genesis, in their public broadcast on Christmas Eve 1968, as part of a US plan to claim the Moon for God, in opposition to the atheists in the USSR.

The Command Module pilot on the Apollo 8 mission, Jim Lovell, subsequently co-wrote with Jeffrey Kluger the book, 'Lost Moon: the Perilous Voyage of Apollo 13' (1994) about his ill-fated, but much more famous, second journey to the Moon as the Commander of the Apollo 13 mission. Near the end of chapter 2 in that book, he recounts the circumstances of the Genesis reading, and makes it clear that the choice of reading material was the crew's, not NASA management's. And their rationale for choosing that text was simple: they were reading it 'on the eve of the holiest day in the Christian calendar'. Reading out some biblical text about the creation of the world on that date, when you're the first three humans in history ever to be able to see the whole globe of the Earth from a quarter of a million miles away, seems to me an entirely reasonable personal choice for the crew to have made themselves.

5 Who owns space?

Chapter Five is titled 'Whose Space Is It' and begins with a discussion which will, I imagine, be familiar to most readers of Principium. It concerns both the purpose and the value of space travel, with Rubenstein referencing the many critics who argue that space travel is a waste of time and a huge waste of money which 'could be better spent back on Earth'. This criticism came to the fore during the Apollo programme, perhaps most famously epitomised by Gil Scott-Heron's spoken poem 'Whitey on the Moon' [1]. It is now rearing its head again, prompted particularly by the recent wave of space tourism missions.

Rubenstein goes on to talk about the geopolitical response to the space race. The United Nations set up its Committee on the Peaceful Uses of Outer Space (COPUOS) in 1959, and this committee has subsequently produced several pieces of international law, most notably the 1967 Outer Space Treaty. This legislation initially appears to be very helpful to Rubenstein's argument, for three reasons. It insists that space 'is not subject to national appropriation', is to be used 'for the benefit of all peoples', and must only be used 'for peaceful purposes'. Unfortunately, as the author acknowledges, there are caveats within the Treaty wording on all these points, watering them down and providing loopholes, such as the one which allows the US Government to create a 'Space Force'. Following the Apollo landings on the Moon, COPUOS drafted a Moon Treaty which, amongst other things, said that the Moon is 'the common heritage of mankind', and as a result, any resources extracted from the Moon would be subject to 'equitable sharing' by all State Parties. Although this Treaty has been signed by several countries, none have their own space programmes. The main countries that *do* have a space programme all refused to ratify the Treaty, so its provisions have no real-world effect. As a consequence, it was legally permissible for Congress to pass the 2015 Commercial Space Launch Competitiveness Act, which allows any US citizen or corporation to claim any space resources they manage to extract, whether on the Moon or anywhere else. Many people contest the ethical validity of this legislation, but it does seem to be legally watertight.

[1] Gil Scott-Heron's poem is very audible in the sound track of the Neil Armstrong biopic *First Man* (2018).

This brings us to the heart of Rubenstein's argument: *NewSpace* is all about the capitalist exploitation of space resources, not about ensuring that space remains the common heritage of all humanity. But to what end? She would prefer that the money be spent down here on Earth, solving social problems. But she also doesn't see what the point is of mining space for resources, if all you do with those resources is use them to expand your mining activities. To Rubenstein, the whole argument appears circular - go to space to mine resources, so that you can go further out to mine more resources, so that ... And in the meantime, every launch creates more space junk in orbit around our planet. What's the point?

Unsurprisingly, as a keen advocate of space exploration, I don't agree with the argument that space exploration is pointless and the money should instead be spent down on Earth. The counter-arguments are many, and will be familiar to Principium readers, so I'll limit myself to the most obvious point: that the investment in space exploration is spent down on Earth, since the money goes into the wages of those working in the space industry, or perhaps into the dividends of shareholders in private space companies. But in both cases, it's undeniable that these people live 'down on Earth', and that's where they spend their money.

The middle part of this chapter is about the



'The New World Order' imposed from the air in Alexander Korda's film *Things to Come* (1936) based on H G Wells' novel, *The Shape of Things to Come* (1933).

limitations of the UN's activities through COPUOS. The criticisms are factually valid, but seem to me a little naïve. I've had a very minor level of involvement with a couple of UN Treaties over the last three decades, as part of my day job as a policy wonk on sustainability issues, and the reality is that, in practice, no UN Treaty delivers anywhere close to 100% of what's written on the page. Why? Because the UN is not a single World Government of the sort that HG Wells proposed in 'The New World Order' (1940). The UN can't force anything through, certainly not against the views of larger countries like the USA. It operates on the basis of consensus, and that means that almost everything the UN does is subject to the ultimate reality of international relations: that every country acts in its own best interests. We might wish it were otherwise, but when we're in the midst of a year-long war in Eastern Europe, caused by the illegal invasion of one sovereign country by another, it surely must be clear that the UN has a limited ability to solve any problem where the strategic interests of major countries are at stake. So to say that COPUOS hasn't been able to force the USA, Russia or China to play nicely in space is true, but also entirely unsurprising.



Uluru-Kata Tjuta National Park. parksaustralia.gov.au/uluru/discover/nature/geology/

6 Rights for Rocks?

In Chapter Six ('The Rights of Rocks'), Professor Rubenstein explores the issues of the value and rights of things that aren't humans. She notes that most people, even if not religious themselves, wouldn't dream of visiting a cathedral and then jumping all over the pews or daubing graffiti on the walls. Yet if we turn to Australia, and consider Ayers' Rock, or Uluru, as it's known to the Aborigines, who consider it a sacred site, we find at least some visitors are happy to climb all over the site and carve their initials into it, despite polite requests from the indigenous population to treat it with respect. Is the difference between these two cases due to the fact that a cathedral is comprised of rocks that have been fashioned into an imposing building by human effort, whereas Uluru is a natural rock formation? Does the value of a cathedral come from the human labour that made it? In the Western worldview, the answer is probably yes. But for other people with other belief systems, rocks, rivers, landscapes and the flora and fauna that inhabit those landscapes can have an inherent value of their own, and in some cases be seen as persons or even deities. In those worldviews, rocks can indeed have rights, and aren't simply resources to be exploited by humanity.

So where does that leave space mining?

Asteroids contain large amounts of valuable material, and mining them could be a key element of the *NewSpace* agenda for space exploration. However, the practicalities have not yet been worked out, as it's difficult to mine stuff in a low gravity environment. Similarly, there are questions about what you do with the material once you've mined it. Do you keep it in space, and if so, what for? NASA's answer to that question is 'to help us deliver our mission'. In other words, to support their plans for going back to the Moon, and then on to Mars. Focusing on the latter, Rubenstein runs through the many challenges that will face anyone who wants to live on the red planet for more than a short period, and then discusses the concept of terraforming that has been proposed as one solution. Most approaches to terraforming are challenging to implement and will take a long time, so why bother? Robert Zubrin's answer, according to Rubenstein, is that it's necessary for America to have a frontier to settle, even if it's difficult to do, because that's an inherent part of what has made the country great. Elon Musk's answer, as we've already heard, is the need for humanity to become a multiplanetary species, to reduce the risk of extinction. Rubenstein

rejects these arguments, and suggests that we should focus our time and attention on dealing with the environmental problems here on Earth instead, since our 'pale blue dot' is quite clearly the most habitable place for humans to live, now and in the foreseeable future.

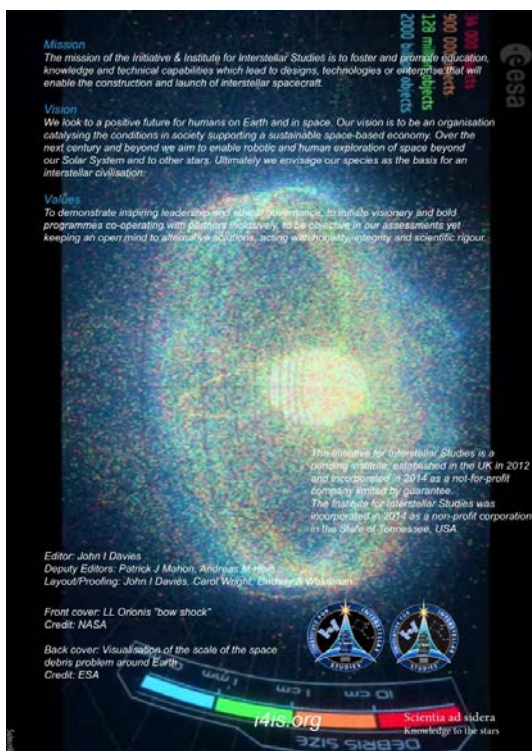
Would it be OK to terraform Mars if it turned out that life still exists there today, even if that life was just primitive bacteria? Carl Sagan's view was that if Mars still harboured life, it should not be destroyed. Elon Musk seems likely to disagree, presumably on the basis that improving the likelihood that living humans will continue to exist is more important than preserving the future evolutionary possibilities of some Martian bacteria. But this brings us back to the ethical question of whether things that aren't human - in this case, including Martian bacteria and rocks - should be considered as having any existence value, and potentially the right to continue to exist, or not?

If we take a historical perspective, we have to recognise that there was a time when the legal system of countries like the UK and USA split

humans into those (adult male property owners, generally) who had rights, and those (including women and slaves) who had few or none. The fact that this is no longer the case indicates that legal and ethical judgements can change over time. Rubenstein invites us to consider how our approach to space exploration might change in the future if we suspended our current worldview, and adopted a less anthropocentric one.

I found myself agreeing with several of the arguments made by Professor Rubenstein here. If we are to expand out into the solar system, we need to have a serious debate about the circumstances under which it is OK to set up a permanent base on a planetary or lunar body, or to consider terraforming such a body. At the moment, the Earth is the only place in the whole universe where we have clear evidence of the existence of life. We presumably do not want to destroy any living organisms elsewhere in the solar system, given how much they could teach us about the circumstances under which life can exist beyond the Earth. But at the same time, we would presumably want to have clear evidence that living organisms *are* present, for example below the surface of Mars, before using that evidence to restrict the kinds of exploration or exploitation of that planet or moon.

As a professional environmentalist, I similarly have a lot of sympathy for the points Rubenstein makes about orbiting space junk, and the general sense that some in the *NewSpace* sector - most obviously, Elon Musk - seem to be happy to pollute space in much the same way that we've polluted our own planet.



Visualisation by the European Space Agency of the scale of the space debris problem around Earth - rear cover of P34 August 2021.

However, I think there's a straightforward solution here. Sustainability issues need to be taken more seriously when space missions are planned, and that should be a requirement imposed by the regulators, just as it is by many governments for Earth-based activities with the potential to pollute. You can then get into an evidence-based discussion about which types and levels of environmental damage are acceptable and which are not, rather than resorting to the easy binary choice of 'all pollution is fine', or 'no pollution is acceptable', neither of which is a helpful guide to sensible decision-making.

However, I think there are limits to how far you can take this argument. Is anyone seriously going to argue that any small asteroid in the middle of the asteroid belt, not previously mapped by astronomers and never seen by anyone on Earth, has such inherent value that there should be a veto on mining it? It's clear from Professor Rubenstein's argument that some people would take this position, on the basis that it's not 'our' asteroid to mine, and that the asteroid has just as much right to exist as we do. However, for as long as we continue to mine huge amounts of material down here on Earth, with all the resultant environmental pollution and human rights problems that are well-documented in the mining sector, particularly in low-income countries, then I think we should probably focus our concern there, rather than on the potential future mining of an as yet unidentified asteroid.

7 A View from ET?

The final chapter is titled 'Other Spacetimes', and considers how our current approach to, and future plans for, space exploration might appear to any extra-terrestrials that visited the Earth. Professor Rubenstein doesn't think they'd be very impressed. So are there viable alternatives to our current model of space exploration? She suggests some, drawn from certain strains of science fiction. Her focus is on the work of Afrofuturist SF writers such as NK Jemisin and Octavia Butler. In their work, she sees the seeds of alternative ways to imagine the future of space exploration, which break with what she sees as a colonialist, capitalist and exploitative legacy, and replaces it with something more inclusive, peaceful and harmonious.

I read a lot of science fiction, and I certainly see it as providing interesting thought experiments when considering the future of space exploration. However, the first distinction I would make, if using written SF to back up my arguments in this debate, would be between so-called 'hard' SF, which makes an effort to be consistent with known scientific and engineering principles, so that it's at least conceivable that what happens in the story might be physically possible, and 'soft' SF, which is often more focused on social or political issues, and the use of the story as a metaphor. My impression of the stories that Rubenstein refers to in this chapter is that they fall more towards the soft SF side of the spectrum.



Musk and Bezos from BBC *Elon Musk and Jeff Bezos: The Silicon Valley space race*

www.bbc.co.uk/news/av/world-us-canada-49006786

I read a lot of soft SF, and I enjoy much of it. But I wouldn't see it as a particularly useful starting point when planning the future of the space programme. Space exploration is currently very difficult, and very expensive, not least because it has to take place within a demanding envelope of scientific and technological constraints. Once we've settled the entire solar system, soft SF stories may have much to teach us about how to live in harmony with each other in all our new and exciting environments. But as far as the next 50 years of the global space programme is concerned, I don't think soft SF is particularly relevant to the difficult challenge of designing a programme that is practically, technologically and economically viable.

8 Conclusion

Seen as a whole, 'Astrotopia' is an interesting book which contains many fascinating insights into the ways in which religion - and, in particular, the religion of the Christian Old Testament - has become bound up in the standard worldview of the Western democracies. However, I'm afraid that it failed to convince me that the *NewSpace* sector is a 'dangerous religion', as the book's sub-title asserts, or that a religious lens is the most useful one to adopt when analysing the future of space exploration. There are three main reasons why I say this.

The first is that Professor Rubenstein's main concern is ultimately not with *NewSpace*, but with the American capitalist economic model. Throughout the book she makes clear that she thinks that capitalism is wrong, particularly when it leads to the creation of highly wealthy people like Elon Musk and Jeff Bezos, who choose to spend the money they've made on activities which she doesn't like, such as SpaceX and Blue Origin. That is, of course, a view shared by many other people.

But it seems to me that the topic the book is nominally focused on – the dangers of the *NewSpace* sector – is actually just a symptom of the wider issue of the pros and cons of modern capitalism.

My second point is that she makes a persuasive argument for the way that, in the past, the Catholic church and several countries used what's written in the early part of the Old Testament to justify the colonisation of Africa and North America, with horrendous consequences for the indigenous people who were already there. However, she fails to show convincingly how that argument is relevant to the future human exploration of the rest of our solar system, where the number of indigenous, intelligent lifeforms is, to the best of our knowledge, zero. There are useful analogies that can be made between the two situations, but on the key issue, they are fundamentally different.

Finally, I am unconvinced by Professor Rubenstein's assertions of the centrality of religion to the *NewSpace* model of space exploration. It is true that American political leaders often use religious rhetoric to bolster their arguments for this or that policy choice,

particularly in space. But with the exception of Trump's Vice-President, Mike Pence – who as an evangelical Christian very much does take what the Bible says literally – my view, as a big fan of political set-piece speeches, is that these days at least, most speechwriters will add in religious imagery and rhetoric to a political speech because it sounds good and gets your point across, not because they, or the person they are writing the speech for, actually believes any of it. And much more obviously, neither Elon Musk nor Jeff Bezos, the two key targets of this book, have ever shown any overt sign of using religion as part of their decision-making process in relation to their activities in space.

'Astrotopia' is an interesting book and I learned a lot from it. However, although it contains many valid criticisms of the current model of American space exploration, it did not convince me that this model is fatally flawed. Nor did it demonstrate a radically different alternative that could deliver any *actual* space exploration in a way that was technologically feasible and economically viable.

Patrick Mahon has been Deputy Editor of Principium since issue 16 in February 2017. He was born in 1969, a few months before the first Moon landing. Watching the first Space Shuttle launch live on TV in 1981 started a lifelong fascination with space exploration.

Patrick is Head of Policy at Common Seas, a UK-based NGO focused on tackling ocean plastic pollution around the world. He has worked on environmental policy for most of the last 30 years, following a BSc in Mathematics and Physics at the University of Warwick. He also has an MSc in Environmental Decision Making from the Open University.

In his spare time, Patrick is a writer and reviewer, mainly of science fiction. He has been a member of the Board of Directors of the Initiative for Interstellar Studies since 2018, and is a Fellow of the British Interplanetary Society.