
**Episode 712: Should We Settle Mars?**

**Guest: Robert Zubrin**

**WOODS:** I don't remember how many episodes ago it was ——we got to discuss Mars only toward the end of the episode, and I had people begging me to bring you back on to finish that conversation. So I'm afraid I am going to have to ask you a few things you've been asked a million times before. I like to avoid that on the show, but it's sort of unavoidable. The first question that you probably get is "why?" Why Mars? It seems like not the most hospitable place in the world, so why Mars?

**ZUBRIN:** Well, there's three reasons to send people to Mars. One is for the science, to found out if there's life on Mars, because if there ever was it means life is abundant in the universe. Second is for the challenge. Scientists grow when they're challenged and stagnate when they are not, and a humans-to-Mars program would be a terrific challenge to our society, to the youth of every country that participates. Learn your science, and you can be an explorer of new worlds. And out of that we would get an immense amount of intellectual capital in return. Young scientists, engineers, inventors, doctors, medical researches, technological entrepreneurs — that would pay us back big time.

But finally, there is the future. Mars is the closest planet that has on it all the resources needed for life and therefore human settlement, and if we can do what we can do in our time, which is to establish that first little Plymouth Rock human settlement on Mars, then 500 years from now there will not only be new branches of human civilization on Mars, but on thousands of planets orbiting stars in this region of the galaxy. We will have transformed humanity into a spacefaring species with an open frontier and infinite prospects before it.

And there can be nothing more valuable than that, and I will have to say that, just as Americans today when we look back to Columbus' time do not consider all the court and treaties in Europe of that time as being anything like the importance of Columbus' voyage, so that people 500 years from now looking back to today won't think of all our little political rumbles and geopolitical squabbles of any importance whatsoever compared to what we did to open up the future.

**WOODS:** All right, let's say for the sake of argument, then, that human settlement of Mars is something desirable. When I look online, I see all different approaches that are recommended as to exactly how we ought to go about it, and I've seen, for

example, the proposal by the people at Mars One who say it ought to be a one-way mission, because it would be a lot easier than trying to design a mission that would also have the capability of bringing everybody back. Where do you stand on this? How do you imagine this happening?

**ZUBRIN:** Well, I believe that the first human missions to Mars will be round-trip missions, that we will do reconnaissances first, and then we will identify the best places for permanent settlement, and then people will go to Mars one-way. With respect to Mars One, the problem with Mars One is not the one-way mission plan. The one-way mission plan is in principle okay if you're prepared to follow it up with reinforcing missions. Now, you want to do the one-way mission as a settlement mission, not a suicide mission, and the problem with Mars One is they don't have the resources to do even one mission, let alone an unopened string of missions. You're certainly not going to fund that with a reality television show. So I don't think that their one-way mission is intrinsically bad, but you've got to be prepared to carry it out. It can't be a one-off. A one-way mission has got to be a settlement program.

**WOODS:** I want to talk about funding this a little bit later. Let's talk about the kinds of scientific objections or just physical limitations, physical challenges that you would face that no doubt are raised again and again when you talk about settlement of Mars. The first — I mean, I'll just say a few of them. One would be the temperature. One would be the atmosphere is unbreathable. One would be gravity is different there from what human beings are accustomed to. And one would be radiation levels. Now, why collectively does this not put the kibosh on the whole thing?

**ZUBRIN:** Well, it kind of puts the kibosh on the whole thing in the same way as a 10-year-old's argument that five inches of snow clearly makes it impossible to go to school. That is, if you're looking for reasons why you can't do what you don't want to do, it's easy to come up with them, and I have to say, there's a lot of people in the space establishment and NASA — in parts of NASA, anyway — who have been looking for a snow day with respect to Mars and seek to take every difficulty and claim that it's a showstopper. But they're not.

The radiation that an astronaut would get flying one-way to Mars is the same as Kelly, the astronaut who just spent a year at the space station, actually got at the space station, because the radiation rates at the space station, the cosmic ray radiation does rates are 50% that of interplanetary space. And frankly, if you calculate the radiation dose you would get on the whole round trip, it represents about a 1% risk of getting cancer at some point later in your life. That compares to a smoking habit, which is about a 20% risk. So actually, if we recruited the Mars crew out of smokers and sent them to Mars without their tobacco, we'd be substantially reducing their chance of getting cancer.

Ailments that have been identified — I just saw an article today about T cells being less developed in space flight. That is inaccurate. It is less developed in zero gravity, but we can rotate the spacecraft and create artificial gravity for the crew, and there

is natural gravity on Mars. You can just run down the list here, and some of these are concerns, but they're all well within our capacity to solve these issues.

**WOODS:** What would my life be like, though, on Mars? In a way it's like asking what was it like for the people who settled the Americas. They come to a wilderness, and they somehow have to create a civilization out of it. It seems overwhelming.

**ZUBRIN:** Well, okay, you're talking about life as a Martian settler as opposed to as an explorer on the first mission or two?

**WOODS:** Yeah, I guess so.

**ZUBRIN:** All right, well certainly on the explorer going there on the first several missions it will be an absolutely fascinating life of going out and exploring a new world. In terms of life on an actual Martian settlement, it would be hard in some ways but extremely rewarding in others. I was several times asked how bad it would be to the children of Martian settlers to have to live in this frontier, working and helping the parents around the greenhouse or in the shop and so forth. And I think of Laura Ingalls Wilder and *The Little House on the Prairie*, and did she have an impoverished childhood because she had to help out around the farm instead of living in Philadelphia and going to plays and the opera? I don't think so. I think it's a different life. I think it would be an extremely rewarding life to be part of a settlement that is pioneering the Martina frontier.

**WOODS:** What are we talking about in terms of money, let's say just for the initial exploration? Forget about long-term settlement. How much money is contemplated for something like this?

**ZUBRIN:** Well, this all depends how you do it. When NASA comes up with plans that are not really plans to go to Mars but plans to use the Mars mission as an excuse to justify every program they can imagine that they would like to have an excuse to fund, you can come up with hundreds of billions of dollars. When we designed my Mars Direct plan, which involved a much more streamlined approach to going to Mars where we were not trying to use the mission as an excuse for spending money, but we were spending money in order to get the mission done, but nevertheless doing it within the NASA world of kind of doing things, we came up with cost estimates for the program on the order of $30 billion. If you did this outside of the government world, I believe it could be done for under $10 billion.

**WOODS:** Okay, what would be the difference — I mean, I know you and I are both free market people, so I can guess at why there'd be such a difference, but fill in the blanks for me. Help me understand why the difference would be so great.

**ZUBRIN:** Okay, so you understand the difference between the first alternative, where you're doing things in order to spend money rather than spending money in order to do things, why that might cost more. That's like having your company run by your vendors. So that's where you get these gigantic cost estimates. Now, the difference

between the $30 billion Mars Direct plan done within the government world or a plan like that done, say, by SpaceX is that when you do a government program, they want there to be all this accounting of cost, because they want to do it as a cost plus program.

And actually, in part of this process they impose massive amounts of overhead on the companies that work for them. At Martin Marietta or Lockheed Martin, where I used to work, I mean, over three-quarters of the people at the place were not either engineers, technicians, or factory workers. They were overhead people of one form or another. So this is an enormous overhead. If you're doing things in the private world and you're just trying to get it done, you can do things a lot cheaper. And we see this in military procurement as well. You've heard all the horror stories about the $700 hammers and toilet bowl seats or whatever, and it's all because of this immense bureaucracy piling over —

**WOODS:** Right, but then what they come back with is, yeah, no doubt there are all these horrors, but when you're dealing with something on such a staggering scale, nobody else can provide the funding except the state. So likewise with Mars, where would the money come from?

**ZUBRIN:** Well, okay. You say it has to come from the government. What you should do is instead of having the government oversee the program and impose all these requirements and kind of try to co-design the system with the vendor, you should just say to someone like Elon Musk: look, Elon, this is what we want. We want a heavy-lift launch vehicle. It's got to be able to lift 100 tons to low Earth orbit, and we're willing to pay $5 billion to develop it, and it has to be able to do recurring flights at no more than $300 million each. And in fact, we're going to put that up for bids. Lockheed Martin, you can do this too. Do it any way you like, but get it done within those numbers. Numbers that are beyond those will be considered non-responsive — that is, cost numbers.

And you better believe you would get bids. Let us do it our way, don't get in our hair, and we will deliver it to you for that price. And don't complain if it costs us much less than that, so we can go laughing to the bank, because you're giving us $5 billion to develop a heavy-lift launch system. If we can develop it for 3, that's our good luck. If it costs more than 5 billion, we'll pay the difference.

As opposed to, you know, the Augustine Commission came up with their own estimate on how to develop a heavy-lift launch vehicle. This was for the Bush moon program. And they said, well, it will take at least 12 years, and we want to fund it at 3 billion a year, so that's $36 billion. Musk went in there and he said he's do it for 2 and a half billion. They said, "Get lost." So there's a difference between whether you're running a program in order to fill in people's time cards — that is, to keep them employed — or whether you're just saying, I've got this much to spend. If you can provide this for this much, I'll buy it from you, no questions asked as to how you did it. Just do it. And so if they took the Mars mission and if they cut it up into chunks in terms of the major hardware elements, the heavy-lift launch vehicles is the biggest single one, and

certainly $5 billion would do it. You know, well, the Dragon already exists as the capsule. The space habitat element, $1 billion. A Mars lander and a sent vehicle, you know, $3 or $4 billion. And then a couple of miscellaneous items: space suits, surface reactors, so forth. A billion or two. And you've got yourself a $12 billion humans-to-Mars program. This is how you could do it. And you could do it easily within the next two terms of the next administration.

**WOODS:** All right, let's look farther out into the future then. Let's imagine that it becomes possible to have not just exploratory missions, but large-scale settlement taking place. How many people do you envision going there, let's say in a first wave?

**ZUBRIN:** Well, the first human mission to Mars might be four, five, six people, and we do a number of reconnaissance missions with crews of that size. Then the first settlement crew is that many people, and then the next mission — and they set up greenhouses and other installations. So you start producing a harvest in advance of the arrival of larger numbers of people. So then maybe the next mission opportunity you send out eight people, and then they build more infrastructure to prepare for the colonists to follow them. And then 20 and 40 and so forth. That's how you do it. When the Mormons went west, they would stop, they would plant a field, and they would move on, and the next wagon train that came by would harvest what had been planted before them. And that's sort of the idea.

**WOODS:** Okay, so then at some point I guess the idea would be that well into the future the settlement becomes self-sustaining. Just like any civilization, eventually it doesn't require any further subsidy. It becomes self-sustaining. But between now and getting there, it seems like it would be a much larger expenditure than just the relatively small amounts you're talking about for exploration.

**ZUBRIN:** Well, yes, although the development is a substantial cost here, and that would be done upfront as part of the exploration program. I believe if you put in, you know, order of $10 billion or even 20 to develop all the hardware for the exploration program, you do that over 10 years, that's 2 billion a year, that's 12% of NASA's budget. I believe as long as we have a space program, it would be reasonable to have 12% of it spent on actually exploring space. And then if you then continued that with a couple of billion a year like that, you could fly a mission or two every two years. You can go to Mars every two years; the launch window is every other year. And you could keep doing that, and basically spending 10% of NASA's budget or so we could build a human Mars settlement.

**WOODS:** All right, let me put it this way. There are a lot of things that people on the political Left want to do with money that I think is not helpful, not useful, and it's not anything I would spend my money on. And I think if we had the money back, we could make our lives a lot more comfortable. But couldn't somebody just as easily say to you that if there's a real benefit to settling Mars, somebody will figure it out?
Some entrepreneur will make it work. If government has to be involved, this is a reflection of the fact that there is not adequate demand for this, and we're simply

diverting a huge amount of resources that could be used to make our lives more comfortable here on Earth.

**ZUBRIN:** Well, as the political Left would be glad to point out to you, there are certain important social functions that the government does that wouldn't have been done by private money. The building of the interstate highway system, for example; the building of the whole national aviation system; the electrification of much of the country; the public school system. You know, so —

**WOODS:** I'm not sure I think that's a good — I can argue with you about that. I'm not sure that's had such great results. I mean, are you impressed by — you see a lot of great budding scientists coming out of that system? Original thinkers coming out of there?

**ZUBRIN:** Well, I think there's many flaws with it, but if you take two steps back and look at the project as a whole, it's been a phenomenal success. America is 4% of the world's population; we produce 50% of the world's inventions, and the vast majority of those inventors are products of the public school system.

**WOODS:** Yeah, but I —

**ZUBRIN:** We won World War II with graduates of the public school system.

**WOODS:** Sure, but these are people who would have been smart no matter what, you know? These are people who would have been smart no matter what.

**ZUBRIN:** Well, I'm just telling you that — I mean, look, I've got a lot of complaints about the public school system. Don't get me wrong, Tom, okay? But universal public education has been an enormous success, and every developed country has it for that reason, and you can't be a developed country without it.

**WOODS:** But they say the same thing about national healthcare. I mean, at some point you have to hit back.

**ZUBRIN:** Okay, well, perhaps, but there is a problem there, which is that, well, national healthcare or even frankly health insurance puts no — it is antithetical to cost controls on the system.

**WOODS:** Right.

**ZUBRIN:** But we're getting off topic here.

**WOODS:** I guess what I want to know is why —

**ZUBRIN:** Let's talk about this —

**WOODS:** How do you defend this against —

**ZUBRIN:** Let me just say this. Columbus, Lewis and Clark, these first missions, they were both funded by governments, and it was afterwards that you found out what the benefits were that private money went that way. Now, first of all, you brought up the issue of the political Left. Now, the political Left is not opposed to governments taking initiatives, but they do have certain different ideas than humans-to-Mars associated with how they would like the government to go. Now, I have to say that if you do a humans-to-Mars program that costs $400 billion because it's maximizing its costs, they have a point. That is abuse of taxpayer money, and there are plenty of other things, both the projects of the Left and also national defense and many other things that are projects of the Right, that could use that money. So it is the obligation of the space program to get its goals done in a cost effective way and not be grossly abusive of the treasury.

But if we do reduce this now to this $10, $20, $30 billion, the cost of a small to medium-sized military procurement, and we look at what we're getting out of it, we're getting a new world. We're getting a chance to put our stamp on the future. I mean, look, you and I speak English — okay, your name is Anglo Saxon; perhaps your ancestors came from England. My name is Russian; mine did not. But we're speaking English here, and all these other people are speaking English, and people all over the world are speaking English, because the English went forth from England and put their stamp on the world. If the English had stayed home in England, then it would be a dialect like Serbian right now that would be spoken in a corner of some island somewhere, and no one else would know about it, and no one else would know about Shakespeare or the King James Bible or any of that. And the Magna Carta, more importantly. So there's that.

And then as far as — I mean, look, okay, let me talk to the Left right now. Okay, you're concerned about education. Well, do you think we're improving American education by testing the kids to death with standardized tests? I don't think so, and I know plenty of public school teachers who think this is pure nonsense too: Common Core, massive standardized tests. The rest is just bull****, okay?

But what did Sputnik and Apollo do for American education? It inspired millions of young people to go into science and engineering. We doubled our number of science graduates during the 1960s because of Apollo. And in this day and age when science and engineering is open not just to boys but to girls, the effect on education would be much greater than it was in the '60s. I mean, look, I was actually a schoolteacher myself for seven years before I became an engineer, and I taught in good schools and bad schools and in-between schools, and my takeaway from that experience was anybody can teach kids who want to learn, and nobody can teach kids who don't want to learn. So how do you get kids that want to learn? You've got to create the environment. And if we say this is a nation that is pioneering the future out in space, you're going to get millions of kids that want to learn.

**WOODS:** And that may well be, and I love to see kids who want to learn. That's fantastic. I just want to know how you — it seems like I could just come at you and say this sounds like a project where scientists are saying, look, we think this would be

really cool, so therefore we're entitled to your money, and we think our project is more important than what you would spend your money on. And that just sounds like the Left to me.

**ZUBRIN:** Well, you know, everybody in every area tends to prefer their own business. But the fact is I think this is strongly justifiable. I think it is justifiable in terms of mobilizing our technical capabilities in terms of massively increasing our scientific and engineering intellectual capital in this country, which, by the way, is — that and our other intellectual capital — that's where our wealth comes from. I mean, our wealth comes from the creation of new inventions, new ideas that lead to new industries, as well as new medical cures. You want to improve public health? Well, find the cures and so forth. So the creation of intellectual capital that this would result in in itself would massively repay the cost of the program.

Just ask — I mean, look, who do you think built Silicon Valley? Who were these 40-year-old technical entrepreneurs of the 1990s? They were the children of Apollo. They were the 10 and 12-year-old little boy mad scientists making rocket fuel in the basement in the 1960s. That's who they were. Now, I happen to be a little different than most of those guys. I was one of them in that I actually ended up doing space, but the rest of them went out and did computers, the rest of them went out and did biotechnology. They did all kinds of stuff that has benefitted us in any number of ways.

So you want to advance science and technology, which is the core to advancing our living standards and improving our national defense and our health? Well, create intellectual capital. And there is no more powerful way to do it than this.

**WOODS:** One other thing: is it possible — I mean, can you imagine getting to a point where this kind of project could be handled with private money?

**ZUBRIN:** Well, sure, because I believe that once people become established on Mars — okay, well, first of all, what will happen is first we're going to become self-sufficient in bulk goods. Things like food — we don't want to import food from Earth. We can grow food on Mars. We can make steel on Mars. Mars is red because it's very rich in iron oxide. So we can make steel; we can make glass; we can make ceramics, bricks, plastics. There's carbon on Mars, unlike the moon, and so forth. So we can make all these bulk goods, and we can make a variety of other things.

Now, as the level of craft and industry advances on Mars, you're going to be reduced to only having to import rather specialty items — you know, computer chips and so forth — which require a larger division of labor, but which don't weigh very much, so the cost to transport is way down. On the other hand, what you're going to have on Mars is a group of technologically adept people in a frontier environment where they're forced to innovate and free to innovate, and they're going to make inventions for themselves that are going to have enormous value back on Earth.

For example, since their agriculture's going to be greenhouse agriculture, they're going to have a tremendous incentive to maximize the production of every square-yard of land in those greenhouses. So they're going to go in for genetic engineering. They're not going to let any kooks hold them back saying, oh, we're afraid of killer tomatoes escaping out of your greenhouse. They're going to do this, and these inventions, which will benefit them, can be licensed on Earth and will produce income on Earth that they can use to pay for their imports, but furthermore will greatly advance life on Earth.

You know, 19th century America, we had a tremendous labor shortage here. That's one reason why it was so attractive to immigrants, because pay rates were higher. But at the same time, that put a tremendous incentive here on manufacturers, for example, to come up with inventions, labor-saving machinery. So we became the nation of invention. We picked up from the British, and we started driving the industrial revolution like nobody's business. And that created our great standard of living, but it's what has uplifted the world. You know, first Europe and Japan, and now even China and India are coming out of poverty because of those inventions made by the frontier society that had to make them.

**WOODS:** Well, I mean, I do understand there is this crossover argument that you can make from military technology and a lot of government investment. My initial response to it is just that I think a lot of these are things that would have been invented anyway, and they would have been invented at the pace society wants them to be invented. We might have been able to invent the iPod in 1900, but at what cost? I think the American railway system probably was premature. It wound up going bankrupt; there were all kinds of problems. It would have been better to let the market do it, and there were market innovators in the railway system. So I would rather just do whatever possible to keep the state out of this, keep the politics out of it, and encourage private entrepreneurs. And maybe Mars could really be a new world, and we wouldn't have to live with Nancy Pelosi anymore.

**ZUBRIN:** Well, I just think that sometimes you've got to plant the seeds. Sometimes the government's got to take the first step. Frankly, if we didn't have government involved in rocketry, we would probably be living under Soviet rule right now, so one cannot be an anarchist in a world in which there are governments. And look, there's a difference between government taking a constructive, creative role, and government taking a destructive, restrictive role. I mean, the problem with government is not that sometimes it does some great projects like development of atomic energy or the development of rocketry or, frankly, jet airplanes. The problem is government when it's used as an element of hyper-regulation, making it impossible to set up new industries or even build buildings. So government is a mixed bag, and what we need to do is get government to play a positive role and not play a negative role.

**WOODS:** Tell us about the major book that you wrote on the subject, *The Case for Mars*. What are people going to get in that book? I'm linking to it at TomWoods.com/712, today's page.

**ZUBRIN:** Okay, well, I've written a book called *The Case for Mars*, which people can get on Amazon as either a paperback book or a Kindle book. And what this book does is explain how we can get to Mars in our time and how we can get to Mars basically within 10 years of program start using technology that either we have now or which is within reach — in other words, how we can explore Mars, why we should, how we can start building bases on Mars, how we can settle Mars, how we can even terraform Mars, transform Mars from the dead desert world it is today ultimately into a fully living world [inaudible]. Really put the total disproof to the environmentalists, who wish to represent humanity as a curse upon nature, showing that we are the vanguard of the biosphere; we are the vanguard of nature. We are able to bring dead worlds to life. That is who we are. And we are the vanguard of life on Earth, so that we don't just bring life to Mars; we bring Mars to life. And then where the future goes from there. And what this means, by the way, for our society, in terms of countering the tendency toward stagnation that we have if you don't have an open frontier.

You know, historians have written — notably, Frederick Jackson Turner wrote a tremendously important essay called "The Significance of the Frontier to American Society." And it was the challenge of the frontier and the idea that there always is a new place and there's always a place where the rules haven't been written yet and where everything to be found hasn't been found yet, that this has been key to the creation of not only American society, but the American character. And that the threat that he identified — this was written in 1892, when the frontier was first declared closed; that is, when the western California, Oregon, Washington, moving east and the plains settlers moving west had finally met, he said that this would lead to a more bureaucratized society, a more stagnant society, a less optimistic society. And I think in many ways he was right. And how an open frontier will be the thing that ensures that the American spirit of creation and innovation and can-do and optimism and lack of acceptance of things as they are, that this will not die. And in short, if we are going to continue to be Americans, we have to continue to be pioneers.

**WOODS:** Well, the book is *The Case for Mars*. I'm linking to it at TomWoods.com/712. I know you've written extensively on this subject, but you've also said that really is the go-to book that you've done on it, so I'll refer people there. And thanks so much for your time.

**ZUBRIN:** Thank you, Tom.