Space on the Page Podcast
Mars Past: The Canal Builders

>> David Baron: I recently made a rare find on eBay. It's an audio recording from 1902 meant to be played on an original Edison phonograph. Now, I don't have one of those at home, but I tracked one down, loaded this century-old plastic cylinder on the machine, lowered the needle, and it was like being transported back in time.

[Music]

I wanted to hear this music because it's a relic from a very strange era. During this period of history -- right around 1900 -- the Earth went crazy for Mars. Martians at this time, they didn't just exist in science fiction -- many people thought they might be real, that the red planet really was home to an advanced civilization. Well, Martians showed up everywhere -- in vaudeville skits and Broadway plays, in novels and comics strips, in the news pages of newspapers, and in song. So this musical composition? It was titled A Signal from Mars.

[Music]

>> William Sheehan: The turn of the 20th century was a propitious moment for this type of thinking to take off, really, because there were enough observations of Mars at that point that were suggestive that something really unique and remarkable was taking place on that planet.

>> This is William Sheehan. He's coauthor, with Jim Bell, of a new book called Discovering Mars: A History of Observation and Exploration of the Red Planet. Bill Sheehan will be my guest today, for the inaugural episode of this new podcast.

[Music]

I'm David Baron, and this is Space on the Page from the Kluge Center at the Library of Congress. This podcast explores outer space in literature, in science, and in the human imagination. I'm an author, and I spent part of 2021 as the Baruch S. Blumberg NASA Library of Congress Chair in Astrobiology, Exploration, and Scientific Innovation. In that role, I conducted research for a book I'm writing about Mars and how that small planet came to play such an outsized role in our collective psyche. I'll be your host for the first three episodes of this podcast, and you'll hear me talk to other authors of recent Mars books about our society's magical visions of that planet in the past, present, and future. Well, today we focus on the past, specifically the time of the Mars craze at the turn of the twentieth century, and we feature my conversation with author Bill Sheehan. Now, where my book will examine Mars in popular culture, Bill's book looks at the science. So I asked him to explain what it was about astronomy in the late 1800s that led people to believe in an intelligent civilization on Mars. Bill says it all started when telescopes grew powerful enough to show the surface of Mars in considerable detail.

>> William Sheehan: The best views of Mars suggested that it was an Earth-like planet with continents and seas. There were dark areas which seemed to be tinted, either bluish or

greenish in color and the other areas were ochre or, in some people's interpretation, tinted brick red. We could see details including the icy polar caps, which were dazzling white, suggested there was water on Mars. We could watch those melt. And that created a real compelling illusion that Mars, from a distance, looked a lot like the Earth would it seemed from a similar distance. But the big turning point really was 1877. There was a really good opposition that year.

>> David Baron: And just to say opposition, meaning that's the period when Mars is opposite the sun in our sky. And that's when Mars comes closest to our planet, and we can see it best.

>> William Sheehan: Yeah, precisely. And because Mars has quite an elliptical orbit, eccentric ellipse, some oppositions are quite a bit better than others. And this one in 1877 was close to the best that Mars could be seen. It was only 35 million miles or 56 million kilometers away. But anyway --

>> David Baron: Close by Mars standards.

>> William Sheehan: Close by Mars standards. And an astronomer named Giovanni Schiaparelli, who was at the Brera Observatory in Milan, had a really sharp eye. But also was colorblind and only had one good eye. And he mapped Mars showing all sorts of linear features, which he called canali.

>> David Baron: Right. So, and these linear features, so they evolved over time, but they got -- on his maps, they seem to get straighter and straighter. And they were like these arrow-straight lines crisscrossing the planet.

>> William Sheehan: Yeah. His first map showed them as somewhat more streaky and curved. But over time, as you suggest, they became more and more regular, geometric, and you know, resembled sort of a cobwebbing of the planet, which was really unnatural looking. I mean, it didn't look like the kind of features that one would expect to arise from natural processes like geology or meteorology. And also, although more is made of this than probably is justified, the term canali, which in Italian can mean a number of things, including channels, which was probably Schiaparelli's preferred translation, was translated into canals. And you know, this was during the period when the Suez Canal had just been built. You know, there were -- there was a lot of canal building going on in the United States. So canals were a big deal. Like railroads, you know, they were sort of on the cutting edge of 19th-century technology at the time. And so the, you know, the whole canal-building craze on the Earth ended up perhaps inevitably being transferred onto the surface of Mars as an indication that they were about the same things that we were.

>> David Baron: Right, so here, you've got this Italian astronomer, Schiaparelli, who creates this map. He calls these features -- He could have called them anything. He could have called them lines. He calls them canals. And so there is a period where there seems to be some joking about, oh, there are these canals on Mars.

>> William Sheehan: Yup.

>> David Baron: But my sense is that for a while, it really wasn't taken all that seriously that they were canals.

>> William Sheehan: Right. I mean, Schiaparelli himself, who introduced the nomenclature that's still the basis of that used today, said that all of these terms that he introduced on his map, including canali were just terms of convenience. You know, they weren't meant to be taken seriously. And in fact, some of the features that became part of the canal classification, he actually called rivers.

>> David Baron: So just to complete the story of Schiaparelli and what came next, so Giovanni Schiaparelli in Milan, he's come up, in 1877, he begins his work mapping Mars. Seventeen years later, another important character comes into the story. And who was that?

>> William Sheehan: Well, there were a few, but the one you're talking about is Percival Lowell, I think.

>> David Baron: Right.

>> William Sheehan: He was an interesting person from the standpoint that he came from this very prominent family in Boston, a very intellectual family. So, you know --

>> David Baron: These were the Lowells of Massachusetts.

>> William Sheehan: Yup, the Lowells --

>> David Baron: Very wealthy, very prominent.

>> William Sheehan: And very influential in the Boston culture not only from a standpoint of business interests, which they, of course, had in very developed form but also his grandfather was on the board that chose the Presidents of Harvard, had a lot of influence over Harvard. His brother became the President of Harvard. And you know, the cousins and so forth were involved in all sorts of intellectual thing. One of his cousins became a leading meteorologist. His sister became Amy Lowell, the poet. A couple of other sisters married prominent financiers. So they had tentacles in every aspect of Boston life. And one of the things about Lowell, he went to Harvard after --

>> David Baron: So this is Percival Lowell again.

>> William Sheehan: Right. He was seen as just unbelievably brilliant and promising.

>> David Baron: So he was not an -- He certainly was not a professional astronomer. He may have -- He studied the sciences when he was an undergraduate at Harvard. But he spent his 20s and most of his 30s doing things very far from astronomy before he suddenly decided to focus on Mars.

>> William Sheehan: No, he wasn't a professional astronomer at all.

>> David Baron: Right. So Lowell is inspired by Giovanni Schiaparelli to use some of his own wealth, open his own observatory with a very, eventually, his own telescope, very fine

telescope, and to focus on Mars. And so when he looks at Mars, what does he find, and how does he explain it?

>> William Sheehan: Well, that's interesting. He found essentially what Schiaparelli had found. And --

>> David Baron: So he sees the lines too.

>> William Sheehan: Well, eventually he does, but it's clear that he's looking real hard. And so what's interesting is that Lowell, despite having relatively few observations of his own to draw upon, started publishing at -- First of all, he formulated this theory of intelligent life on Mars, which is one of the magical things about it is it's so straight forward that a 10-year-old can understand them without any difficulty. It's not like general relativity or something.

>> David Baron: So tell me what it is. So he came up with what a coherent theory to explain Schiaparelli's canals, right, these straight lines.

>> William Sheehan: Basically, he recognized that Mars was a dry planet, that it didn't have a thick atmosphere. And so what he thought was going on was that the polar caps would melt, the Martians would capture this in their canals. But, you know, later he explained that these were pipes and, you know, that what we were actually seeing was vegetation, strips of vegetation along these pipes. And then these dark areas would bloom with all of this vegetable growth sustaining the Martian civilization.

>> David Baron: So, according to his theory, these lines, these canals, these were not shipping canals, these were irrigation canals. And what we're seeing, the vegetation growing along the edges, essentially were crops, right? So these were the --

>> William Sheehan: Yup.

>> David Baron: -- Martians growing their crops because they needed the irrigation water on their dry planet. They got the water from the polar ice caps.

>> William Sheehan: Yeah, precisely.

>> David Baron: And he was a very eloquent and prolific writer and speaker.

>> William Sheehan: Well, at that -- that in and of itself, I think is indicative of the reasons for his success because 1894, he started his observing run. But during the summer and into the following year, he essentially did a Blitzkrieg of publications. He wrote five articles that were published in popular astronomy. He wrote a series of five that appeared in the Atlantic Monthly and a few odd articles in other publications. And then, as his coup de gras, he published this book Mars, which largely rehashes some of the same, even some of the same phrasing of these articles. But essentially, he just covered the waterfront of publications and got his ideas out there before anyone could react. And he made such a strong impression with this huge amount of writing that, as you say, was of literary high quality regardless of whether or not you followed the scientific arguments. And he banged the same points over and over and over again so that, you know, there'd be no missing it.

>> David Baron: Well now, also though I think you have to look at where the public was at because it seems the public, a good chunk of the public, not only was fascinated by what Lowell was saying, but I think wanted to believe what he was saying. And this is actually a lot of what I'm exploring right now in a book that I'm working on about this very same period and what has brought me to the Library of Congress. And that is, what was happening on Earth that made people want to believe in the Martian civilization? And one thing that seems central, as far as I'm concerned, is Charles Darwin had published just a few decades earlier on his -- on natural selection on evolution and had really undermined traditional notions of a God who was directly involved in human affairs and created humans as the pinnacle of all evolution. And now, first of all, we have the idea that humans may be a waystation to a higher form of being. And that's what the Martians supposedly were. They were even more evolved than humans. At the same time, where people felt a little unmoored in maybe not having a God looking over our shoulders, the Martians became, in essence, guardian angels. They were looking down on Earth. They might even be our saviors. They were so much more moral than we are, so much more knowledgeable, so much more technologically savvy. So I think the public, really, it wasn't just Lowell. It was what the public wanted to believe.

>> William Sheehan: I think you're right. And I would say you've, of course, explored that dimension of this whole interesting subject further than I have. But what's interesting is that it quickly became two sides of a coin because, you know, the benevolent kind of pointy-ears Martians that looked wise, you know, and had resolved all of these things in a pacifistic way, quickly gave way to the more intriguing possibility that was grasped by H.G. Wells. And that is, that they were also a potential threat, something ominous.

>> David Baron: Right.

>> William Sheehan: And of course, that would play out spectacularly in 1938 in the War of the Worlds broadcast by Orson Welles in the Mercury Theater.

>> David Baron: Right.

>> William Sheehan: So I think we've also --- that there's also this more prurient side to the Martians, which is that they fascinated us because of their potential menace as substitute devils and monsters. So I think they met a lot of psychological needs for people. And the mere fact that still, I think, continues to tantalize us, that we aren't alone in the universe, you know, that there are inhabitants out there. And Lowell was able to make that case rhetorically, literarily, and at least semi-scientifically in a way that made it eminently plausible. And so I think that even though scientists quibbled about it, and they ended up, of course, as pessimists often are, more right than not. But the public was taken along. They saw this train leaving the station, and they wanted on it.

>> David Baron: Well, and you're the perfect person to talk to about this, not only because of your -- the books you've written, but your professional background, you worked for decades as a psychiatrist. Your training -- You have training in medicine. And so from the standpoint of human, not only human emotion but human perception, what -- And also, I should mention you wrote many years ago a real classic on this called Planets and

Perception, which also deals with the canal craze. But what was it about the human brain and the human eye that helps explain what Lowell was seeing on Mars?

>> William Sheehan: Well, I think in a nutshell -- And that book that you mentioned was inspired by my own attempt to try to understand better what was behind the canal illusion if you want to call it that, which by that point, had been shown to be the case. And what was apparent to me was as Lowell and others themselves often bore witness to, in their writings, people tended to think, I think, and maybe still do, that planets and the telescope are somehow kindred to still life compositions. You know, you just sit there, and you carefully draw. And looking at these maps, which are extremely detailed, and everything seems to be very well laid out and carefully positioned on the grid like Schiaparelli's maps, you tend to think that's what they were doing. But the reality is they were basically seeing in glimpses of little kind of corner of the eye details, you know, like a line between this point and that point. And then, as soon as they turned to try to get a better look, it was gone. And so they cumulatively built up an image of these kinds of furtive details. And so what you get into is actually the whole realm of perceptual psychology and physiology. In other words, what we see depends upon what our theory is about what's out there. And you know, and as -- so it gets into a real complex sort of realm of understanding how we perceive the world. And somebody has actually said, we hallucinate a reality, and that is the same, you know, apparatus in the brain that creates our sensory world that, you know, that we live in is also that which is active that creates our dream world. And it also creates for people that I've worked with for many years, you know, the kind of delusions and hallucinations.

>> David Baron: So were the canals, were these fine lines purely optical illusions?

>> William Sheehan: Well, I think Lowell's were largely optical illusions. If you look at Mars with a really good telescope, or if you look at its surface on like a globe of Mars by a spacecraft with that level of detail, what you see is a very subtly textured surface that has little splotches and variations in tone. And that essentially was the substratum of what Lowell then, with his seeing this by glimpses and with a strong desire to believe there were these linear markings on Mars, was then able to see as illusions.

>> David Baron: But it wasn't just Lowell who saw the canals on Mars. Of course, Schiaparelli saw the lines earlier. Not everyone saw them, but there were other astronomers who looked through a telescope. They saw the lines too. So we're not just talking about one person who's set on a theory. I mean, was there something going on with the human eye as well?

>> William Sheehan: Yeah, the eye and brain. Now the human eye is fast. But it isn't instantaneous. I mean, you know, when you look at a program on a TV set nowadays, it's about eight frames per second. And that limit in terms of how fast the eye is is what causes us to perceive out of discontinuous picture frames kind of a seamless continuous movement. So essentially, these guys were using very slow, by our standards of today, a very slow imaging system, that of the eye and the brain.

>> David Baron: Their eyes, you mean.

>> William Sheehan: Yup. And they were also, because the information was only clearly visualized in very short periods of a very perfect scene, they were only really getting a small amount of information forwarded to the brain. And then the brain had to sort of try to fill in the gaps and make sense of it.

>> David Baron: Right, and when you use the word seeing, you mean in an astronomical sense. And that is, that --

>> William Sheehan: [inaudible], yup.

>> David Baron: -- the roiling atmosphere makes it so that you can't see so well all the time. And so under poor seeing conditions, the view of another planet may flit in and out. And it's only when it flits in that suddenly Schiaparelli or Lowell, or someone else might say, oh, there's a canal, that they saw for a tiny fraction of a second.

>> William Sheehan: Yeah. And then it becomes a little bit of a matter of autosuggestion really because as a person, you know, keeps studying this fluctuating disk, they're going to have repetitive visions of the same or other canals. And so they're gradually going to build up what's essentially a fictitious picture that's consistent, as we were talking about, but is also completely fictitious. And it really takes a larger telescope and better conditions to break through that. The sad thing is that Lowell didn't ever want to get out of his little hermetically sealed conceptual system. And so he kept doggedly repeating himself. He said in one of the last things he wrote in 1916 when he prematurely died of a massive hemorrhagic stroke. But you know, everything that we've seen since 1894 in 22 years has confirmed what we believed then, you know, and --

>> David Baron: Right, so he was intellectually stubborn.

>> William Sheehan: Yeah.

>> David Baron: Well, so Lowell, really, for much of the first decade of the 20th century, he was taken quite seriously by a lot of people, certainly in the public, if not all astronomers clearly. He died in 1916, as you said. At that time, his hypothetical Martian civilization had pretty well fallen into disfavor among, I would say, most astronomers. And the idea that, you know, that the lines were canals was not taken too seriously. But still, through much of the 20th century, there remained the idea that Mars probably had life. And they're maybe not intelligent life. And there remained the idea that Mars was covered with strange lines of some sort. And then things changed again in the mid 1960s. And that's when we finally get our first close-up view of Mars. NASA sends the Mariner 4 Space Probe. It goes whizzing by Mars and takes pictures on its way past. And what did it find?

>> William Sheehan: Well, it found a barren crater-strewn surface. That looked for all the world like the moon, like the highlands of the moon. It looked old. It looked battered.

>> David Baron: And there was not only no sign of cities and great fields of crops, but not even straight lines, not even things that are not canals, but could look like what Lowell drew.

>> William Sheehan: Yeah, it was utterly devastating. I actually remember Mariner 4's, you know, fly-by of Mars. I was already interested in astronomy at the time. I was 10. And I remember the eve of the fly-by talking to my brother. And we were just talking about what was likely to be found, you know, by the fly-by. And I was hopeful. I may not -- Lowell's writings had captivated me. And I was --

>> David Baron: Even all those years later?

>> William Sheehan: All those years later, yeah.

>> David Baron: I mean, Lowell had been dead for half a century.

>> William Sheehan: You know, and admittedly the books that were accessible to me in the local branch library were a few years out of date. But those ideas were still there. And, you know, you're a kid. You're 10 years old. But anyway, so the Mariner 4 flew by Mars. And I remember being as devastated as if, you know, I had been a kid told there was an -- compellingly told that there was no Santa Claus. I mean, it was a real kind of a grieving out process for me as a kid. And --

>> David Baron: My.

>> William Sheehan: Yeah. So, you know, I think the starkness of those images, and they were gray kind of, you know, fuzzy pictures that were really bleak looking. You know, they looked, Mars in those images looked kind of like, you know, maybe an area of a World War I battlefield, you know, in one of those, you know, early 1910s images taken when there was no color film. And it was just utterly stark and forbidding, you know. And so it was -- that's the way that it impacted just a kid. But on the other hand, I don't think that professional scientists at the time reacted much differently to those images. That was the era which really, it sort of finally shut the last sliver of hope for Lowell's canals and so on. And it started us on this new era of Mars exploration, which is what we're still into.

>> David Baron: And your book goes very much into that next phase of exploration. But that I'm going to hold for my next interview. So to wrap up though, looking back on the whole Mars craze at the turn of the last century, which had such a profound cultural effect, what do you see as the lessons? Do you see that -- is it a cautionary tale of people being misled by emotion and improper perception? Or is there, is this maybe a strangely uplifting tale?

>> William Sheehan: I think it's both. You knew I was going to say that.

[Laughter]

But it certainly is a cautionary tale that shows how, you know, how susceptible to illusion and error we are as a species and how easily, especially when our emotions get involved, how easily we can deceive ourselves. But on the other hand, I think that it is uplifting as well in the same way that the cathedrals of the Middle Ages are uplifting. I mean, ultimately, they show an aspiration of the human spirit to something greater than itself. And I think with regard to the canals of Mars, they show the human spirit at its best. They show our inquisitiveness, our wanting to make contact with something out there that is

greater than ourselves, and to understand our place in the scheme of things wherever that might lead. I mean, I love the whole thing.

>> David Baron: Well, Bill Sheehan, it's been a real pleasure. I mean, you have written so many great books about Mars and the other planets. I tell you this, one day, when there are libraries on Mars, there will be a shelf of recommended reading. And your books will be prominently displayed there. So I want to thank you again for your time today.

>> William Sheehan: Well, David, it's been, as always, a pleasure to talk to you. And best wishes for your book, which is eagerly awaited. And I can only imagine the fun you're having with exploring all of those pathways and byways of the history of culture.

>> David Baron: William Sheehan is the co-author, with Jim Bell, of the book Discovering Mars: A History of Observation and Exploration of the Red Planet. In the next episode, we'll move the conversation forward from the Mars craze of the past to the Mars excitement today. Once again, both scientists and the public see Mars as a possibly living planet, although, of course, one inhabited by a very different sort of life than that imagined by Percival Lowell. My guest next time will be Planetary Scientist Sarah Stewart Johnson. Her book is called The Sirens of Mars. This is Space on the Page, a podcast from the Kluge Center at the Library of Congress. Our original music was composed and performed by Andrew Breiner. I'm David Baron. See you next time.

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