Voyages to Mars 2

Crossing Lunar Orbit

Matt Shindell:

Hello, and welcome to Voyages to Mars from the Smithsonian's National Air and Space Museum. It's our monthly literary mix tape of classic sci-fi readings set to music by DJ Kid Koala. I am Matt Shindell. If you're new to this corner of AirSpace, we're releasing these special installments monthly to accompany NASA's Perseverance rover as it travels to Mars. Track one of our mix tape was all about the launch. Track two gives us a glimpse of some of the cosmic scenery we're going to see along the way.

Leaving earth on your way to Mars, the first pit stop you might make is the moon's orbit. If you time it right, this gives you the chance to see the moon as you head off on your journey into deep space. Today, we'll be listening to selections from the 1911 novel, To Mars Via the Moon. Author Mark Wicks had his three space travelers spend some time examining the moon's near side up close as they pass by. In the selections that follow, Wicks's narrator, the professor, gives his companions a tour of the features of the moon as he understands them. Now today, most planetary scientists believe the surface of the moon was shaped by the impacts of asteroids. At the time Wicks wrote this novel, much of the shape of the moon was considered to be the product of volcanic activity. Most agreed that there was no water present on the surface of the moon, but the professor believes water was involved in eroding and reshaping many of these volcanic features.

He and others imagined that the moon's surface was the product of pretty much the same forces they saw on earth, but on a smaller world with less gravity, and they assumed it must have all happened in the moon's early history. This is not the understanding of the moon that we have today; rather, it's the moon, as it was discussed and debated at the turn of the last century with some of the gaps in scientific knowledge filled instead with Wicks's imagination. Remember, no one had yet seen the moon up close. Writing shortly after the Wright brothers' first flight, Wicks imagined an airship that could carry his protagonists on their journey to Mars. In secret, in the suburbs of London, the professor and his two companions, a young Englishman obsessed with aeronautical engineering, assisted by an old Scotsman who spent his career as a mechanic and electrician in the Royal Navy, set out to build a metal craft that can fly in space. They named their ship, the [inaudible 00:02:36] in honor of Aries, the Greek God associated with Mars.

Now I'm going to turn it over to my Airspace cohost, Emily Martin herself, a planetary scientist, to take us on a tour of Wicks's moon.

Emily Martin:

To Mars Via the Moon by Mark Wicks. Selections from chapter four: Close to the Moon.

I give some information about it. And chapter five: We View the Lunar Scenery in the Northern Hemisphere. The size of the moon's disk was very rapidly expanding as we approached nearer and nearer to it. In the course of a little over half an hour, we were within 10 miles of its surface, which now seemed to fill the whole space below us. And it's rotundity was most impressive.

The shadows of the mountains and other elevated portions near the Terminator were jet black, owing to the absence of an atmosphere and seen contrasted with the brilliant lighting of the parts exposed to the full glare of the sun appeared almost like deep holes in the lunar surface. John now remarked, "Professor, you are aware that I have only a rather vague general knowledge of astronomy, although I take an interest in the subject, and that I know still less about the dimensions and physical

character of the moon and planets. So perhaps you will be good enough to give us a little detailed information respecting this beautiful orb."

"Well friends," I replied, "It is not my wish to lecture you upon the subject, so I will merely just run over a few of the bare facts. To begin with, the moon is very much smaller than the earth. Its diameter being only 2,160 miles, while the earth's diameter is 7,918 miles. Being a smaller globe, its mass is much more loosely compacted than that of the earth. So although it would take nearly 50 Globes the same as the moon to make one globe as large as the earth, it would require nearly 80 such globes to make one as heavy as the earth."

The surface of the moon shows evidence of very violent volcanic action having occurred in every part of it. The moon was at one time a part of the same mass as the earth, which became separated from it before the earth had quite cooled down and solidified into its present form. It was therefore originally as hot as the rest of the mass which formed the earth. But being formed into a smaller globe of much less gravity, only one sixth of that of the earth, volcanic action of the same intensity is that on the earth would have a much more far reaching effect. A force, which on the earth would project volcanic lava and scoria a distance of three miles, would on the moon projected a distance of 18 miles. This accounts for the very high mountains we see on the moon, some of which are comparatively, for the size of the globe, much higher than those on earth. It also accounts for the vast size of the lunar craters, ring plains, and ring mountains.

There are numerous instances where one mountain ring has overlapped or cut into another, thus indicating that it was a later formation. And in many cases, the mountains are terraced, as it is termed, either owing to a series of landslips or to the rise and fall of a sea of lava, which cooled as it sank down, thus forming terraces.

Small craters abound all over the surface of the moon and on the floors of the rings. Cracks in the lunar surface are also numerous.

I will not say any more just now, but as we pass above the lunar surface, I will point out a few of the natural features that may be of interest to you. We now set the machines going very slowly and move toward the northern part of the moon, where I pointed out the position of the lunar north pole and explain that, owing to the very slight inclination of the lunar axis, there can be very little variation of seasons in any one particular part of the moon.

I further explained that as the moon revolves on its axis in the same time that it takes to make one revolution round the earth, those on the earth always see the same side of the moon, except when occasionally, owing to inequalities in the lunar motions, they are afforded a peep just round portions at the edges at different periods. The remainder of the other side of the moon has never yet been seen from the earth by human eyes and in all probability never will be seen for millions of years to come. I went on to explain that owing to the absence of an atmosphere, the nights must be so intensely cold as to be almost beyond our conception, probably approaching nearly the absolute zero of outer space.

You will gather from this, that although the moon appears so beautiful from a distance, it must be anything but a desirable place of residence, even from a climactic point of view. For we should practically be fried at mid-day while at midnight, or even in the daytime, when out of the direct rays of the sun, we should soon be frozen stiff. As I said this, John chimed in, "Professor, all things considered, I think I could smoke my pipe more comfortably upon the earth than upon the moon. I really don't like such extremes of temperature."

"I am of the same mind," I replied. And it is because I prefer a more equable temperature that I've carefully kept our blinds drawn over those windows of our vessel, upon which the sun is shining. "I'm simply burning," John said, "To know something about that very striking formation, with the steel

gray colored flooring, which is situated not very far down from the north pole and a little to the east of the central meridian."

"That," I said, "Is a large walled plain called Plato. And being on a receding curve of the moon, it is seen from the earth foreshortened so that it appears to be elliptical in shape."

You will notice that there are several breaks in the walls and a large one on the southwest, whilst on the inner slope of the mountains, you can see where a great landslide has occurred. "It is rather singular, John, that in your first selection, you have chosen a formation, which is one of the lunar mysteries."

"Ah, professor," said John smiling, "I always was lucky. What is this dreadful mystery?" He asked with an assumed expression of awe. "Oh, it's not a ghost story, John, nor anything to make your flesh creep," I said rather grimly. Usually the floor of a wild plain becomes brighter as the sun rises higher and higher in the sky. But Plato actually becomes darker under a high sun. Some have suggested that the hot sun causes the growth of some kind of vegetation all over the plain. The ripening of which makes the floor darker in tint.

As regards to this suggestion, it is the fact that upon Mars, the old sea beds are the places where vegetation is the most luxuriant at the present time. So, if Plato were at one time and enclosed sea, it might not be impossible that vegetation in some low form might grow and be nourished by the crude, gaseous remains of a former atmosphere. A greenish tint is occasionally been noticed by some observers.

I drew their attention to some small isolated mountains on the area to the south of Plato pointing out Pico, an isolated mountain over 8,000 feet in height, and another with three peaks, not very far from it. To the northeast of these, some distance away, are the tenor reef and straight ranges, also isolated groups. "You will remember," I remarked, "That I said there were several formations which seem to meet, owe their present appearance to the action of water. Now look well at all this district before us, does it not seem to bear out my contention?"

Those numerous small mountains in isolated groups were not, I think, originally isolated, but connected with the adjoining ranges. If we assume that Plato was once an enclosed sea or lake, which bursts through the mountain walls, possibly owing to their being weakened or broken by volcanic action, there would have been a tremendous outrush of water, which must've carried away a good deal of the softer material of these hills and mountains.

Whilst in after years, the continual wash of the waters combined with aerial denudation would gradually have worn away all but the hardest parts of these formations. Most probably, the whole of the surrounding area was also at some time a sea, though volcanic action has since altered its surface confirmation, and in places it bears evidence of having been covered with lava.

McAllister here interjected, "Professor, would you kindly tell us something about that fine range of mountains over yonder just to the right hand?" "Oh yes," I replied. "I was just about to mention that mountain range, which is called the Alps, after those in Switzerland. You will notice a very large number of peaks in this and the other neighboring ranges. In fact, several thousands have been marked in our large maps, cutting diagonally in a northwesterly direction, completely through the Alps, you will notice a long and deep valley. This is known as the Great Alpine Valley and is over 80 miles long." At the Eastern end, it is some 11,000 feet deep. Whilst at its northwestern extremity, it is very shallow and emerges onto what is known as the Sea of Cold, which covers an area of about a 100,000 square miles.

This valley seems to afford another example of formation by the action of water. "Amongst the 3,000 peaks comprised in the Apennine range just below the Alps, are several mountains of considerable altitude," I remarked, pointing out Mount Huygens, Mount Hadley, and Mount Wolff. This range curves

round towards the east and finishes with a fine ring plain called [inaudible 00:13:06] some 37 miles in diameter with a floor depressed 8,000 feet below the lunar surface.

It encloses a central mountain, and on the East wall there is one peak which rises 16,000 feet above the floor. Eastward and northward of these ranges is the Sea of Showers, on which there are several fine ring mountains and wild plains, notably [inaudible 00:13:32], two very perfect ring mountains, some 9,000 feet high.

One of the most striking, on account of its size and situation is that large one, which is called Archimedes. You will see a little below and westward of Archimedes, the commencement of a system of large cracks or crevices in the lunar surface, which are known as [inaudible 00:13:56]. Many such systems are found in various parts of the moon. Some of the cracks are comparatively shallow, but according to Professor Langley, others are known to be at least eight miles deep and may be infinitely deeper. The length of the cracks vary from a few miles to over 300 miles and from a few hundred yards to some miles in width. They are attributed partly to volcanic action, but mainly to the contraction of the crest of the lunar globe, as it became cold. Being so much smaller, the moon would cool much more rapidly than Earth, and the disruptive effects would necessarily be greater.

Objects of interest being so numerous on the lunar surface, we could only give a comprehensive glance at many of them. And as we had so many places to inspect, I now gave McAllister the order to steer eastward.

He accordingly moved his switches in the [inaudible 00:14:51] quickly passed over the Sea of Tranquility. We now turned and looked back at the earth and as the moon was so near to it at that time, the Earth's disk appeared very nearly two degrees in diameter or nearly four times the usual apparent diameter of the full moon as seen from the earth. The crescent of light on its right-hand side was rather wider than when we last looked at it. But so many clouds hung over it that we could not see what countries were comprised in the lighted portion of its surface. Having passed away from the moon, I now gave McAllister the necessary directions in order to keep the [inaudible 00:15:30] on a course, which would enable us to head off the planet Mars at, as near as I could reckon, the point it would reach in 50 days time. The course having been set, McAllister was free to join us again, as the machinery required very little attention.

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Voyages to Mars is presented by Airspace from the Smithsonian's National Air and Space Museum. It is produced by Katie Moyer, Matt Shindell, Jennifer Weingart, and Andrew Fletcher, mixed by Tarek Fouda, music by DJ Kid Koala. This series is made possible by the Secretary of the Smithsonian and the Smithsonian-Orlando Regional Council.