Voyagers

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There comes a season in one's life when we consider every spot as the possible site of a home, according to Thoreau. And the more we learn about our universe, the more homelike and inviting it seems. We earthlings are not merely voyagers or visitors in the vastness of space. We're homesteaders, here for keeps. And the cosmos is the kind of place where creatures like ourselves can not only survive but flourish. For as Robinson Jeffers says, there is a great humaneness at the heart of things.

It's a nice neighborhood, this solar system, the kind of place you might want to settle down. Mars is right next door. Look east an hour after dark this week and you'll see it ascending, outshining the gas giant Jupiter, getting brighter as it rises earlier in the evening sky each night for the next month, until it sails past Earth in a fly by when the two planets are in opposition, meaning they're close, only 38 million miles apart. If you're sending a rocket to Mars, that's the time. And that's why three countries launched Mars probes this past summer that are now about a third of the way to their destination. Call it the window of Opportunity.

Seventeen years ago is when the last opposition occurred and when a spacecraft called Opportunity landed. That little rover far outlived its 90 day mission, sending thousands of images back home for nearly eight Martian years until just two summers ago, when contact was finally lost in a sandstorm. As the blowing powder covered its solar panels, Opportunity transmitted its last poignant message: "My battery's running low, it's getting dark." And yes that was a discovery, that even the thin Martian atmosphere can stir up dust devils like the ones here in our own Southwest. Mars is even drier than New Mexico, but Opportunity and its companion Spirit found that it was much wetter and warmer millions of years back. Even now it's a living planet, with not just sand dunes but extinct volcanoes and hydrothermal vents and perhaps flowing water as well as briny aquifers deep underground. And the Mars 2020 mission that's scheduled to land

next winter will touch down in the Jezero Crater, an ancient lake where a craft called Perseverance will scoop up soil samples destined for eventual return to Earth, as well as stripping the carbon dioxide that passes for Martian air of its oxygen, producing pure O2, the stuff we humans breathe and that also can power rocket engines for the ride back home.

In case you blinked and missed it, the future is here. Think about the change that occurs over one lifetime. When I was a little kid, I remember lying outdoors with my family after dark, stretched out on a blanket, staring upward to look for a winking light called Sputnik. From my parent's excitement (or alarm), I knew this was something big, even if I couldn't understand why spotting it was so darned important. And in my own lifetime, I might well witness a human colony on Mars, at least if Elon Musk has anything to do with it.

But the biggest change of this last century, I think, is in our understanding of who we are.. For we are all descendants of the Great Radiance, that beginningless beginning of things which Edwin Hubble deduced a century ago when he discovered the red shift, meaning light from distant galaxies and quasars had longer wavelengths, traveling away from us in all directions, indicating that the universe was expanding. And hence, working backward, the cosmos was at some original point much more compact, in fact, smaller than a single proton, which some 13 billions years ago fluoresced into all the time and space we see today. Out of that original fireball hydrogen was born, with the other essential ingredients of life cooking in the bellies of tremendous fusion reactors which over the millenia brewed up heavier elements like nitrogen, oxygen, carbon, the building blocks of organic chemistry, until finally iron was formed and the nuclear reaction abruptly stopped. The star suddenly collapsed into a supernova, scattering all those elements across the heavens, with the iron finding its way to the center of a molecule called hemoglobin, while an almost identical molecule called chlorophyll had magnesium at its heart. And those molecular bonds were just right: the valences of the atoms in that happy medium where some stability could be achieved and metabolism could also occur at livable temperatures.

These chemistries are not unique to Earth. One thing that hasn't changed is that the laws of nature and of physics are everywhere the same. And what happens here will probably happen on Europa or anywhere conditions are right. And the conditions are excellent in so many places. When I was in high school, I learned about a famous experiment conducted by two researchers at the University of Chicago, Stanley Miller and Harold Urey. They flashed an electric spark through a flask containing ammonia, methane and hydrogen--thought to mimic Earth's primitive atmosphere-- and amino acids were formed. Amino acids are what make proteins, the stuff of the genetic code. So the Chicago experiment was hailed as confirmation of an hypothesis that life originated on Earth when lightning hit some primeval shallow sea and the antedeluvian soup became vital and alive. But now we know that amino acids are abundant in outer space. They're everywhere, in gas clouds and comets. The Murchison meteorite which landed in Australia fifty years ago has been determined to be over half again as old as our own Mother Earth and contains most common aminos. So life on Earth didn't need to wait around, hoping for lightning to strike at just the right place at just the right time. The conditions were ripe from almost the start. The oldest fossils have been traced back over three and a half billion years. So there wasn't a lot of time for procrastinating or pining for the phone to ring to get a date. Almost as soon as Earth's molten crust had solidified and cooled, life started to conjugate and hook up. And it's been that way ever since.

Will we find evidence of life on Mars? Yes. I will bet a dollar. Because I subscribe to a school of religious thought called process theology, one of the very few branches of divinity that comes close to making actual testable predictions about how the world behaves and why. Process theologians hold that the universe is more like a living organism than like a mechanical contraption. More like a communion of subjects than a collection of objects. And when you look at the big picture, the macro-level, what you find (to paraphrase physicist Briane Swimme) is that if you take a giant cloud of hydrogen gas and simply leave it alone for thirteen billion years, let it gestate, it starts writing cantatas and playing rock 'n roll.. So believing that the universe itself is alive at

some level, I do predict that we will find life on Mars. I'll bet a dollar, but only a dollar. Because the thing about life is that, unlike a machine, it is fundamentally unpredictable.

Theories about what we'll find up there have ebbed and flowed more often than the planet's famous polar caps. Percival Lowell--of that famous Unitarian Boston family where the Lowells talked only to Cabots, and the Cabots talked only to God--was a serious astronomer whose mathematical wizardry predicted the existence of Pluto decades before it was actually located (by another Unitarian, as it happened). Percival was a man like his name sounded, entitled, civilized and aristocratic, like some character out of Downton Abbey. His great wealth enabled him to build a private observatory in Flagstaff, where his telescope revealed an intricate network of canals and other signs of advanced civilization on Mars. Or so he thought. Have you ever tried looking through a telescope? There's distortion. It's often really hard to tell what you're seeing! Some think that Lowell with his gi-normous mirrors was really just gazing at the reflection of his own eyeball. But his ideas caught on. About that same time, a group of French scientists offered a prize of 100,000 francs to the first person to communicate with spacemen--with the hitch that contacting Martians wouldn't count, since everyone knew the planet was inhabited anyway.

The first really good look at the surface was a Mariner 4 flyby in 1965, almost dashing hopes that anything could survive on that barren and blasted terrain. Martiner 9 rekindled optimism a few years later with what appeared to be remnants of dried rivers and lake beds. There have been dozens of missions since, and perhaps we'll have an answer soon.

But whether or not we discover life on Mars, whether or not we ever receive the radio signals that will inform us of sentient beings on other worlds, or get a phone call from E.T., I will remain convinced that we are not alone. The odds are overwhelming that we have company here. Our galaxy alone is so big that if we tried to produce an atlas of it, giving each star one page of the book, we would need a library larger than Harvard's to hold all the volumes. Thousands of planets have been identified outside our own solar

system, and surely this is only a minuscule fraction of the total. This year NASA is launching the new Nancy Grace Roman Space Telescope (named for yet another Unitarian) which will look for orphan planets not attached to any solar system and cosmologists think there may be trillions. With so many worlds, it seems inevitable that some will produce life, including beings with minds as quirky and inquisitive as our own. But the sheer number of planets, the magnitude and scale of space, also inevitably raises the question: Who are we, such fragile and ephemeral creatures, set down amid these immensities?

The answer is we're star stuff, deeply and forever related to a beautiful and ever changing cosmos. And though it wasn't necessarily made for us, we were made for it and made from it.

Asked if he ever got lonesome on his little hut by Walden Pond, Thoreau answered, "Lonely? Why should I be lonely? I live in the Milky Way." We all live here in the Milky Way, of course. But what is even more remarkable is that the Milky Way--in all its big boggling brilliance--also lives in us.