



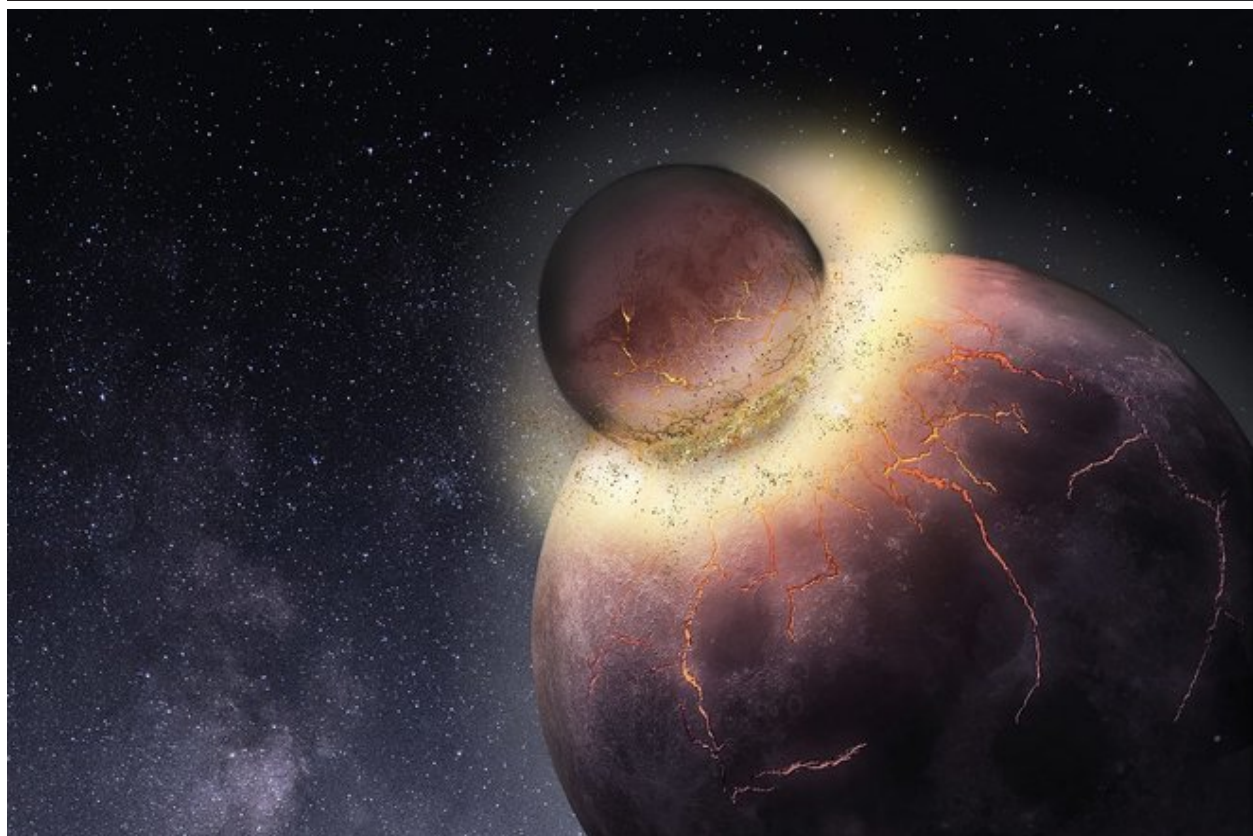
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Earth Swallowed Another Planet and (maybe) that's Why Life Exists!

By Yasemin Saplakoglu, Live Science Staff Writer , January 24, 2019

<https://www.space.com/43103-planetary-collision-life-earth.html>



A new theory holds that Earth might have received the elements needed for life to form from a massive collision with a “Mars-sized” planet.

<https://www.space.com/43103-planetary-collision-life-earth.html>

Credit: Image courtesy of Rice University

The ancient collision that formed the Moon may also have brought with it all the ingredients needed for life, a new study finds.

Over 4.4 billion years ago, a Mars-size body smashed into a primitive Earth, launching our Moon into permanent orbit around our planet.

But a new study finds that this event could have had a much larger impact than previously thought. The collision could also have imbued our planet with the carbon, nitrogen and sulfur needed for life to form, scientists reported today (Jan. 23, 2019) in the journal *Science Advances*.

Back then, Earth was a little like Mars is today. It had a core and it had a mantle, but its noncore portion was very poor in volatile elements such as $\sqrt{\text{nitrogen}}$, $\sqrt{\text{carbon}}$ and $\sqrt{\text{sulfur}}$.

Elements in the noncore parts of our planet, called the "bulk silicate Earth," can intermingle with each other, but they never interact with the elements of the core. Though some volatiles existed in the core, they couldn't make their way to the planet's outer layers. And then a collision happened.

One theory holds that special kinds of meteorites, called carbonaceous chondrites, slammed into Earth and gave the bulk silicate Earth these volatile elements. **This idea rests on the fact that the ratios of different versions — or isotopes — of nitrogen, carbon and hydrogen seem to match those found on these meteorites.** So, proponents of the theory argue, *the meteorites must be the source of these elements.*

But there's just one problem: the ratio of carbon to nitrogen is off.

While the meteorites have about 20 parts carbon to one part nitrogen, Earth's noncore material has about 40 parts carbon to each part nitrogen, according to study author Damanveer Grewal, a fourth-year Ph.D. student in the Department of Earth, Environmental and Planetary Sciences at Rice University in Houston, Texas.

An ancient collision

So, the study authors' group decided to test another theory: What if another planet brought the goodies? "Earth could have collided with many different kinds of planets," Grewal told Live Science. Could one of those planets have given the bulk silicate Earth the correct proportion of elements? **If this collision happened, the two planetary cores would have merged and the two mantles would have merged.** So, they set out to create a possible planet that could have collided with our own.

In the lab, in a special kind of furnace, Grewal and his team created the high-temperature, high-pressure conditions under which a planet's core might form. In capsules of graphite (a form of carbon), they combined metallic powder (which represents the core and includes elements such as iron bound to nitrogen) with different proportions of silicate powder (a mixture of silicon and oxygen, meant to mimic the hypothetical planet's mantle).

By varying the temperature, the pressure and the proportions of sulfur in their experiments, the team created scenarios of how these elements could have divided between the core and the rest of the hypothetical planet.

They found that **carbon is much less willing to bond with iron in the presence of high concentrations of nitrogen and sulfur, whereas nitrogen bonds with iron even when a lot of sulfur is present.** So for **nitrogen** to be excluded from the core, and be present in other parts of the planet, it **should have contained very high concentrations of sulfur**, Grewal said.

They then fed these possibilities into a simulation, along with information about how different volatile elements behave, and the present-day amounts of carbon, nitrogen and sulfur in Earth's outer layers. After running over 1 billion simulations, they found that the scenario that made the most sense — the one that had the most probable timing and could lead to a correct ratio of carbon to nitrogen — was one that posited a collision and merger of Earth with a **Mars-size planet that contained about 25% to 30% sulfur in its core.**

This theory "is very probable," said Célia Dalou, an experimental petrologist at the Centre de Recherches Pétrographiques et Géochimiques in France, who was not a part of the study. "This work is a very successful result of years of research of various different teams."

<https://www.space.com/43103-planetary-collision-life-earth.html>

“Earth Swallowed Another Planet and (maybe) that's why Life Exists”

Editor’s comment: this theory seems to settle a lot of questions about how our Earth was formed and the Moon too. Certainly a very interesting thesis! Kudos to the authors!

**Hmmm? If Earth is the Mother,
Then this intruder is the Father,
Sex on a Cosmic Scale! (for real!)**

**We have come up with a better, faster, revolutionary way
to make Mars another Human World.**

The usual plan is for a spaceship to take settlers to Mars, *then come back to Earth-Moon space and pick up another group of settlers etc. etc.* Meanwhile, the early contingent builds housing for themselves and for the contingent to follow.

The “heart & soul” of our plan to build Settlements on Mars will work differently:

Our “alternative” is to **“design” the parts of each ship (even their fuel tanks) that takes a contingent of future Martians to Mars, so that the various parts of the landed ship itself, rearranged and reconnected, become a “neighborhood” of a Mars settlement:**

[√ settler cabins > settler homes, √ connecting passages > neighborhood passageway, √ any and all “container factories” > neighborhood industrial areas, ship pilots compartment > engineer compartments on trains, or on dirigibles, or as drivers section of overland coaches a la Greyhound etc. - *meaning, of course, that no such ships will make a return to Earth.*

Details of a “neighborhood complex” to follow.

This **“ship to neighborhood” conversion** will lead to a faster, better buildup of human settlements on Mars. It sure beats the thoughtless plan of just unloading passengers and tools then leaving them to create settlement neighborhoods out of the ingredients in Mars soils at various locations. In our plan, newly arrived settlements will bring with them their new Martian settlement neighborhood.

Location, Location, Location!

Where on Mars we choose to settle first, is at present unsure, and will remain so, until we can create “**an improved resources map of Mars,**” especially one which maps where we will find **the top two early industrial “musts”**

√ (1) **basalt** (out of which we can make so many useful things such as habitat homes, home furnishings, clothing and other fabrics, and, of course,

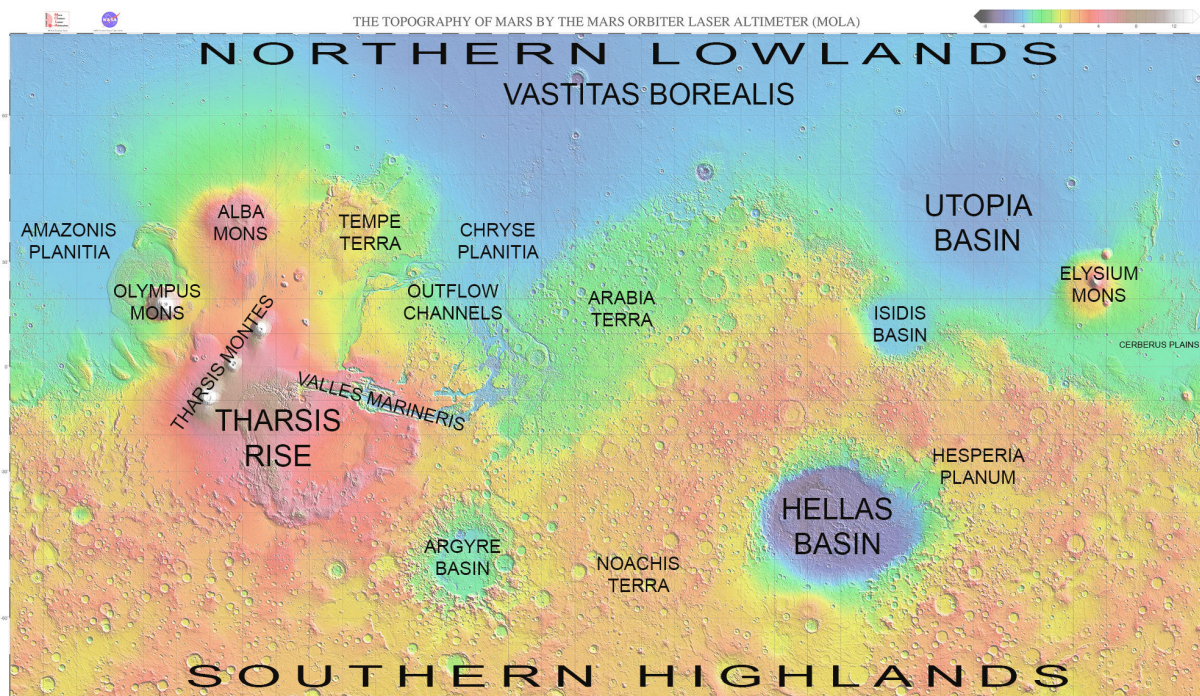
√ (2) **large sub-surface conveniently nearby water reservoirs.**

We have flown several probes over Mars, but none of them with instruments designed to map basalt, and/or to map subsurface water reservoirs. Our probes to date have been designed to answer more “scientific” questions. Nonetheless, their findings, will be helpful.

In lack of such a key resources map, our expectation is that we should concentrate on finding the nearest likely subsurface “water basins” near the flanks of Mars great shield volcanoes, particularly Amazonis Planitia near Olympus Mons and, our pick, Utopia Planitia near Elysium Mons, both “Planitia,” are deeper areas of the great northern ocean-like basin. If I had to pick, it would be the latter, as Utopia Planitia is deeper, and more likely to hold a residual water sea below its visible dusty surface.*

[On November 22, 2016, NASA reported finding a large amount of underground ice in the Utopia Planitia (Basin) region of Mars. The volume of water detected has been estimated to be equivalent to the volume of water in Lake Superior.

Once we are ready to send the first settlers to Mars, but have not found a “wetter basin,” the logical settlement site, with access to basalt might be at the **NW base of Elysium Mons.**



That these great shield volcanoes are basaltic is certain. That the deep “basins” near them hold sub-surface reservoirs of water, is a possibility.

To date, most Mars landers and orbiters have been tasked with mapping altitudes alone.

Our best bet, to be sure we are able to set up successful settlements, is to probe for subsurface water reservoirs in these relatively deeper basins.

*NASA scientists (and those of other countries) must move to the top of the Mars probe list, **probes with instruments that can confirm and quantify water reservoirs in these deeper areas of Mars surface.** Until such missions have flown, and created maps of basalt rich and water-rich areas, until we have such a “**Key Resource Maps**” we can’t plan sending “settlers” to Mars, with any real assurance that they will survive.*

A Southern Hemisphere Option

*In the Southern Hemisphere of Mars, **Hellas Basin (planitia)** is by far the lowest area on Mars, and it is here that Mars atmosphere will be thickest, and it is here that a subterranean sea of water might exist - and more, **Hespera Planum to the NE does appear to be basaltic.***

*One positive thing we know about Hellas Basin is that here, Mars’ atmosphere is thicker than anywhere else on Mars. *It will be in this Hellas Basin that we (not just unmanned devices) first learn to “fly” on Mars.**

*Note that both sites (**Elysium Mons/Utopia basin & Hellas Planitia/Hespera Planum** are close together longitude wise. But “visitors” will also want to tour Valle ss Marineris, a 3,000 mile long canyon that makes our “Grand Canyon” look like a “ditch!”*

Mapping resources by air or from space by orbiting instruments:

The closer to the surface we “fly,” the more likely we are to find clear answers to these questions. The point is that we cannot thoroughly plan settlements on Mars until we know where all the necessary resources for settlements are located.

It is not enough to satisfy “scientific curiosity.” What settlers need to know and what scientists want to know, may not always neatly coincide. In short, our job of learning what Mars is really like, needs more in depth exploration. ##

Cf. https://en.wikipedia.org/wiki/Lakes_on_Mars

<https://hypertextbook.com/facts/2003/AllisonChin.shtml> (signs of past water flow in NE part of **Hellas basin, the deepest area on Mars, where the atmosphere is thickest**) (editor: but keep in mind that *Hellas is in Mars Southern Hemisphere where winters are longer, summers shorter, than north of the equator.* That “minus” in mind, and not putting all our eggs in one basket, *it is most likely that we will build settlements in a number of places on Mars,* and Hellas with its thicker atmosphere, is sure to be on the short list.)

*With the future of humankind on Mars in mind, **it is best that we settle in more than one place.** So we must not just look for the best site, but rather for **the best sites, plural.** And if there is **friendly rivalry, that might encourage reaching the goal of settler self-reliance, sooner.***

Meanwhile, Encouraging News

An innovative Mars “helicopter” to fly on Mars, a useful new Mars exploration tool.

www.nasa.gov/press-release/mars-helicopter-to-fly-on-nasa-s-next-red-planet-rover-mission

NASA's Mars Helicopter, a small, autonomous rotorcraft, will travel with the agency's Mars 2020 rover, currently scheduled to launch in July 2020, to demonstrate the viability and potential of heavier-than-air vehicles on Mars.

(see image and animation, at address above.)

The first human place to place “flight” on Mars is likely to be within the deep Hellas basin, where the air pressure is higher than anywhere else on Mars.

Some of you will remember that NASA intended to fly “something” on Mars to mark the 100th anniversary of the Wright Brothers first airplane flight in 2003. It never happened.

This new craft is small, but it is a start. Hooray!

https://en.wikipedia.org/wiki/Mars_aircraft & <https://youtu.be/oOMQOqKRWjU>

Gifts made by (or brought by) settler pioneers *on route to Mars to fill the time.??*

- ✓ Knitting and/or crocheting blankets, rugs, placemats, sweaters etc/
- ✓ Glass works, metal work, jewelry, many colored decorative and useful items,
- ✓ Basalt sculptures & carvings
- ✓ Basalt fiber clothing, bedding, drapes and curtains, and much more
- ✓ Bamboo fiber products: softer fabrics, and more
- ✓ Photos of Marslike areas on Earth

LESSONS EN ROUTE

- ✓ Mars geography and geology and current ideas of its history etc. ,
- ✓ Designing and assembly of “Living Walls” & how to maintain them
- ✓ How to make furniture and furnishings out of Martian basalt, etc.
- ✓ Touring any “Container Factories” brought along as a start for industry on Mars

Before the first Settlers Arrive - Orbital Mappers

- ✓ to map in great detail, elevation contours down to the meter/yard
(Needed for “routing” roadways and railways and canals)
(And finding suitable settlement sites)
(Not to rule out the lowest slopes of volcanoes, with low slopes for water system drainage & lakes & falls/rapids)

Mapping nature of terrain:

- ✓ park locations
- ✓ basaltic, non-basaltic areas
- ✓ sites where highways and/or railways will need bridges or tunnels
- ✓ Terrain chemistry: basaltic, non-basaltic - iron, copper, aluminum - water reservoirs etc.

Chemistry of Hellas Planitia and of the Great Northern Basin,

looking for old “shorelines” and the clues to former “seas,” even a northern ocean
(to keep in mind: oceans do not make basins, they find and fill them)

Looking for sub-surface water, first below the deepest depressions, on up.

Special areas - lower slopes of the great volcanoes may be ideal for cities:

Assets: basalt, lava tubes, possible water reservoirs, ideal areas for global parks

- ✓ Map which way winds are strongest or weakest? Constant or intermittent.

PENSA (The ancient Roman “Latin” for **homework**):

- ✓ Determine wind flows near interesting sites
- ✓ **Terrain projects: “cuts” and “fill ins”** needed for roads and railroads
- ✓ If settlements are built on the lowest slopes of volcanoes, put an “eyebrow” channel above the settlement to catch any boulders rolling down the slopes above
- ✓ **Locate “cuts” and “ridges”** where needed for railways & highways
- ✓ determine **which side of a volcano is safest for settlement**
(may depend on surrounding terrain and location of smoothest route “off” the volcano)

- √ High resolution photos to of volcanos to determine advantages of morning or evening side.
- √ **Places where best connections to roads to and from elsewhere converge, i.e. possible settlement sites.**
- √ Advantages of **putting settlement on a ridge “shoulder” near a collapsed lava tube?**
- √ Urban sites on sizable higher ridges for drainage?
- √ Southern edge of **Olympus Mons** (warmest, E-W winds?)
- √ Western edge of **Pavonis Mons** on Mars’ equator, as a possible launch/landing **track?**

Time-filling exercises for Settlers en Route to Mars

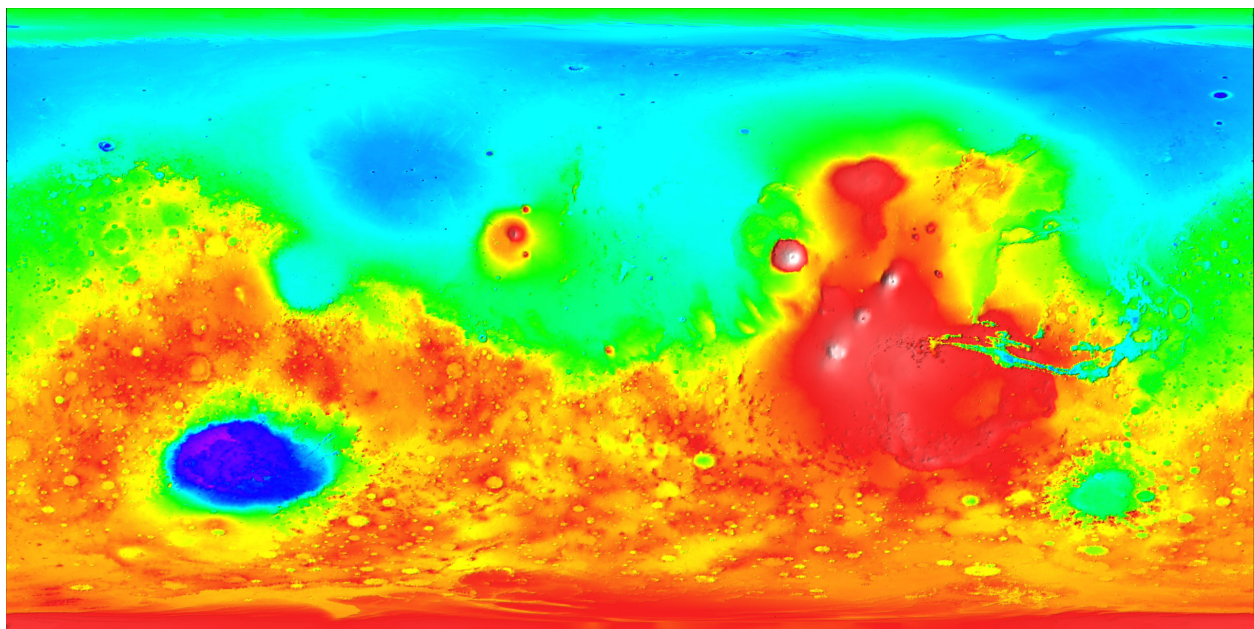
√ SE edge of Pavonis Mons is nearest to the Eastern source of Mars’ three thousand miles long **Valles Marineris** valley system, with denser atmosphere along the floor, **thousands of miles of scenic overlooks on ridges above, on Northside and Southside**, as road destinations, and possible tourist hotels and hiking trails.

NOTE: plotting roads and hiking trails all along the 3,000 mile long Valles Marineris would be a neat group activity during the months long flight from Earth to Mars. A long table model of the valley, say 30 ft or 10 meters long would yield much better results in plotting roads, trails and overlooks than lookin at a flat photograph.

And such an activity could be repeated on successive flights. It would be interesting to see how much of such plans were the same, and where, if anywhere they were different. The results of such exercises would be sure to further enthuse people back on Earth who were considering joining the group of Mars settlers.

√ Meanwhile, **there seem to be no good map of Mars’ vast northern “oceanlike” basin, that map altitude and depth lines. Have no Mars orbiter probes been able to do this? If so, why not? And what kind of instruments do we need to fly over Mars to map such altitude and depth levels. The map below is the best:**

below: Utopia basin v v & nearby Elysium Mons volcano



Hellas basin ^^^

Hespera ^^^ Planum

Valles Marineris ^^^^^^^^^

Clothing: It is most likely that over time, settlers will find that the clothing items they had brought along, have become too big (the pioneers have lost weight) or too small (they have gained weight.) If, after a while on Mars, they have not returned to their original weight (or mass) these items could be made available to others, or used as fabrics available for making **bed spreads and comforters**, or other fabric uses (**curtains, dolls, etc.**)

Perhaps such “reassignments” should wait, in case after a few months, their owners’ weight mass, returns to what it was when they left Earth. ##

There is a way to avoid long waiting periods between sending a message to settlers on Mars, or on route, and getting their answer, while still on route, a way, if you will, to “cheat” the speed of light.

Minimum & Maximum “Speed of Light Distances” between Earth-Moon & Mars.

Mars is on average **about 225 million km** (139.8 million miles) from Earth (the distance varies greatly, depending on both planets' position in their orbits). That translates to an average distance of 12.5 light minutes. **But that can vary from about 4 minutes to 24 minutes**, depending on Mars's current distance from Earth or from a ship en route, or the space ship’s current distance from Earth or from Mars. The minimum distance from the Earth to Mars is about **54.6 million km (33.927 million mi = 3 light minutes)** The farthest apart they can be is about **401 million km (249.17 million mi = 22 light minutes)**

Conversation between mutually distant parties without waiting for responses.

Both parties talk at the same time for X amount of minutes (from 3-22 minutes), then both parties listen at the same time for X amount of minutes, (3-22 minutes) the “X time” increasing as the two parties get further apart, and decreasing if they are getting closer together.

No one is twirling his/her thumbs waiting for a reply. No silent periods .
Everyone at both ends is either talking or listening. Neither party is waiting for a response.

Both parties have a clock that adjusts as the distance between parties increases or decreases. *The clock tells them when to stop talking and start listening, or when to stop listening and start talking.*

This system will apply no matter how far apart the two parties are. It works for Earth to Pluto distances as well. The periods when both parties are listening and then both parties are talking, varies with the “speed of light distance.” Yes, even if you want to talk to a “phone friend” on Alpha Centauri A3, both talking for 4.3 years then both listening for 4.3 years. Hopefully, both parties will have a lot to say, LOL!

More tolerable will be conversation, **between Earth and Jupiter’s moon Europa** (with an ice-crusted global ocean which could possibly harbor life) **588 million km** at its closest = **33 light minutes**, at its farthest, **968 million km = 54 light light minutes** at its farthest, away.

In comparison, communications between Earth and the Moon are much more “conversational” as the two worlds are only 1.4 light seconds apart.

But Earth/Moon > < Mars communications should be easy to get used to. And, of course, this applies to ships en route conversing with people on Earth or on the Moon, or on Mars, in one direction or the other. #

LOOKING FOR “TECHNO-SIGNATURES”

It’s time to start taking the search for “E.T.” seriously, astronomers say

<https://www.sciencenews.org/article/astronomers-say-time-start-taking-search-aliens-seriously>

Long an underfunded, fringe field of science, the search for extraterrestrial intelligence may be ready to go mainstream. Astronomer Jason Wright is determined to see that happen. At a meeting in Seattle of the **American Astronomical Society** in January, 2019, Wright convened “a little ragtag group in a tiny room” to plot a course for putting the scientific field, known as SETI, on NASA’s agenda.

The group is writing a series of papers arguing that scientists should be searching the universe for “**technosignatures**” — *any sign of alien technology, from radio signals to waste heat*. The hope is that those papers will go into a report to Congress at the end of 2020 detailing the astronomical community’s priorities. That report, **Astro 2020: Decadal Survey on Astronomy and Astrophysics**, will determine which new telescopes are built and which studies will receive federal funding through the next decade.

“The stakes are high,” says Wright, of Penn State University. “If the decadal survey says, ‘SETI is a national science priority, and NSF and NASA need to fund it,’ they will do so.”

SETI, the Search for ExtraTerrestrial Intelligence, searches date back to 1960, when astronomer **Frank Drake** used a radio telescope in Green Bank, W.Va., to listen for signals from an intelligent civilization (*SN Online: 11/1/09*). But *NASA didn’t start a formal SETI program until 1992, only to see it canceled within a year by a skeptical Congress*.

Private organizations picked up the baton, including the **SETI Institute**, founded in Mountain View, Calif., in 1985 by astronomer **Jill Tarter** — the inspiration for Jodie Foster’s character in the movie *Contact* (*SN Online: 5/29/2012*).

Then in 2015, Russian billionaires Yuri and Julia Milner launched the **Breakthrough Initiatives** to join the hunt for E.T. But the search for “technosignatures” still hasn’t become a more serious, self-sustaining scientific discipline.

“If NASA were to declare technosignatures a scientific priority, then we would be able to apply for money to work on it. We would be able to train students to do so,” Wright says. “Then we could catch up to more mature fields of astronomy,” he says.

Wright himself is a relative newcomer to SETI, entering the field in 2014 with a “**study on searching for heat from alien technology**.” He was also one of a group to suggest that the **oddly flickering “Tabby’s star” could be surrounded by an alien megastructure** — only to then debunk that idea with more data. ##

EDITOR’S COMMENT: In the Star Trek science fiction TV Series, “the Prime Directive” (also known as “Starfleet General Order 1” and the “non-interference directive”) is a guiding principle

of Starfleet, prohibiting interference with the internal and natural development of alien civilizations that were not yet spacefaring.

https://en.wikipedia.org/wiki/Prime_Directive

If civilizations in advance of ours, have followed this “directive” and continue to do so, we may not find any such civilizations. That is, if they visited an inhabited world, they must keep themselves invisible and/or out of sight.

But the odds are that “some” civilizations will neglect to hide easily found signatures of their progress. And there may be some with a “messianic” outlook and will deliberately advertise their existence.

Indeed, those advanced civilizations that do not leave any such signatures, may do so not out of respect for less advanced upcoming civilizations, but out of fear that even more advanced civilizations may want to squelch lesser advanced ones.

So if we do find signatures of a “few” advanced civilizations, there may be many more such civilizations that endeavor to leave no “signatures.”

The universe is so very large - our Milky Way Galaxy is a “piece of dust” in our universe - that it is absolutely inconceivable that we are alone. Of course, any civilization which has yet to be detected, or has not yet itself detected any other, will be “alone,” for the time being.

And it is my conviction, that there are an INFINITE number of “universes,” the “Omniverse,” the popular name for this totality.

[Am I an “atheist”? *Yes, if* you see God as for all eternity twirling his thumbs and then in his boredom, deciding one day to create something, that is, if you see “God as Alpha.” (The 1st letter in the Greek alphabet.)

But *No, if* you see God as *working out of the future, pulling, not pushing*, that is, as “*Omega*,” (the last letter in the Greek alphabet) *then it all works, and that is what I do believe.*]

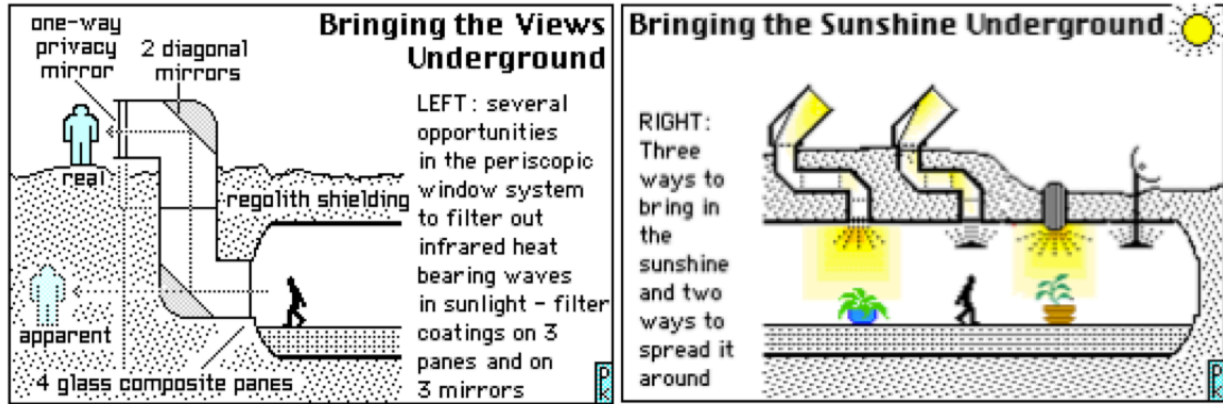
My last book, (after the Moon, Mars, and Rest of the Solar System books), if I am still living, will be about this: it’s tentative title?

“The Omega Factor: What makes the Universe Tick, and Everything in it.”

Of the four books, this last one is the one I started composing first, way back on September 1-2, 1961 when I was a 23 year old student at a small private college in a NE suburb (Totteridge) of London, England.]

[My home, before and since, has been and is now Milwaukee, Wisconsin, USA on the western shore of Lake Michigan (wide enough [85 miles at Milwaukee] that you can’t see the other side; wide enough, as you look over it, to get one thinking without bounds!)] ##

How to \sqrt see the outdoors and \sqrt bring in the sunshine in homes on the Moon or Mars that are covered with 3-5 meters (yards) of local Moon/Mars dust both to minimize temperature swings and for protection against cosmic rays that easily penetrate Mars' thin atmosphere (or the Moon's vacuum, *as well as from micrometeorites*).



(This “Z-view” idea comes directly from George Keller’s **Terra Lux** underground home some 25 Miles NNW of Milwaukee, that I toured way back in 1986. Ditto the 3rd sun port above.

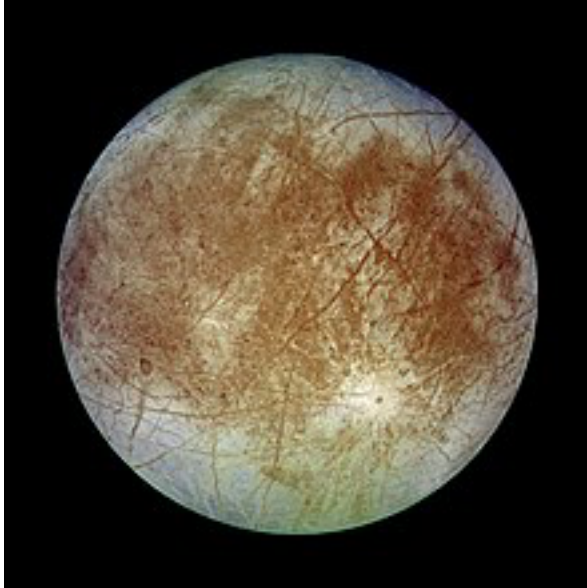
^^^^ outers panes of 2 “z-views” ^^ (Recent photo)



This novel home is still there, privately owned and visitors are not welcome.)
 On the Moon or Mars, the outdoors “glass” pane can be made of **Alon™**, an aluminum ceramic product that *cannot be broken, not even punctured with a bullet, or by a micrometeorite*. Alon™ also comes in *domes*, letting in sunlight (also seen above).
 Would I buy it? YES, *if it was for sale, and if I had the money*, neither being the case.
 More on Alon™ <http://www.surmet.com/technology/alon-optical-ceramics/>
 Both these Alon βproducts will be of great use on both the Moon and Mars. #

Europa, and an obvious mission that NASA is too timid to undertake

Europa, one of Jupiter's four large "moons," about the same size as the Moon, has an ice crust, and below it, lies a global ocean of unknown depth. The evidence? The many fractures in its ice crust. NASA has sought mission ideas from various companies, looking not for the best idea, but for the cheapest one.



Europa's ice crust surface is a maze of cracks, of a rusty color. The cracks form as Europa's orbit about Jupiter brings it closer, then farther.

It is universally believed that this cracked ice hides a water ocean below it of some depth, possibly 50-60 miles.

Is there life in that ocean? If not, is there evidence of life at one time?

That is the big question. There is one easy way to find out. Land a probe on the ice, a probe equipped to analyze those reddish streaks. A landing probe could analyze what makes these cracks reddish. Is it some non-biotic chemical?

Or are there organic compounds that could only have formed by life forms in that ocean.

NASA hopes to find out by an orbiter looking for amino acids in those reddish streaks.

But why not put a lander down which could tell us much more, give a yes or no to the question of life, and how advanced it might have evolved.

And if we found that the relish hues in these cracks are indeed of organic origin, why not send a probe capable of drilling through that crust and bringing up enough samples to tell us how advanced life had evolved in that ocean. At first we thought the ice crust was only a couple of miles thick. Now we estimate that is quite a bit thicker, maybe a couple of miles.

If we found clues that life forms of various types might still exist in that ocean, then we need to brainstorm the best way to drill through that ice crust, send down a probe with a number of instruments that might tell us how advanced life in Europa's ocean might be, and if life forms still live therein, and if that life originated as *it did on Earth, over fissures in the ocean floor.*

It seems remotely possible that life evolved on Mars, but didn't get far. It is also possible that Mars has never had life forms of any kind. NASA has sent a good number of probes to Mars' surface. **It is time we do the same on Europa. Cost be damned!**

If there is or was life in Europa's ocean, then that tells us a lot about our universe. Why? Because ice-crust ocean hiding moons such as Europa can exist around any gas giant planet, and even around "Brown Dwarf" stars, the most numerous type of stars in the universe. Could any conceivable "finding" other than this, trump such a finding in its significance? We doubt it.

Let's agitate NASA & other space agencies and our Congress - to get together and find out! #