

[A publication of the Milwaukee Lunar Reclamation Society,  
a chapter of the National Space Society & the Moon Society]

## OUTBOUND #18 JUNE 2019

**The Pluto-Charon System** (note: Charon is pronounced Karon)

### Pluto's Status

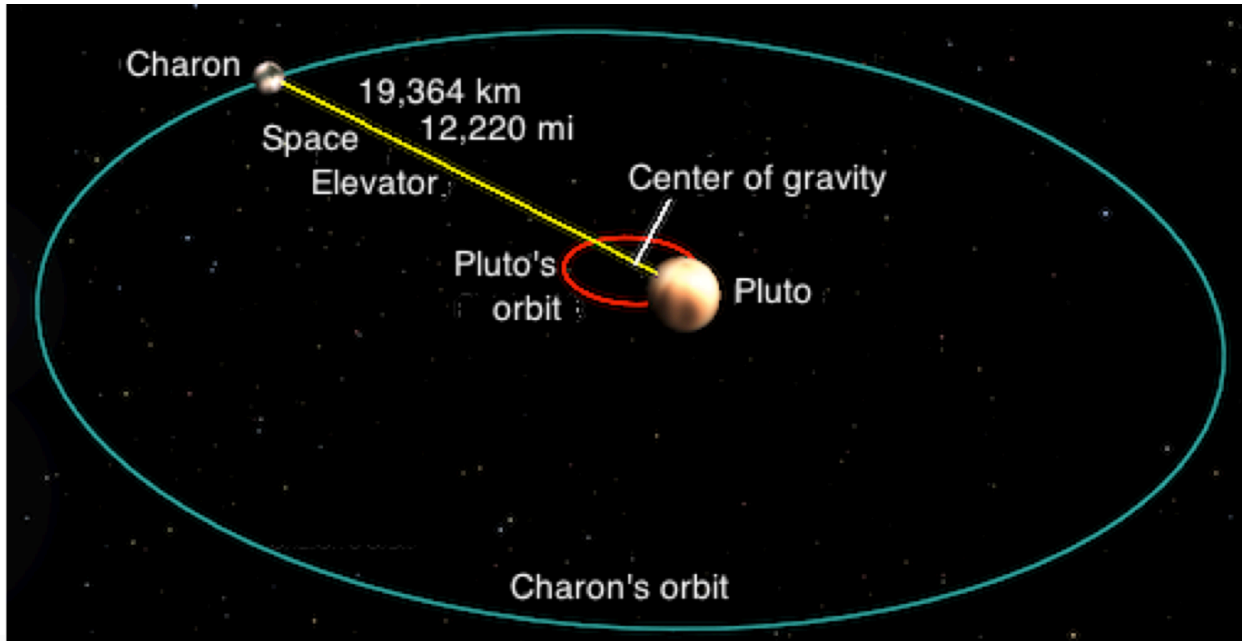
The IAU, the International Astronomical Union, has labelled Pluto as a “Minor Planet” because “it has not cleared other bodies from its orbit.” *Not only does this decision reek with “pettiness,” it totally misses Pluto’s very uniqueness.*

Satellite “moons of all planets have something in common *not shared by Pluto’s “companion” Charon*, incorrectly labeled “a moon.” *In all other planet moon systems the center of joint moon & planet gravity is inside the outer layer of the planet.*

For example the center of gravity of the Earth Moon system is inside Earth’s molten mantle, a benefit of this being the Van Allen Radiation Belt, which makes near-Earth space safer for astronauts.

In the case of Pluto and Charon, the center of gravity is *between* these two bodies. A consequence of this is *not only that Charon presents the same face to Pluto as our Moon does to Earth, but that Pluto presents the same face to Charon.*

**The result is that it is incorrect to label Charon as a moon of Pluto; rather, Pluto-Charon is a unique system, never encountered before. Pluto and Charon are a “binary planet system.” Further, no other planet has a moon so large in mass as compared to its primary as Charon is to Pluto.**



That the pair does not clean its orbit of other bodies is irrelevant. But how did Pluto-Charon pick up its 4 mini moonlets, Styx, Nix, Kerberos, and Hydra, if not by clearing its orbit. *In this context, the IAU's labeling is not only wrong, it is "petty," and reflects badly on their members' collective analytic expertise, and attitudes. ##*

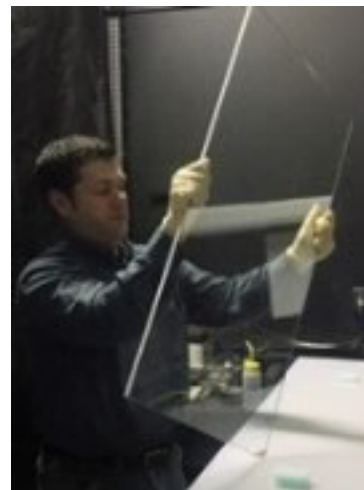
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**"Transparent Aluminum" (yes, "transparent!")**  
 ✓ **Alon** - *an amazing invention without which no settlers on the Moon or Mars or travelers in spaceships could ever look out a window to see the stars, worlds left behind or approaching, or just to let the sun shine in.*

**"ALON® Optical Ceramic - An advanced transparent polycrystalline ...**

[www.surmet.com/technology/alon-optical-ceramics/](http://www.surmet.com/technology/alon-optical-ceramics/)

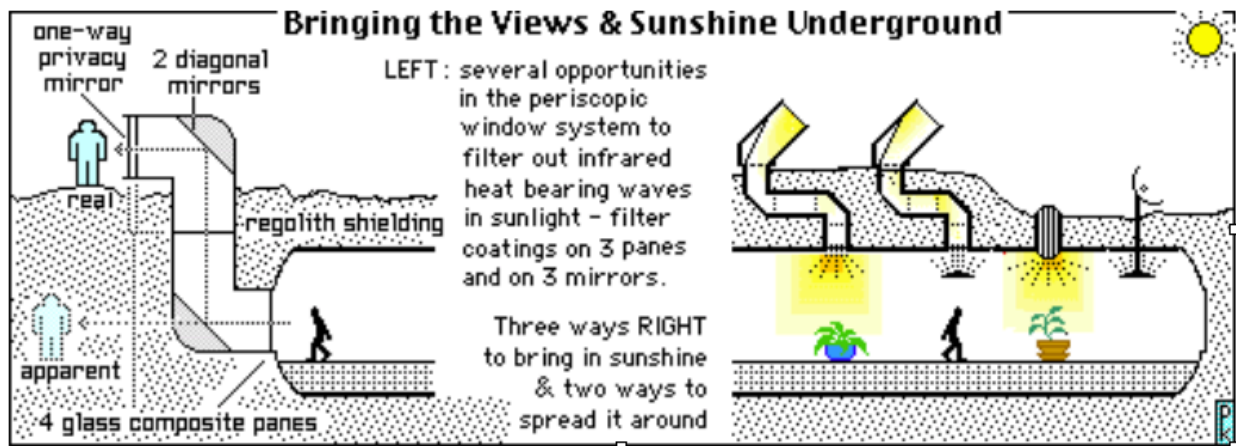
**ALON® or Aluminum Oxynitride** is an amazing and unique transparent advanced ceramic that is polycrystalline (made from powder) with a cubic spinel crystal structure. In the popular media and in the Star Trek community, it is commonly referred to as **"Transparent Aluminum."**



✓ As we learn the possibilities, larger sizes and shapes are becoming available.

✓ *Without Alon windows, space ships would be stuck with radar and its limitations. An Alon window cannot be broken, not even by the bullets of a machine gun!*

*Unbreakable Alon "dome windows" may also be used to let the sunshine inside spaceships as well as into homes on the Moon and Mars.*



*Above: the “Z view” window system uses unbreakable Alon windows and mirrors, as do the left two “sundows”*



## Looking for “Earth-like” planets in the Alpha Centauri 3 star system

[https://www.space.com/alien-planets-alpha-centauri-breakthrough-watch.html?utm\\_source=sdc-newsletter&utm\\_medium=email&utm\\_campaign=20190612-sdc](https://www.space.com/alien-planets-alpha-centauri-breakthrough-watch.html?utm_source=sdc-newsletter&utm_medium=email&utm_campaign=20190612-sdc)

*Alpha Centauri is a three-star system that lies about 4.37 light-years from the sun. Two of the three stars are sunlike neighbors that together form a binary system called Alpha Centauri AB. The third star, Proxima Centauri, is a small, dim, more far-flung red dwarf. (Proxima Centauri is the closest individual star to the sun, located about 4.2 light-years away.)*

In 2016, astronomers discovered a roughly Earth-size planet circling Proxima Centauri. This planet, known as Proxima b, appears to lie in the habitable zone, the just-right range of distances where liquid water might be stable on a planet's surface.

“No planets are known to reside near the binary star Alpha Centauri AB, but NEAR may change that fact. The coronagraph — a joint project of ESO and Breakthrough Watch, a program that hunts for potentially Earth-like planets around nearby stars — upgrades an existing VLT instrument called VISIR (VLT Spectrometer and Imager for the Mid-infrared). [Photo of this instrument included]

NEAR is capable of spotting planets about twice Earth's size or bigger in the Alpha Centauri system. [Photo of NEAR on next page]

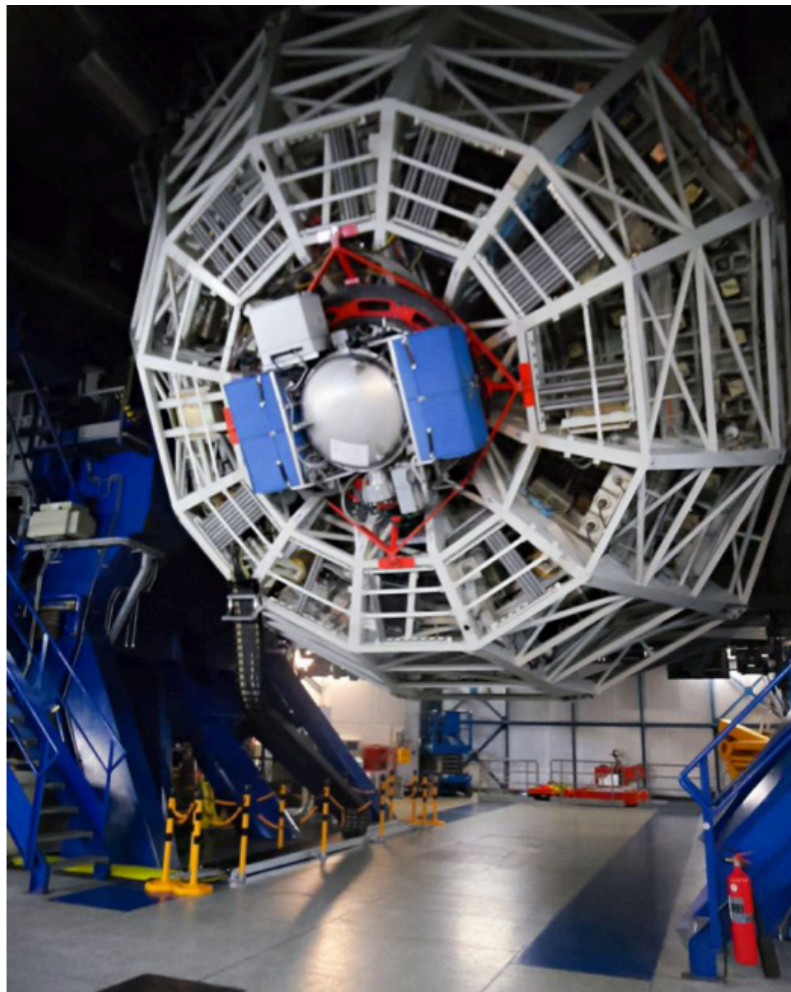
Breakthrough Watch is part of the Breakthrough Initiatives, a suite of programs designed primarily to search for alien life. The initiatives also include the SETI (search for extraterrestrial intelligence) program Breakthrough Listen and Breakthrough Starshot, which aims to launch superfast laser-sailing probes to Proxima b and other nearby exoplanets in the next 30 years or so.

[Editor: We are fortunate to have such an interesting 3 star system so near to our Solar System. We do not have data to base this on, but it would seem that the average distance between

solar systems such as ours would be significantly greater. While the odds are against us, we all hope for the Alpha Centauri system neighbor to be a happy exception.

**That nothing can travel faster than the speed of light remains the law.** The only way to mitigate this barrier is to put people to sleep in a manner that preserves every part of their body and especially, their brains, without confidence that they would be “resurrected” in a functional stage. But should we find a way around this barrier, when they awoke and reported back to Earth, their report would reach not us but our descendants generations later.

What we do find out about the Alpha Centauri System will be fascinating none the less. Those who believe in a spiritual afterlife will not find these laws of physics a barrier. But for me, when the lights go out, the lights go out. “Heaven” is now for those who maintain a positive outlook, *negative experiences being ignored.*



Above: The **coronagraph** — a joint project of ESO [European Southern Observatory in NE Chile (*where the air is the driest and clearest of anywhere on Earth*)] and **Breakthrough Watch**, a program that hunts for potentially Earth-like planets around nearby stars. This coronagraph upgrades an existing VLT instrument called VISIR (VeryLT Spectrometer and Imager for the Mid-InfraRed). ##

## *“Cottage Industries” for Mars Settlers*

“A cottage industry is a small-scale, decentralized manufacturing business often operated out of one’s home rather than at any purpose-built facility. ... They often focus on the production of labor-intensive goods but face a significant disadvantage when competing with factory-based manufacturers that mass-produce goods.” (GOOGLE)

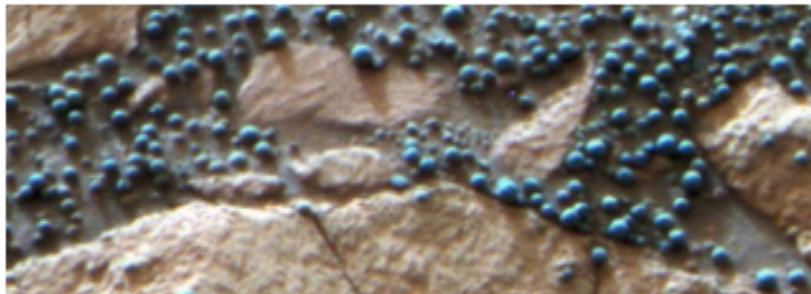
“Cottage industries” are defined by the amount of investment required to start, as well as the number of people employed. They often focus on the production of labor-intensive goods but face a significant disadvantage when competing with factory-based manufacturers that mass-produce goods.” (INVESTOPEDIA)

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Usually, cottage industries are begun *to make extra money in one’s spare time*, often by those who do have a regular job, but sometimes by family members not regularly employed, or who want to be “productive” in their spare time by expressing their “creative imagination.”

While some “cottage industries” might be computer work e.g. “doing” someone’s “taxes” or taking inventories, most are likely to be material-based. Below is a wide variety.

- **Computer-based:** doing someone’s taxes, taking inventories, sketching home expansion options, and more
- **Hand-based:** for example carved basalt creations from lamp bases, statues, planters, to mugs, door stops, paper weights, rings, etc.
- **Others** based on “retired” equipment from space ships, other vehicles, etc. and reassembled as interesting creations.
- Some may be based on the **“blue” pebbles** that are found here and there on Mars’ surface.



- Not to forget items made out of “retired” clothing, e.g. creations of the **“patch-work”** e.g. bed spreads, table cloths, curtains, shirts, etc.
- Pieces of **abandoned metal equipment** can be put together to create interesting **sculptures**  
**The only limits are those of one’s imagination. But as a way to express one’s creative and artistic talents, cottage industries are invaluable.**

As one who has dabbled all my life in such creative hobbies, the satisfaction of creative expression is much more motivating than any extra income one might make. I have made 4 (iirc) chess sets out of metal parts of assorted kinds, each unique. The chess boards were made of small square tile bits of contrasting colors, glued to a wood base, the spaces between tiles filled with a neutral colored filling.

I had made several chess sets out of odds and ends metal parts, the one that I liked the most kept for myself, the other two being unique wedding gifts to friends of mine.

Not all “Cottage industries” are pursued in home, as opposed to “out of home:”

- **Baby sitting** (including pets), **cooking meals, doing laundry, etc. to free a parent to work outside the home**, in whatever kind of work, on a regular basis or on occasion when (a) parent(s) is/are sick, or have to go out of town for whatever reason, and for a length of time.
- **Cooking Meals** for Festivals or other Occasions such as the mother being away or sick in bed in the hospital, or out of town
- **Preparing taxes for others or helping someone else start a cottage industry**

**In short, cottage industries do one or both of two things:**

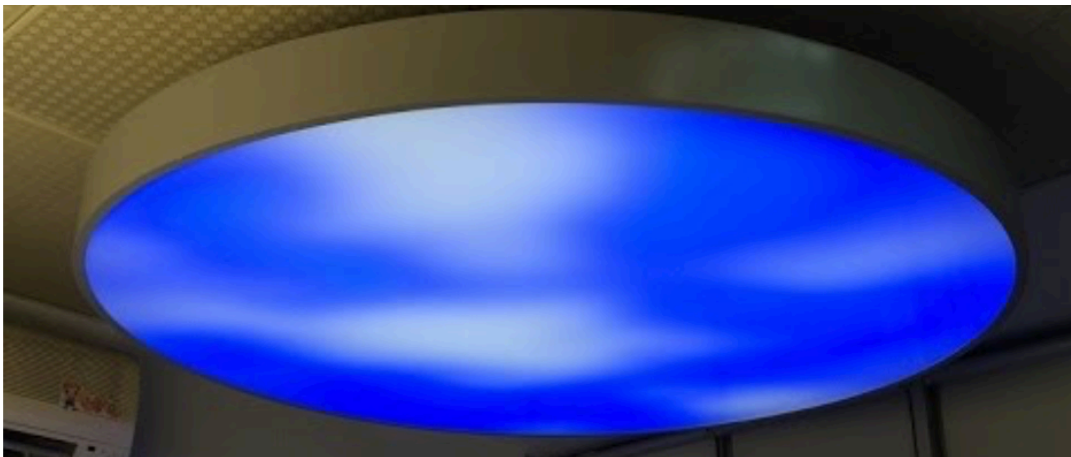
✓ **Express one’s artistic creative talents**

✓ **Make lucrative use of spare time**, ✓ whether to purchase more, ✓ to afford a trip out of town, ✓ further education, ✓ training for new jobs whether for more income or for ✓ better use of one’s creative talents etc., ✓ To enable children to get special training or education ✓ to take a trip to somewhere else on Mars where the terrain is special, or the culture unique, e.g. Mars’ most scenic terrain Valles Marineris, or Hellas Basin, or to one of Mars 5 enormous Volcanoes.

### **Will Martian Settlers Miss Earth’s Blue Skies?**

Some more than others. In some areas of America “cloud free blue skies” are more common than in other areas. But this writer, of Milwaukee, Wisconsin on the Eastern shore of Lake Michigan, certainly would enjoy blue skies more often.

Visitors would enjoy **blue skies with some clouds projected on the ceiling vaults of atrium and/or lobby of “the Blue Skies Hotel.”** and other ceilings. ✓ The cheap version would be a fixed scene. ✓ But in more costly versions, puffy cumulus clouds come and go.



Over time, perhaps most Mars settlers will be “at home” with Mars skies as they are, except for those whose favorite color is blue (such as is the case with this writer). Smaller versions of such projected blue sky ceilings might find they way into some homes. After all, what is more pleasant and energizing than to wake up to blue skies?

### **Catering to Young People with Artistic Talents**

In my native Milwaukee, Wisconsin, on the western shores of Lake Michigan, where I hope to spend the rest of my days, youngsters with artistic talents are encouraged to express them by painting murals on the windowless sides of brick buildings. At first there were a few such works of art, but now there are perhaps a hundred or more. And for us older people, it is a delight to see. Better these pieces of art, than a lot of destruction. To see a great number of these, google “**Milwaukee Street Murals.**” Nowadays we see far less graffiti even in older neighborhoods, and instead these murals boost our love for our city. There are half a dozen within a few blocks of my home, all demonstrating considerable talent.



The one above was the first in my part of the city, on a well-trafficked street (N. 27<sup>th</sup>, a major thoroughfare), on the south side of a brick building, with an empty lot to the south, making it visible to northbound traffic.

**For many, many more examples:** Google “**Milwaukee Street Murals**”

One positive result (besides viewer delight) is much less graffiti.

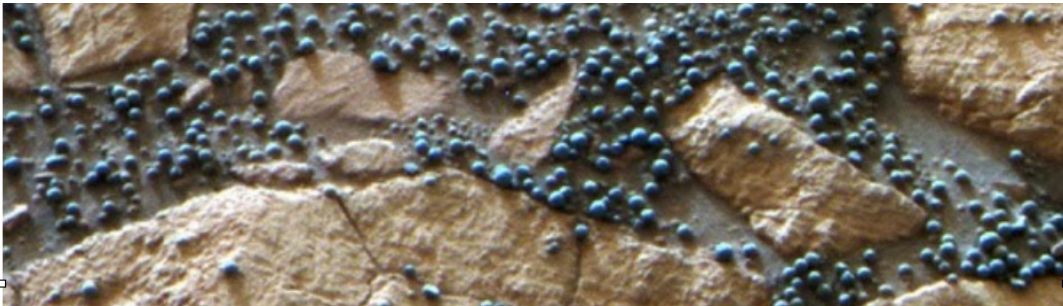
Settlement “Fathers” will do well to encourage artistic teen agers and young folk by finding places in public areas where they can express their talents in similar fashion. Owners of buildings help by allowing sides of buildings to be so painted, and even pay for the paints. But on (the Moon and) Mars, without “gift shipping” of paints (*or of colorizing ingredients*) from Earth, street murals in Mars settlements might be much less colorful.

There are many cases in which delinquent, destructive youngsters, given a chance to express themselves artistically, have turned their lives around through pride in their creations.

As an 8 year old youngster, my godmother aunt arranged special art classes for me, working primarily with chalk, at first black and white, then colors. I still have a box of this artwork from more than seventy years ago. Hopefully space settlement fathers will encourage the artistic talents of their young. There is much to gain for all, beyond just “Settlement Pride.”

Young Martian settlers might also be encouraged to express their artistic talents by designing the “Living Walls” lining the “streets” on which their homes open, by picking the plants and arranging them in various patterns, making them that much more enjoyable. Settlement “fathers” might give annual awards for the most interesting, most beautiful, most unique, most colorful Living Walls.

Like the Moon, Mars is boringly monochromatic and we Earthlings are used to a lot of color. Even in our deserts, there are blue skies above. At the present stage of our skimpy knowledge of Mars, it seems unlikely that settlers will be able to find a rainbow’s worth of “colorizing” pigments in Mars dust. But settlement explorers might be on the lookout for unusual colors in the surface dust. *Perhaps, Mars’ pulverized “blue marbles” might retain their color.*



Such items might be high on the “gift list” for those visitors coming to Mars, planning to return to Earth after their tours of Mars are over and the next “Mars>Earth Window” opens.

But for most Martian settlers, Mars’ monochromatic landscapes will be a challenge, as they seem to be to this left-behind visitor in a scene (below) from the movie, “The Martian.”



**Mars is more colorful than the Moon, but just as boringly monochromatic. *Could opticians invent eye glasses that exaggerate shades of Mars dust to more red or more yellow? If so, there will be fewer Martian settlers that wish they had stayed on colorful Earth. #***



**How to Expand “Starter Homes” (settler cabins on space ships en route to Mars) once on Mars, to accommodate children (born on Mars or en route) and/or for cottage industries, or to accommodate temporary related or non-related visitors**

*While additions of various types can be cast from native Martian basalt, the original cabin must be designed with circular side flat protrusions, one forward, one to the rear to which additions can be attached, the temporary protrusion being removed, once the addition is affixed and sealed. Extensions and additions will be made from Martian basalt.*

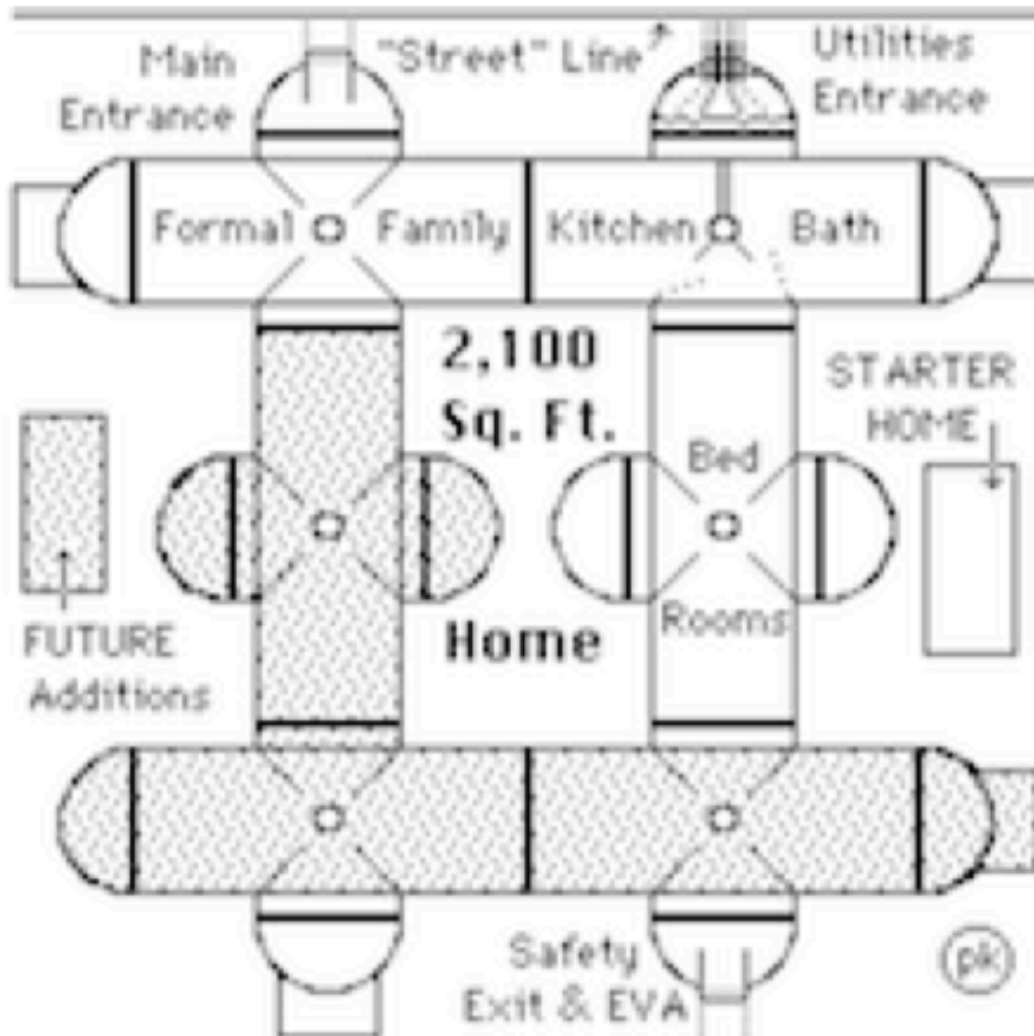
An easier simple option would be to attach another cylinder to the rear of the original.

Below are some addition options. And, yes, the process of adding additional living space will be tricky without the breathable air inside escaping (with occupants not “at home” just in case, and with the crew attaching the addition in space suits, “just in case.”)

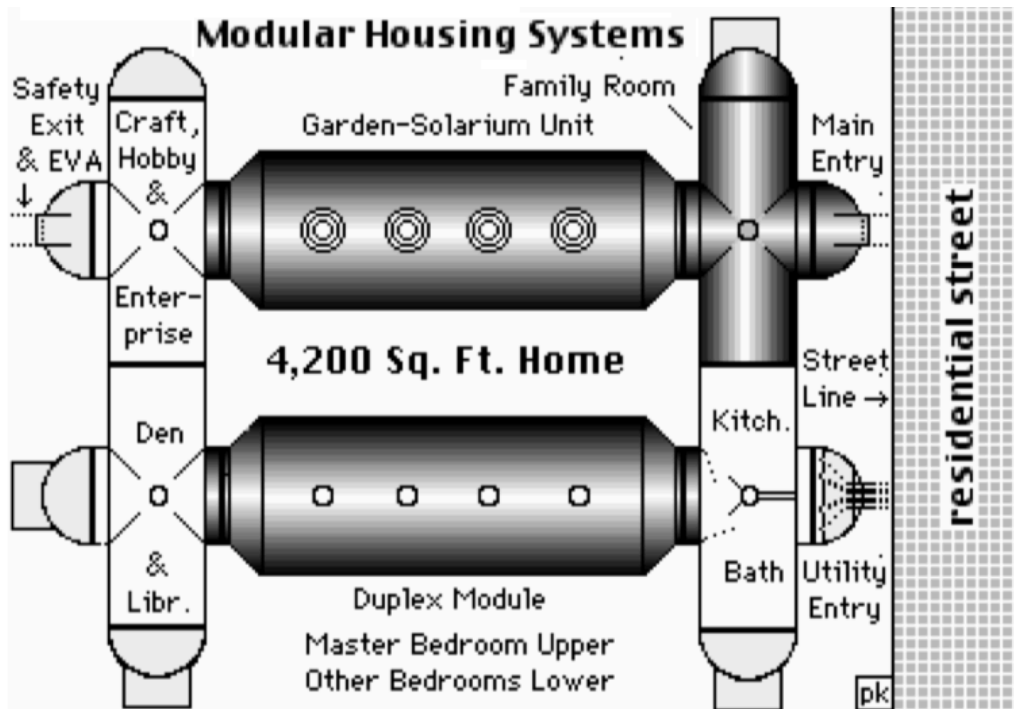
Designing such a process is hard to do without actually doing in on a “practice home” - something we can do here on Earth, perhaps in a vacuum hangar, to make sure that starter “cabins” are designed to be “expansion friendly.”

**Below are some possible expanded home designs**

**A simple one floor addition design**

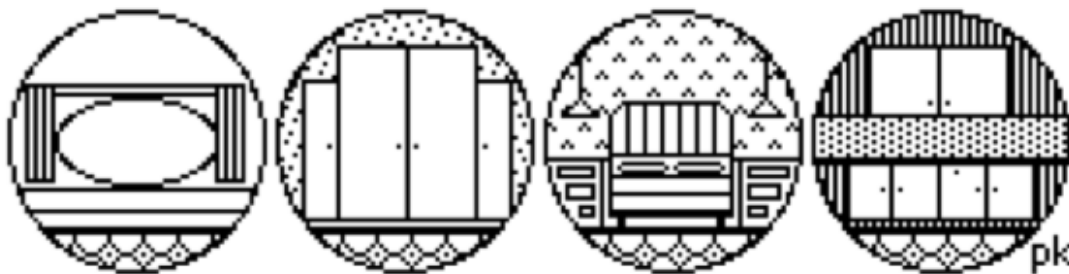


**A larger 2-floor option**



One of an indefinite number of modular home designs

In both designs, the space where additions can be attached is a “semi-sphere” which originally serves a variety of functions, including a “visiscreen (Television #1, **cabinets** (#2), “pull-out” **murphybed** or Murphy desk (#3) a kitchen cabinets & sink (#4) or safety exit.



Behind the row of homes on either side of a “Middoors” passageway, there will be ample space for a crane that will put new homes up to ready doorways, cover the homes with 2 yards/meters if Mars soil for insulation from cosmic rays as well as Mars unbreathable air.

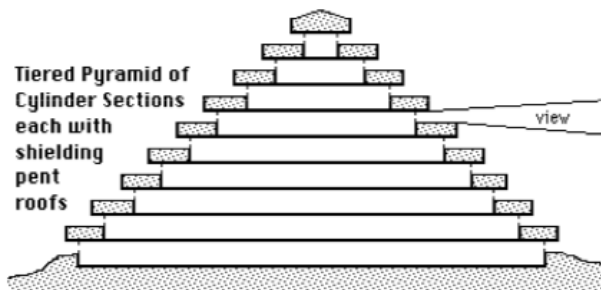
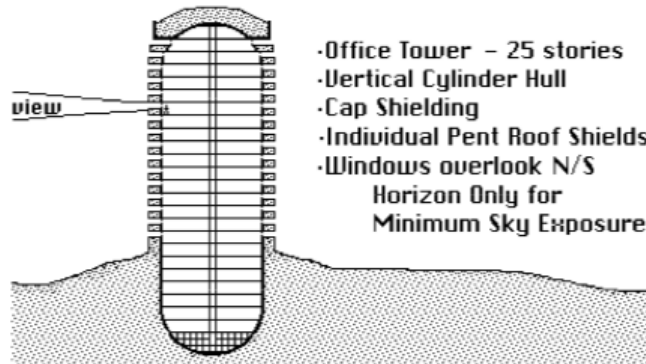
The cranes will remain on site, ready to add additional living space to starter homes when needed, and also serve homes or businesses on passageways “one street over.”

✓ **Role of Cranes:** housing & factory module emplacement, covering modules with several feet of Mars soil, attaching expansion modules as above. The (or a) crane might remain on site in early years as homes and factory modules grow and need additions or replacement.

## (Mars and/or Moon) Settlement “Downtowns”

**Shielding Multi-story buildings:** whether used horizontally as passageways or vertically as apartment buildings, offices, government, hotels, etc.

Here are a couple of design “ideas” for large “downtown” hotels and office buildings etc.



In both designs the dotted “pent roof” retainers, filled with Marsdust, provides shielding from cosmic rays that easily penetrate Mars thin atmosphere. But the partially shielded windows provide a restricted view of the settlement city.

Calling all would be Moon and Mars architects.

Got different ideas for “**Downtown Mars**”?

Send them to me at [kokhmmm@aol.com](mailto:kokhmmm@aol.com) ##

## Spectacular new crater on Mars



(NASA/JPL/University of Arizona)

### Astronomers Spot **New Crater on Mars** Like Nothing Ever Seen before

A fresh impact crater, spotted in April by the Mars Reconnaissance Orbiter (MRO).

***Remarkable for both its size and its impact waves, the black-and-blue mark stands out like a sore thumb on the planet's red, dusty surface.*** The dramatic, enhanced-color scene shown below was captured using NASA's [High Resolution Imaging Science Experiment \(HiRISE\)](#) camera, orbiting 255 kilometers away (158 miles).

While the actual space rock fragment responsible looks to be about 1.5 meters wide (c. 5 feet), the crater itself is much larger, roughly 15 to 16 meters wide (49 feet to 53 feet). Such a tiny culprit would have probably burned up or eroded in Earth's much thicker atmosphere. Even on Mars, these incoming rocks can often shatter upon entry, creating chains of craters - like a machine gun pummeling the surface of the planet.

In this case, however, the rock must have been more solid than usual, because the entire thing managed to slam into one spot in the **Valles Marineris** region, which sits near the Martian equator. What makes this stand out is the darker material exposed beneath the reddish dust.

The impact wave is clear to see. This is the dark zone in the very middle of the image, where dust has been pushed aside to reveal the rocky surface underneath.

The exact nature of the geography in this region is still uncertain, the surface below is probably basalt. And ***the blue in the image, is likely a bit of ice that was hiding under the dust as well. ##***

## Why Settlers might want to Grow Bamboo on Mars - Yes! Bamboo!

**Below: an example of the many things that can be made from Bamboo,**  
Including furniture (a welcome option other than basalt), toilet tissue, musical instruments, paper and book covers, beer, clothing, bed sheets and *much more!*



<https://www.bambooimport.com/en/blog/products-made-from-bamboo>

Not all bamboo trees need to be grown very tall. *On the Moon and Mars, shorter varieties can be grown in settlement agricultural areas, or even in the Middoors Corridors linking settler homes, on the side opposite Living Walls, and harvested if and when they are growing too high, only to grow tall again, rather quickly.*

**Caution: bamboo is not fireproof: only small bamboo Items should be used inside homes.**

Although they are not fireproof, bamboo fabrics & flooring will be a welcome option to similar “outdoor” items made from basalt. *Bamboo items of size should be placed “outside” in Mars’ oxygen free fire-quenching atmosphere - such as chairs, hammocks, fencing, gates, “wind flags,” and outside seating, or in non-pressurized truck beds, and √ Bamboo Bags in which to put found collected out-vac items (stones, etc.)*

While bamboo fabrics are softer than basalt fiber ones, they should not be used in an indoors oxygen atmosphere, except perhaps for *underwear, socks and stockings, handkerchiefs, eyeglass frames, book hard covers, etc.* *Google Bamboo for more! ##*

## We have suddenly entered a brand new “Bamboo era” of consumption

<https://www.bambooimport.com/en/blog/products-made-from-bamboo>

"The challenges we face today is to further improve and **innovate the uses of bamboo**. Since bamboo is *the fastest growing plant on Earth* and *a sustainable building material*, it *could easily substitute all known wood applications* without having to cut down entire bamboo groves or plantations. Better yet, *bamboo continuously grows after harvest without having to re-plant it*.

**Bamboo also converts about 35% more CO2 into oxygen than does other trees.**

*“The **bamboo products** we see on the market today, are just the tip of the iceberg, we predict that **more and more innovative bamboo applications** will enter the consumer markets rapidly. Therefore it is an exciting era to live in if you are also a firm believer of how **bamboo can contribute to a greener and cleaner environment**.*

*We can't change our consumption based economy, but we can certainly change the resources we use and the way we manufacture their products!”*

[There is no mention of Bamboo in our book about the Moon, but there will be in any 2<sup>nd</sup> edition.]

*I grew up in an era (the nineteen forties) when the only use of bamboo of which I was aware was for crude fishing poles for those who could not afford something better. ]*

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## √ Mini Trees on the Moon? And on Mars too?

### Welcome Bonsai flower pot size “Mini-trees”

Most of us grew up when “tree” meant something rather tall, grown for wood, paper, nuts, fruit and so on, of which wood furniture, window frames, doors, and flooring - as well as for paper and cardboard, and fruit (apples, oranges, etc.) - not to forget to provide shade, relief from the sometimes too warming sunshine, and their sheer beauty.

Even for those who grew up on the grassy plains, deserts, or sub-arctic areas, trees were something that made this planet a wonderful place to live.

But except under artificial glass domes, we won't see trees on the Moon or Mars - or will we? *The horticultural art of growing miniature “bonsai” trees of flower pot size (most less than a foot tall) to the rescue*. And no, they are not a new breed of trees, but rather the result of an art that constrains their growth, by growing them from seed, or seedling in flower pots.

Below are three (of several) **YouTube online lessons** on how to raise a Bonsai tree.

√ <https://www.youtube.com/watch?v=L1FDfwyjkrs>

√ <https://www.youtube.com/watch?v=P52yiXliWvQ&vl=en>

√ [https://www.youtube.com/watch?v=j4\\_JLdRVoqA](https://www.youtube.com/watch?v=j4_JLdRVoqA)

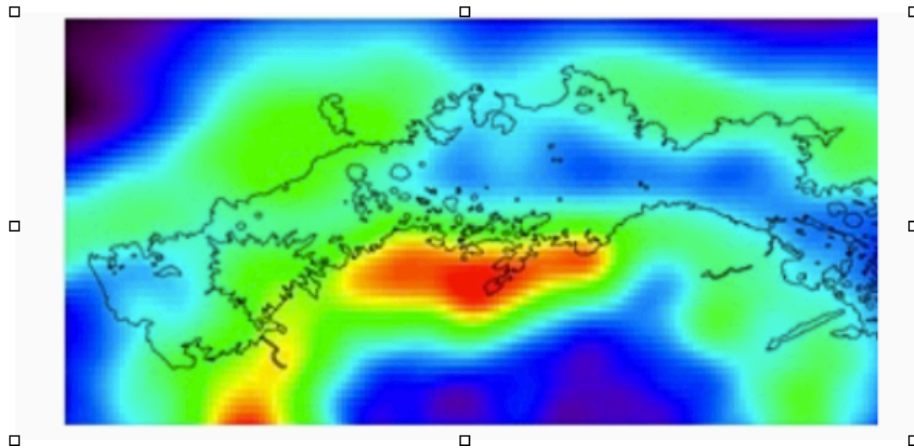


Perhaps your home has a library room or den, *a room with no windows from which to see normal size trees*. Bonsai trees that you bought (Most **Home Depot** stores carry them) or have grown yourself, will help you get the feel for homes on the Moon or Mars.

**Thorium: A rare “moon dust ingredient” that will hasten the debut of Nuclear-powered spaceships to Mars and Beyond**

“A naturally-occurring, slightly radioactive metal discovered in 1828 by the Swedish chemist Jons Jakob Berzelius, who named it after Thor, the Norse god of thunder. It is found in small amounts in most rocks and soils, where it is *about three times more abundant than uranium*.

*Out of sheer luck, the asteroid which punched the Moon just below Mare Frigoris, creating Mare Imbrium, splashed Thorium on much of Mare Frigoris and to the highlands above (green) and below (green, yellow, orange, and red areas where Thorium is abundant).*



Of what use is that? PLENTY? *We can make a nuclear fuel from Thorium for Mars-bound ships, cutting trip time from the 230-300 day range down to a few weeks! The result? Opening Mars to substantial settlement!*

<b>Lunar Thorium to Nuclear Fuel for Mars-Run Ships</b>	$\text{Th}^{232}$	$90 \oplus$	$142 \ominus$	$+ \ominus$
	$\text{Th}^{233}$	$90 \oplus$	$143 \ominus$	$- \ominus$
	$\text{Pa}^{233}$	$91 \oplus$	$142 \ominus$	$- \ominus$
	$\text{U}^{233}$	$92 \oplus$	$141 \ominus$	
<p><b>KEY</b></p> <p><math>\oplus</math> proton</p> <p><math>\ominus</math> neutron</p> <p><math>\omin�</math> electron <math>\beta</math> particle</p>				
<p><b>The Moon has considerable reserves of Thorium</b></p> <p>Th 232 can be transmuted into fissionable U 233 in a fast breeder reactor. Should transport of <i> fueled </i> reactors thru Earth’s atmosphere be banned by international treaty, a lunar thorium industry could open the Solar System</p>				

***Thank the Moon! Mars buffs would do best to see the Moon settled first ! #***

## Why I did not enter the Mars Society's Settlement Design Contest

One of the requirements was that the Settlement *be made exclusively from materials found on Mars.*

Well, you need a spaceship to bring settlers to Mars, and if you design the spaceship carefully, upon landing on Mars, all the components of the ship can be rearranged to become a “**Settlement Neighborhood.**”

The cabins in which settlers lived in for the months long trip to Mars, could be made of cast basalt on the Moon, and shipped to Mars with much less fuel than if they were made on Earth. Ditto many other components of the spaceship.

Instead of sending the spaceship back to Earth/Moon Space empty, wasting fuel, the next group of settlers will come in a similar designed spaceship to serve as another neighborhood.

Sending a ship back to Earth empty makes no sense. And making the components for space ships on Earth makes no sense either as it will require much more fuel.

**Fuel tanks** of the Spaceships could be designed to become neighborhood “streets.”

And the space **ships’ (pilot control) “bridges”** could be designed to serve as the driver’s part of the Mars equivalent of Greyhound busses, or of the engineer’s cab on Train locomotives, or as the crew cab under dirigibles. (*Now here are design challenges for would be engineers!*)

**Space ship engines** can likewise be designed so as to be used on Mars train locomotives and/or dirigibles.

Designing components for such dual purposes will be quite a challenge. But the result will be considerably faster and more comprehensive settlement of Mars.

Meanwhile, Nuclear powered spaceships (fueled in space with **uranium 233** [See page above] made from abundant **thorium** on the Moon) that can make the trip to Mars from Earth-Moon space much faster, say 2 months instead of 8-12, where its nuclear engines become power plants on Mars. And this fuel will be considerably cheaper shipped from the Moon than from Earth. *Further there may be much public opposition to sending up anything radioactive from Earth should the rocket fail to reach orbital space and crash back on Earth.*

Sending anything from or back to Earth space, other than settlers, makes no sense in both the short and long term.

Sending as much as possible from the Moon to Mars, will be much cheaper fuel-wise than sending the same items from Earth. Now all this makes sense only if we begin settling the Moon first, and that is the only plan that makes sense for both worlds, the Moon and Mars.

I have always been a very ardent supporter of settling both worlds. PK