

Astrobiology News March 2022: The Allure of Venus

With an average temperature hot enough to melt lead, and a surface air pressure comparable to the water pressure a mile deep under Earth's oceans, Venus may not seem very alluring today. Nevertheless, it is once again the target of robotic NASA missions that are expected to launch within this decade,¹ and there is growing evidence suggesting that this enigmatic world may have been the first habitable planet in our Solar System. In fact, it may surprise readers to learn that, in some respects, Venus' upper atmosphere is the most Earth-like location found on another world in the Solar System today!²

In September 2020, a team led by astronomers in the UK announced the detection of phosphine on Venus, generating much excitement, since phosphine is produced biotically (by life) on Earth.³ The following year, a team led by astronomers at the University of Washington claimed that the purported detection of phosphine could be explained by sulfur dioxide, which is not considered a sign of life.⁴ The controversy about the detection is actually an excellent example of the scientific process, which, as MIT scientist Avi Shporer notes, “often includes continuous debate and attempts to explain evidence in different ways.”⁵

Although the likelihood that Venus supports any kind of life today may be very slim, the atmospheric pressure and temperature 50-60 km above Venus' surface are similar enough to the surface of Earth to raise the interesting possibility of a mission including human exploration of this otherwise inhospitable world. An airship filled with a breathable gas mixture of oxygen and nitrogen would float at this height in the Venusian clouds, since breathable air is less dense than Venus' atmosphere. Above this altitude, the atmosphere would be dense enough to protect the airship's human inhabitants from harmful radiation from space. Furthermore, the astronauts could generate power from solar radiation – Venus receives about 1.4 times the amount of solar radiation than Earth receives due to its proximity to the Sun.

The robotic NASA missions in development for launch later this decade will hopefully shed light on the question of Venus' past habitability, but might some form of microbial life survive in the cloud decks of Venus today? If so, would it resemble life on Earth, or might we learn that life has multiple chemical origins? The only way to find out for sure may be to scoop up material with a dedicated future mission!

On a different topic, I'd like to highlight two people-powered research (aka citizen science) projects that may be of particular current interest. In celebration of Women's History Month, I urge you to consider participating in *Star Notes*, by helping to transcribe

¹ <https://solarsystem.nasa.gov/missions/veritas/in-depth/>

² <https://dailygalaxy.com/2022/02/a-red-herring-the-life-bearing-clouds-of-venus/>

³ <https://www.nature.com/articles/s41550-020-1174-4>

⁴ <https://ui.adsabs.harvard.edu/abs/2021ApJ...908L..44L/abstract>

⁵ <https://dailygalaxy.com/2022/02/a-red-herring-the-life-bearing-clouds-of-venus/>

the work of the women astronomers who were known as the “Harvard Computers.”⁶
There is also an exciting new project you can find on the *SciStarter* site – *Outbreaks Near Me*⁷ is tracking the spread of COVID-19 and flu-like illnesses. All you have to do to participate is report whether you’re feeling healthy or sick, and answer some additional survey questions. The research team is also interested in collecting at-home COVID test results that won’t otherwise get counted. This is a very worthy project that asks for a very small time commitment from participants - about one minute per week!

Until next month,

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⁶ <https://www.zooniverse.org/projects/projectphaedra/star-notes>

⁷ <https://scistarter.org/outbreaks-near-me>