

Astrobiology News January 2023: On Mystery, Awe, Wonder, & JWST

Dear Friends - I'm finally back after a far more protracted absence than I anticipated when I wrote my last CLP column in May 2022. Last year was particularly difficult for my family and me in many ways, and during July, I underwent two very long spinal surgeries to mitigate the effects of worsening scoliosis. Recuperation has been excruciatingly painful, and I'm afraid that beginning 2023 with a nasty bout of Covid hasn't done wonders for my ongoing recovery. Many thanks to Michael for keeping Astrobiology News alive in my absence, and for remembering me each month!

This month, I want to lift up the theme of this year's Religion and Science weekend. NASA's JWST¹ has been providing many awe-inspiring images,² and its 'Other Worlds' theme includes a focus on astrobiology. Just this month, researchers at Johns Hopkins University announced JWST's first confirmed detection of an exoplanet that happens to be about the same size as Earth.³ This detection is a great example of how new instruments enable us to build on previous results.

While data obtained by NASA's Transiting Exoplanet Survey Satellite hinted at the existence of an exoplanet now known as LHS 475 b, JWST easily confirmed its existence, and discovered some interesting things about its atmosphere, too. JWST is, in fact, the only currently operating telescope capable of characterizing the atmospheres of Earth-sized exoplanets. Although the research team can't draw definite conclusions about the composition of LHS 475 b's atmosphere, they can rule out some types of atmospheres.

Using JWST's Near-Infrared Spectrograph and a technique called transmission spectroscopy, the team measured the size of LHS 475 b at different wavelengths as it passed in front of its star. Different molecules absorb light at different wavelengths, so specific molecules can be identified by the amount of starlight absorbed by the exoplanet at these wavelengths. The data indicate that LHS 475 b cannot have a thick methane-dominated atmosphere similar to Saturn's moon Titan; however, the current data can't distinguish between no atmosphere and, for example, a thick carbon dioxide atmosphere like Venus.

The JWST results for LHS 475 b were announced at the American Astronomical Society (AAS) meeting in Seattle on January 11th. Unfortunately, we don't have actual images of the exoplanet – JWST can do many amazing things, but providing resolved images of Earth-sized exoplanets is beyond the scope of this instrument and current technology. Still, this discovery is another important step in the search for habitable worlds and life beyond Earth.

¹ I have chosen to use the acronym rather than the full name of the mission to stand in solidarity with the reasons expressed in this post by the President of the American Astronomical Society:

<https://aas.org/posts/news/2022/12/response-nasas-james-webb-history-report>

² <https://webbtelescope.org/resource-gallery/images>

³ <https://www.nasa.gov/feature/goddard/2023/nasa-s-webb-confirms-its-first-exoplanet>

Finally, I want to add my voice to Michael's and Susan Barreto's⁴ by highly recommending that you check out the resources provided on Rev. Bruce Booher's *Mystery and Awe* page⁵ for your Religion and Science weekend event. Another excellent resource is the short film, *Awe and Wonder: Scientists Reflect on Their Vocations*,⁶ produced by the AAAS Dialogue on Science, Ethics, and Religion. If you want a participatory experience for your event, check out the awesome people-powered research options on *Zooniverse*.⁷ At the time of this writing, there are 100 active projects from which to choose, so if you need some help making a choice, feel free to email me with your particular science interests and I might be able to help you narrow the field.

Glad to be back!

Until next month,

Grace

Grace Wolf-Chase (she/her/hers)
Senior Scientist; Senior Education & Communication Specialist
Planetary Science Institute
gwolfchase@gmail.com
<https://www.psi.edu/about/staffpage/gwchase>
Vice President, Center for Advanced Study in Religion and Science
([CASIRAS](#))

⁴ <https://www.luthscitech.org/mystery-awe-and-wonder-the-theme-for-religion-and-science-weekend/>

⁵ <https://mysteryandawe.com/>

⁶ <https://sciencereigiondialogue.org/resources/awe-wonder-scientists-reflect-on-their-vocations-2/>

⁷ <https://www.zooniverse.org/projects>