The implications of signs of life on Venus?

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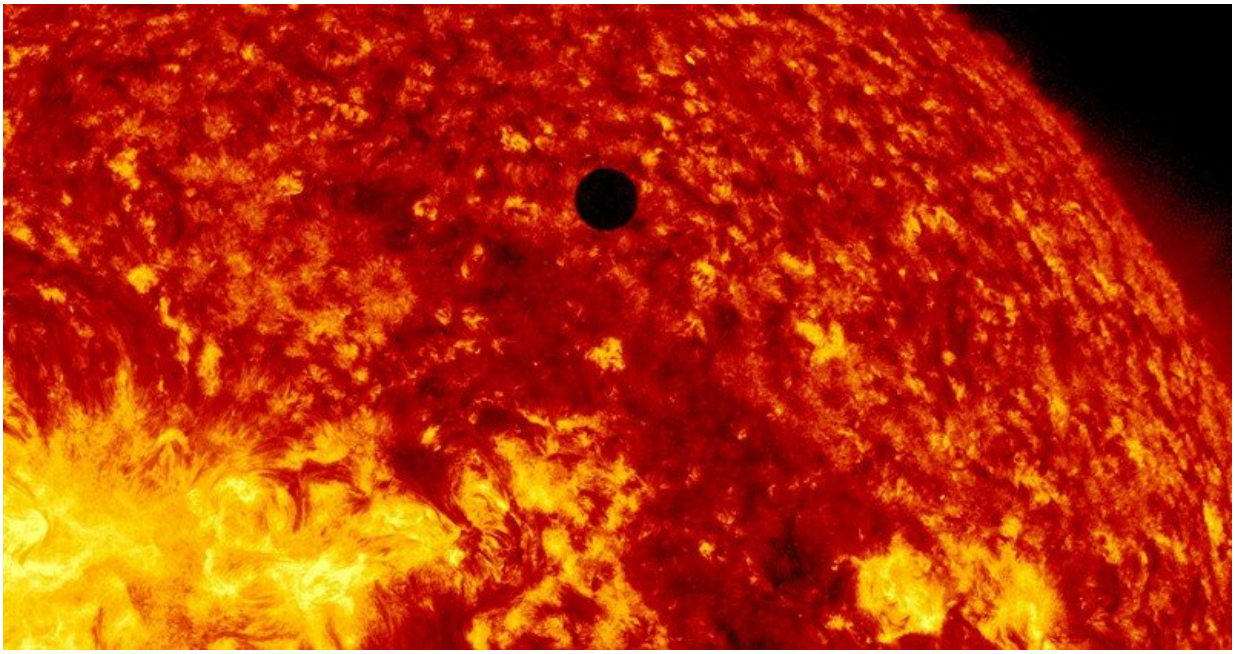

Scientists recently reported the discovery of the gas phosphine around Venus, which may point to microbial life. Venus is the second planet from the sun in our solar system and inhospitable for humans — at least in our current form. Credit: NASA

The planet Venus has arguably remained less captivating than, say, the legendary tennis star or, for that matter, the women's razor blade company—both of those Venuses have at least enjoyed ample airtime on cable TV.

But the second rock from the sun? Meh. It has never radiated the sex appeal of Saturn's rings or dominated space-centric pop culture like Mars.

For the 70 million Americans who read horoscopes, the so-called evening star planet has maintained relevance mostly as an indicator of astrological fortune. Named for the Roman goddess of love, the positioning of this celestial body is thought to dictate Earth-bound matters of the heart. (A bit ironic considering the origin story of said goddess is anything but romantic—legend has it she was born from the castrated testicles of Uranus, father of the sky, after his genitals were thrust into the sea.)

But in September, Venus became more than cosmic fodder for pseudoscientific stargazers. In the journal *Nature Astronomy*, planetary scientists from the United Kingdom, the United States and Japan reported on telescope observations that suggest the existence of phosphine gas in the planet's clouds. The news spurred intergalactic shockwaves not seen since Captain Kirk negotiated peace with the Klingons.

"It's an exciting discovery for sure," said Sarah Dodson-Robinson, associate professor of physics and astronomy at the University of Delaware. Not directly involved in the phosphine research, she studies planet formation and has previously partnered with NASA and the National Science Foundation. "On Earth, this gas is generated by biological organisms—that's the only source. So this could potentially be a sign of microbial life."

It is an especially significant finding considering Venus—rocky and orange-hued—has consistently failed to make NASA's shortlist of promising orbs when it comes to the search for life beyond Earth. At 880 degrees Fahrenheit, the planet is hot enough to melt lead. It is also

home to sulphuric clouds that rain acid and a brutal atmosphere comprising 96 percent carbon dioxide. Meaning? "If you were to stand on the surface of Venus, you would be crushed," Dodson-Robinson said. In other words, this is not an easy place for earthlings to explore, and it has never been considered all that habitable, anyway.

Until now.

While Dodson-Robinson stressed the importance of follow-up—some scientists question whether the found gas is really phosphine at all, while others suggest its source could be volcanic eruptions or some other geological process—she said the report will likely lead to renewed interest in Venus from NASA. It will also impact her own work.

"Right now, I'm conducting a search for Earth-like planets orbiting other stars," she said. "But it is actually easier to search for Venus-like planets, because they are easier to see. Maybe this discovery means we get more excited about those Venus-like planets, rather than writing them off as uninhabitable. It opens up the imagination to more possibilities, and that's really motivating."

The impacts of this research aren't confined to the field of astronomy—they have also raised questions in the international-relations arena.

Shortly after the phosphine findings went public, Dmitry Rogozin, head of the Russian space agency, remarked that he considers Venus a "Russian planet." His reasoning? The Soviet Union sent multiple missions and launched the only spacecraft to land on the planet's surface—it was called the Venera 7, and it measured the temperature of the Venusian atmosphere in 1970. Immediately following this statement, speculation began that Russia was laying groundwork for a potential claim of sovereignty.

But can a country really do that?

"The brief answer regarding whether Russia can lay claim to Venus, or any other celestial object for that matter, is no," said Matthew S. Weinert, associate professor of political science and international relations at UD. He cited a law that prohibits the calling of cosmic dibs. In 1967, members of the United Nations negotiated the so-called Outer Space Treaty, which prohibits any nation from making a claim of sovereignty over celestial objects through use, occupation or any other means.

This treaty was tested in 1976 when eight equatorial countries grew alarmed by the positioning of satellites in the geostationary orbit, 36,000 kilometers above Earth. Through the Bogota Declaration, these countries claimed this orbit as an extension of their air space and declared sovereignty. But because non-appropriation of outer space had been enshrined into international law—and because there is no way to enact control over an orbit, anyway—this declaration did not hold water. Similarly, Weinert said, any modern claim on Venus would be nothing more than a "meaningless gesture."

So phosphine on Venus may not become a source of international conflict, but it may become a source of something far more appealing: Hope. This is because, according to astronomers, Venus was not always home to hellish temperatures and a crushing atmosphere. Billions of years ago, the planet was a mild place with surface oceans and maybe even living things. But then, as the sun grew brighter, these oceans boiled. If life on Venus did not totally disappear when this happened—if it merely evolved into some microbial form that exists in the clouds—then, perhaps, the same will hold true when (spoiler alert) Earth's oceans inevitably boil in approximately one billion years.

Of course, not everyone will find comforting the idea that life as we

know it on Earth is going to disappear eventually but, hey, maybe not entirely. For some, any discussion of the final frontier is an unsettling reminder of humanity's infinitesimal place in the cosmos.

"Encountering another life form could trigger a sense that the universe is vast and there's so much more beyond us—a sense that we're insignificant," said Jean-Philippe Laurenceau, UD's Unidel A. Gilchrist Sparks III Chair in the Social Sciences and a professor of psychological and brain sciences. He is trained as both a clinical psychologist and relationship therapist. "This can trigger salience to one's own mortality, which leads to uncertainty—an anxiety-provoking state. Whenever humans feel this way, we seek ways to feel more certain. We want to have control over our environment."

This means it is plausible, Laurenceau added, that the recent Venus news could have more Americans turning to astrology, one of the avenues by which humans seek greater control over their existence. It doesn't matter that the practice is scientifically unfounded—converts find comfort in the supposed fortune-telling power of the stars.

This belief, according to Laurenceau, can become a self-fulfilling prophecy that is potentially damaging. If Venus predicts the implosion of your relationship this week, you may start fixating on how your partner chews with an open mouth or leaves dirty socks on the kitchen counter. By Friday, you are drafting an it's-not-you-it's-me email.

"Astrology impacts us because it leads us to make cognitive mistakes and errors," Laurenceau said. "We believe our relationship broke up because it was written in the stars, not because we have filtered out our partner's positive behaviors and focused on the negative."

So, if not obsessing over one's star chart, what can a person do to cope with the exciting, unsettling, thought-provoking news of possible life on

another planet?

Buckle up, for starters. This is only the tip of the meteor.

"It is a really exciting time in planetary astronomy, notwithstanding the possible phosphine discovery on Venus," Dodson-Robinson said. "There is a lot of really cool stuff going on."

More information: Jane S. Greaves et al. Phosphine gas in the cloud decks of Venus, *Nature Astronomy* (2020). DOI: 10.1038/s41550-020-1174-4

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