HOW VENUS BECAME COOL:
SOCIAL AND MORAL DIMENSIONS OF BIOSIGNATURE SCIENCE

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Abstract

A 2020 scientific report indicated the presence of phosphine, a potential biosignature chemical, in the atmosphere of Venus. As a result, Venus instantly became a global cultural celebrity. How did Venus become so fashionable, so *cool* in colloquial language, so quickly? I contend that Venus became the center of attention at least temporarily because Venus became moral. Since *life* at present is a concept that is as much moral as it is scientific, I explain this point by offering a geographically broad sampling of world philosophies that show that secular and religious Western forms of thought strongly value life over nonlife as do many Asian traditions. These cultural valuations of life over nonlife become infused in human psychologies globally and astonish us at the discovery of extraterrestrial life. This essay's substantial culture sample thereby demonstrates that Venus became revered because of deep-seated but also widespread attitudes of special moral attendance to the presence of life especially in extraterrestrial settings.

Keywords

biosignatures, life, Mars, religious ethics, research ethics, social roles of science, Venus

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1. Introduction

In September 2020 the news of a possible biosignature in the atmosphere of Venus spread quickly around the world amid members of the astronomical community and the general public alike. A team of researchers found that Venus' atmosphere may consist of 20 parts per billion of phosphine (PH_3), which can be an indicator of the presence of life (Greaves et. al. 2020, 1). Tellingly, and regardless of the quality of this research, on its own this discovery of atmospheric phosphine on Venus technically remains a relatively minor piece of information about planetary chemical composition. Indeed, at the time of this writing this phosphine has not been confirmed nor has a mundane abiotic cause for it been ruled out.

Nonetheless, as a result of what was widely perceived as a discovery of possible life on Venus, overnight the planet transformed from being considered too hot for life and hence overlooked to an exciting Earthwide cultural phenomenon as the object of everyone's conversation and telescope. Queries filled the inboxes of astronomers, who then may have pointed their instruments at Venus. Popular culture reports abounded in arguing, usually implicitly, that Venus became a qualitatively different world due to its alleged scientific potential for life. As Mark Zastrow wrote for *Astronomy Magazine*, "Move over Mars and make room for Venus" (Zastrow 2020).

In this way a smudge of reputed phosphine instantly made Venus a cultural darling capable of crossing ordinary political, religious, geographic, and academic boundaries. The sensational nature of this imaginary planetary shape-shifting was

captured in the somewhat misleading news headline, "Scientists believe there may be alien microbes floating in Venus' atmosphere" (Karlis 2020). Hence, because of its perceived potential for life, the otherwise putative lifeless hothouse of Venus became *cool*, colloquially speaking, in Oxford English Dictionary terms of being "admirable" while also being "fashionable" and "up to date" (Oxford English Dictionary 2021). The speed and completeness of this metaphorical terraforming of Venus from 450º C (Coustenis and Encrenaz 2013, 88) to cool was breathtaking to behold.

Why does a biosignature draw a reaction so strong that in a flash it can flip an entire planet from forgotten to fashionable and admirable? In this article I explore an answer to this question that highlights the moral dimensions and social roles of extraterrestrial biosignature science. As I will explain further, at least temporarily Venus became a fashionably admired place because Venus became moral. Of necessity a biosignature is a concept that is both scientific and moral, with this moral dimension's setting biosignature science apart from some other forms of scientific discourse. An extraordinary extraterrestrial biosignature therefore provides not just scientific questions but also moral challenges, and navigating these unavoidable ethical pressures can be interesting, joyful, and even fun despite their serious nature. By posing a test as a gripping moral puzzle combined with a fascinating scientific reality, Venus thereby became the stimulating, esteemed friend of many people.

In describing this dynamic first I offer some contextualizing background to these claims before I probe some Western cultural factors behind the adoration of Venus that occurred across much of our globe. Some Asian cultural appearances then more precisely

illustrate my characterization of an urgent moral factor within biosignature science which accompanies its capacity for scientific amazement. Both in the West and in Asia we will encounter attitudes, fueled at least in part by some religious anthropocentrism, in which living entities remain more valued morally than do nonliving beings. Then, in the conclusion, Mars offers food for thought about how biosignature scientists can change our perceptions of entire planets in both scientific and public imaginations.

2. Background to the Problem

There are several reasons one may give for why at least temporarily Venus was placed with Mars as one of the most fascinating places in the solar system. One obvious reason is a scientific one. Locating life off-Earth, should this happen, will represent one of the most poignant of research discoveries (Preston 2016, 154), because understanding whether or not life exists only on Earth remains an ongoing scientific controversy. It is difficult scientifically to define the word "life" when we have only one sample source, the planet Earth, to inform our definitions (Cockell 2016, 169). Therefore, answering the question, "Are we alone?," in terms of life itself rather than in terms of intelligent life is one of the "basic reasons for exploring space," in the eyes of the space policy scholar Daniel Deudney (2020, 97). Finding life beyond Earth thus undoubtably could produce dramatic effects across a number of different scientific fields.

Beyond this scientific dimension, though, finding life beyond Earth also bears potential large repercussions economically, politically, and socially (Helmreich 2009, 2, 110). Moreover, for reasons of evolutionary adaptation humans may possess a biophilic

"innate tendency to focus on life" according to the biologist Edward O. Wilson (1984, 1), and this would make finds of off-Earth life seem special to us. Extending Wilson's insight, the theorist of religion Pascal Boyer (2001, 218) argues that innately we are cognitively attuned to distinguish "animacy systems," or presumbably living things that move "in a purposeful manner," from "artifacts," which, being presumably lacking in life, exhibit what Boyer calls Newtonian nonpurposeful motion.

These reasons do not explain satisfactorily why Venus became an instant global celebrity, though. For example, some quite meaningful scientific discoveries of minerals on Mars (Christensen 2000, 9623) have caused barely a ripple with the public, but a little unconfirmed phosphine on Venus grabbed everyone's eye, demonstrating that something more than science is at work in the public perception. Moreover, intriguing living beings still are being discovered on Earth constantly (Onstott 2017, 2-8), but their debuts in our awareness usually do not make the news splash that Venus did. We are used to considering that previous unknown life may exist in an Earth jungle, ocean, or underground cave, after all. Finds of extraordinary life on the bountiful "Oasis Earth," as Deudney (2020, 101) calls our planet, therefore do not require us to reconsider much our inner moral maps of the universe in which we reside. Yet the surprise of locating life on Venus, should it happen, demands that we engage in large-scale ethical reassessments of who we are and where we live.

Thus, instead of purely scientific reactions to finding life on Venus, an ethical impulse also is at work here because *life* may be and is a great object for science to understand but in itself *life* as a concept is both ethical and scientific (Benner 2010,

1021). Life cannot be scientifically defined, quantified, or measured, at least not at present (Cockell 2016, 170). But life is a concept that our morals have tried to define at least since the Pythagorean philosophers in preChristian Greece, the Upaniṣadic books of ancient India, and the two-millennia-old Chinese classics that still are taught today. And if our morals have not exactly quantified life, for centuries our senses of ethics in their own ways still have measured life, its meaning, and its value for us.

A scientific find of life as implied by the *bio-* in *biosignature* therefore inherently also exists as an ethical discovery in terms of impact. "Life is important" is a moral statement, not a scientific one, so that the thrill that we may feel as a result of a biosignature discovery erupts at least in part because it orients our deep moral compasses. Potentially finding life astonishes us for significant moral reasons along with purely intellectual ones. On Earth, this effect remains mostly unremarkable, as I mentioned, since discovering life here may be enthralling but is not a great revelation. But a find of life on Venus or Mars forces us all to reassess dramatically our own inner moral maps of the universe (Race 2009, 218).

Therefore, lurking among and energizing elements like science or economics, one reason why an extraterrestrial biosignature is so charged for us psychologically is that the presence of life marks a location as morally relevant. As I explore more fully below, because of deep cultural traditions that impact almost all humans, albeit in varying ways, even people who profess no religion may remain affected by widespread and common philosophical, social, and religious notions that being alive makes something morally relevant and worthy of our attention. Being socialized into such cultural valuations of life

over nonlife while we are still in diapers, our psychologies then ramify enculturated beliefs regarding life in terms of subjective importance.

Appropriately comprehending these psychodynamics requires recalling that, ever since Sigmund Freud instituted his concept of the superego in the early twentieth century, part of the scientific understanding of being human involves being a moral person (Freud 1990, 22-37). A mountain of psychological research collected over decades indicates that we locate ourselves in the universe not just cognitively but also morally (Doris 2012, 1-3). Of course, like with the physical spatial processing performed by the brain, much of the reflection by which we locate ourselves in the world morally may happen outside of our direct awareness or disguised as things like local customs (Fowler 1995, 1-37). Nevertheless, closely attending to what is alive and what is not remains a foundational human preoccupation from a moral perspective, if not for other reasons, so that if we think that life stirs in the clouds of Venus, we humans ethically are programmed to notice and respond with interest.

Continuing with this line of thought, by foregrounding the topic of life, biosignatures mark locations as ethically, rather than merely scientifically, existent and relevant. Extraterrestrial biosignature science and ethics therefore inherently collaborate in challenging us to reconsider our personal moral outlooks, and since this task can be enjoyable as well as serious, planets who provide us with this profound test become revered cultural icons. We have software that can map our physical cosmos in three dimensions because of optical, infrared, or radio signatures; likewise, studies that locate

biosignatures help us to create updated internalized maps of our moral universe, so that biosignature detections reverberate through our psychologies and social lives.

In this article I contend that it is the construction of such revised moral maps, not just science alone, which helped Venus to rival Mars in visibility and popularity. Whether we were consciously aware of this effect or not, we got excited because Venusian phosphine potentially helped us to enrich our inner ethical cartographies. In order to understand more fully why Venus could be so respected, I now examine several Western cultural traditions for some argumentative grounding before turning for evidence of this dynamic within some Asian cultural formations.

3. Western Cultural Traditions Treasure Life

When it comes to Western cultural views about life, along with some other scholars (Matthews and McMahon 2018, 55-60) I vigorously argue that to be environmentally responsible we must extend our circle of moral concern beyond living things to include nonliving elements of ecologies (Capper 2020, 1-18). Yet the jury is still out on ubiquitous adoptions of this broader environmental perspective. What currently is undeniable is that looking across times and cultures, such as in the West, one can find influential and treasured concepts of life that may alter our imaginary of Venus like recently occurred.

Regarding Venus, a rather direct impact of the moral treasuring of life comes from the secular Western philosophies that undergird much of the sciences and inform a good deal of the debate about life and ethics within astrobiological circles today (Cleland

and Chyba 2002, 387-393). In themselves these secular Western philosophical ethical outlooks exhibit the valuing of life over nonlife, or what the philosophical space ethicist James S. J. Schwartz has called a "life bias" in space science ethics (Schwartz 2020, 124). For instance, despite some critics of the practice of intrinsically valuing off-Earth microbes in formal ethics deliberations (Smith 2009, 277), the astrobiologist Charles Cockell has extended "telorespect" to potential microbes elsewhere because of the possession of "rudimentary interests" by protists (Cockell 2016, 170-171). But nothing in Cockell's argument about "rudimentary interests" seems extensible directly to nonliving entities, thus functionally meaning that even his generous argument favors life over nonlife. In this way current astrobiology, with a few possible exceptions aside (Marshall 1993; Matthews and McMahon 2018; Schwartz 2020; Capper 2020), appears in its literature to value living entities in a way that it does not value nonliving beings. As the space scholar Brian Patrick Green (2020, 180) put it flatly, "We ought to protect living things."

This contemporary Schwartzian "life bias" attitude, however, in strong measure sprouts from older philosophical and religious roots that feature the greater moral valuation of life. Such valuation of life over nonlife, for instance, emerges from the Great Chain of Being concept in the philosophy of Aristotle that for centuries has dominated Western philosophical notions of life. In his *History of Animals* and *De Anima* Aristotle (384-322 BCE) attempted a comprehensive survey of the natural world by grouping varying existents into categories (Lovejoy 1976, 24-66). While there is evidence that Aristotle himself did not perceive of these categories in terms of a hierarchy, almost

everyone since him has graded these categories into preferred levels, and by medieval times it was standard to understand the Great Chain of Being that Aristotle delineated as a ranked ladder. At the top of the Chain in the medieval worlds affected by Aristotle stood God, with humans ranked below the divine (Lovejoy 1976, 67-98). Within levels diminishing in value below humans emerge in order animals, plants, and minerals, leaving things thought to have life to be considered as qualitatively higher morally than nonliving entities. Because this Great Chain notion has been a part of Western philosophies for so long, the philosopher Arthur O. Lovejoy claims that it represents "one of the half-dozen most potent and persistent presuppositions in Western thought" (Lovejoy 1976, vii), and today the concept still subtly if strongly shapes the viewpoints of both secular and religious EuroAmericans.

A cause and effect of the compulsion to order Aristotle's universe into a hierarchy came from the integration of his philosophical concepts with those of the Bible that is sacred to Jews, Christians, and Muslims, with the latter also revering the Qur'ān (Foltz 2006, 20). The Bible overwhelmingly focuses on the salvation of humans, so it leaves little room for valuing even nonhuman animals. The Bible's Genesis 1:20-31, in fact, famously grants humanity "stewardship over the fish of the sea, and over the birds of the air, and over the cattle, and over all the earth, and over every creeping thing that creeps upon the earth" (Hobgood-Oster 2008, 4). In the Bible nonhuman animals remain inferior to humans, and even worse, plants, minerals, and water formations, being considered even lower in moral value than animals, remain utterly overlooked in terms of ethical importance, since they serve as the meaningless furniture of existence (Capper 2016, 76-

77). The same passage in Genesis that grants humanity stewardship over "living things" grants stewardship over nonliving nonhuman entities, too, but does so tacitly, as apparently nonliving entities remain unworthy of mention. Mt. Zion in Jerusalem may be holy but inert mountains in themselves Biblically are just objects for human use (Capper 2016, 76-77). These relative valuations of life over nonlife from the Bible then merged with philosophical notions like the Great Chain of Being centuries ago, thereby creating the worldview taken as common sense by many nonreligious and religious Westerners today that humans are higher in value than are animals, who in turn outrank plants in value, with plants lording over lifeless minerals and water formations in their senses of preciousness (Mix 2019, 17-78).

With contentions concerning plants and some anecdotal exceptions set aside here, the overall thrust of this Biblical thinking is that life has value and nonlife does not. Because of this heritage within their religious and wider cultural teachings even secularists, not to mention Jews, Christians, and Muslims, may be predisposed today to a startled effect from biosignatures, since biosignatures demand moral reflection about salient appearances, living things, that are contextualized within a decisively higher social regard for life than nonlife. And when a place like Venus or Mars impresses us because it may support life, it therefore becomes extremely, if metaphorically, cool.

I offer these comments to delineate some of the culturally ubiquitous sources of values that may lead to the transformations of Venus in scientific and public imaginations. Such an understanding provides some supporting fabric for my example of biosignature effects within Asian cultural worlds, to which I now turn.

4. Buddhist Valuing of Life

I choose to examine Buddhism as an Asian cultural example within this essay for two reasons. First, Buddhism, which "values life deeply" (Traphagan and Traphagan 2015, 306), supplies a vivid instance of my point that culturally we tend to value life more than nonlife, thereby regarding Venus differently if life perhaps is found there. Additionally, Buddhism's dynamics in valuing life over nonlife remain not dissimilar from those of Buddhism's religious cousin of Hinduism. Generally, my Buddhist example in this essay more or less also represents the views of many Hindus, while differing in some specific details which for our purposes in this essay are insignificant. In this way as a representative sample the Buddhist views I examine here pertain approximately to more than two billion Asian people or about one-third of all humans today. This large sample allows me to demonstrate how huge numbers of humans at present substantially treasure living beings more than nonliving beings, leading to heightened interest in biosignatures relative to other types of scientific finds. In other words, along with the Aristotelian and Biblical heritages that we examined, Buddhism helps to explain the global nature of the phenomenon whereby planets and moons become fashionably admired like Venus did.

In the Buddhist world we can understand the excitement that biosignatures can generate by looking at a basic Buddhist cosmological presumption, the divergence between a realm of living beings and a receptacle realm for housing living beings. Buddhism posits that the universe can be divided into two realms that, depending on

which Buddhist one asks, represent actually existing ontological facts or, more figuratively, dual mental points of view regarding the same reality. Whether actual or figurative, though, the first of these realms, the *sattvaloka* or realm of living beings, consists of a layered Buddhist understanding of the cosmos (Harris 2006, 207-217). According to Buddhist thought, living beings reincarnate and do so within at least five levels (Ñāṇamoli and Bodhi, 1995, 168-169).

The collection of these levels of rebirth is called samsara, a word of such cultural importance that it already has entered the English language from Sanskrit. The highest level of rebirth in samsara is that of the gods, who must be understood correctly. These Buddhist deities are not creating and judging single gods like that of the Bible. Instead, they are plural beings of limited life span and power whose quality of existence is very high when compared to that of humans. Sometimes this spirit realm is divided into two levels, that of the pleasure-intoxicated *deva* gods and that of the strife-prone lesser spirits known as *asura*s (Suzuki 1973, 274). This latter division of the god realm into two sectors creates a universe of reincarnation which consists of six levels, not five, as one sees artistically in the famous Tibetan Wheel of Life image (Teiser 2006, 55).

Below these spirits in the realm of living entities rests the level of human beings. Humans are prone to greater suffering than are the gods, which from a Buddhist point of view is a good thing, since increased pain lends motivation to humans to engage in spiritual practices (Ñāṇamoli and Bodhi 1995, 168-169). The nonhuman animal realm manifests one rung below humans, so that animals and humans can be reborn as each other. Important to this article, this means that nonhuman animals who live retain a

cosmic kinship with humans who live and therefore enjoy great value. If grandmother may be reborn as a chicken, for instance, one may wish carefully to nurture that chicken, thus emphasizing the value that a living being can enjoy when compared to a nonliving one that cannot be reborn. In addition, appearing in the two lowest rungs of Buddhist samsara are ghosts and hell beings. Although unpleasant human actions can result in one of these rebirths, in Buddhist belief one eventually dies as a ghost or hell being and thereafter can move up to the less stressful realms of rebirth like that of humans, unlike in Western Abrahamic religious lore.

Given this tiered notion of the universe, Buddhist ethics emphasize the importance of valuing living beings, the ones who experience reincarnation across these levels rather than perceived nonliving entities. In terms of practice this valuing of living things may include Buddhist vegetarianism or veganism, for instance, or the existence of Buddhist animal sanctuaries (Capper 2021, 1-22). No matter what the behavioral outcome, though, Buddhist ethics remain more stringent when dealing with humans and other animals than they are with things that are considered nonliving (Capper 2021, 1-22). For instance, the Buddhist monastic code for nuns and monks condemns killing human or nonhuman animals but lacks similar strictures that protect mineral formations, bodies of water, or other nonliving things. A Buddhist nun endures expulsion from the monastic community for killing a human and must confess publicly to killing a living animal, but she faces no discipline for destroying the integrity of a perceived nonliving thing like a stone (Capper 2020, 7-9).

This differential of value between living and not stems in part from the nature of the second realm of the universe according to Buddhist cosmology, the *bhājanaloka* or "receptacle realm" (Harris 2000, 128-156). We see its lesser value written into its name, which indicates that it is just a receptacle for living beings. Receptacle realm elements include perceived nonliving existents that are not available for rebirth such as water, mineral formations, and, for Buddhists (Hindus may differ here), plants. Because these constituents are not available for rebirth, they lack moral parity in Buddhism with what Buddhism considers to be living things that do reincarnate (Harris 2007, 149-168). This difference in value in turn then means that nonliving things exist essentially at the disposal for humans and other living beings. The nonliving existents of Buddhism's receptacle realm thereby represent the banal backdrop to existence, lacking almost any sense of importance in themselves. The present-day Buddhist leader the Dalai Lama of Tibet, in fact, openly describes the receptacle world of the nonliving as "secondary" and of lesser moral value than the realm of living beings who reincarnate (Lopez 2008, 70). The medieval Japanese Zen master Dōgen may have taught that apparently nonliving mountains are enlightened beings (Tanahashi 2012, 154-155), but voices like Dōgen's are exceptional and unrepresentative within Buddhism's overall trajectory, in which life is valorized and nonlife often taken for granted (Capper 2021, 1-22).

The divergence in value between Buddhism's realms of living beings and their receptacle realm helps us to understand how Venus suddenly became so popularly admired. From the point of view of these Asian ideas, the notion that living beings potentially may exist on Venus altered the planet's ethical valence from

nonliving/nonmoral to living/moral. And, once a place like Venus has entered our moral radar, we must find room for it in the ethical maps by which we all live. When enough of us reflected on facts about alleged Venusian biosignatures and thereby stimulated a rich inner response that was in part moral, we then woke up one day to notice that Venus' reputation had transformed from sideshow to global cultural celebrity.

5. Conclusion

In 1976 two Viking landers looked for extant life on Mars via four different experiments. One of these experiments, the Labeled Release trial, sought to find $^{14}CO_2$ as a biosignature arising from mixing water and nutrients with Martian soil. Interestingly, the test appeared to give a positive result, allowing the interpretation of the discovery of an extant life biosignature. But this interpretation conflicted with other test results, so that since the time of the Viking mission most scientists have considered the Labeled Release experimental outcome to be negative. Nonetheless, some controversy regarding the Labeled Release experiment still simmers today (Coustenis and Encrenaz 2013, 99).

Like the space policy scholar W. Henry Lambright (2014, 8), I offer that the continuing fascination of this experiment and of Mars in general derives from more than their scientific value, which so far is indeterminate at best. Attention to Mars also emerges from more than the potential economic, political, and social ripple effects that finding a biosignature of life could inspire. I contend that the Labeled Release experiment incited a significant effect even before the Viking probes were launched because of the capacity of the experiment to allow us morally to place ourselves within the universe in a

most profound way. If Viking definitively had found a true biosignature on Mars, then today we all would be uniquely challenged to embrace new paradigms for how to meet some deep moral psychological needs.

Of course, current and future investigations for biosignatures extend at present beyond the Viking probes and the phosphine on Venus to include other parts of Mars, Jupiter's moon Europa, Saturn's moon Enceladus, and even the atmospheres of far away exoplanets. Naturally some scientists hope that these explorations reveal intriguing evidence of the certain existence of extraterrestrial life.

However, one thing that we can count on during these quests is the ability of such research metaphorically to terraform various places and thus render them culturally cool. We humans have needs to locate ourselves in the universe morally as well as cognitively, and finds of extraterrestrial biosignatures excitingly impel us to reassess the moral landscapes around us and our places within those landscapes. The spark of recognition of an effective new moral map of one's universe contributes, with other factors, in making us respond positively to scientific reports of biosignature discoveries. Because of their abilities to instigate such moral reassessments, we should expect biosignatures to continue to astound us with ethical puzzles while they illuminate more planets and moons as delightfully, if figuratively, cool.

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