

## Interstellar Messaging—An Embodied Perspective

Carrie Paterson, California State University, Fullerton. [carriep@rof.net](mailto:carriep@rof.net)

This paper suggests rationales and new methodologies for sending interstellar messages in the search for extra-terrestrial intelligence. While it is widely accepted that radio signals are the most applicable way to send interstellar messages, other methods should also be explored. I propose multi-colored lasers with light polarization be considered for sending signals because of the possibilities to create multi-channel, pluralistic and complex representations of terrestrial environments and the embodied experience of living on Earth. This paper gives the background to justify the proposal. As far as we know, Earth is a unique heavenly body, though new findings suggest habitable planets in the Milky Way galaxy and the universe on the whole are common. Any signal should reflect an acknowledgement that life on Earth—and indeed, our intelligence—arises from and is specific to our environment. While this paper cannot concentrate on the technical aspects of encoding interstellar messages to differentiate a signal from noise<sup>1</sup> or the physics of optical signals due to time and my own lack of expertise, it will cover the historical aspects of interstellar messaging, and a critique of how our bodies have been envisioned and translated into binary code for transmission through space. As well, I lay the groundwork for future explorations about the new freedoms and conflicts that technological developments have proven to bring to the science of interstellar messaging, and how a confrontation of past efforts opens a window onto creative ideas for constructing future signals.

As an artist-researcher I have studied the history of interstellar communications, both in signals and on spacecraft, as well as current trends. With a focus on the aesthetics, cultural assumptions and underlying meanings in such constructed messaging, I have also been keen to explore the way information comes to us through multiple sensory inputs, and not only through the visual. Sight is interestingly privileged in both astronomy and art. To dismantle this innate hierarchy of the senses in both fields is not an easy task—some may say, perhaps, an impossible one—but studying the artworks and communications intended for extra-terrestrial audiences creates an opportunity. Communications meant to represent something as abstract as “humanity” have changed over time in fascinating ways and should keep evolving as we understand ourselves and our universe as comprising many “dimensions.” One of these is to look beyond our willful “blindness” toward exploring space using only visual tools. What are to be the next steps in the efforts to send interstellar messages is an open question that is important to entertain—be it thought experiment or to influence the reality of scientists who have taken it upon themselves to represent us all. The discussion and implications of countering prejudice toward visibility is worthy of endeavor.

The common acronym for sending interstellar messages to possible sentient beings residing elsewhere in the universe is METI—Messaging Extraterrestrial Intelligence. SETI, the Search for Extraterrestrial Intelligence, has been going on since

---

<sup>1</sup> For an excellent discussion of power laws, including Zipf’s Law, informatics, and an analysis of entropy and complexity in communication signals, see Ballesteros, Fernando J. *E.T. Talk: How Will We Communicate with Intelligent Life on Other Worlds?* Springer Press. 2010. Pages 135-140.

the mid-1970's, with METI being part and parcel of the same activity although with different hopes, its own set of critical and technical issues, and social functions. SETI is a form of listening, and this listening can be a kind of spying; it is an activity cloaked in safety and suggests pre-emptive action—war, evasion, strategy, control. We have been listening to the universe most carefully with large arrays of radio telescopes positioned strategically all over the globe. SETI activities have encompassed locations as diverse as Arecibo, Puerto Rico; the University of Western Sydney, Australia; the SETI@home project, which solicits individuals to use their personal computers during off-times to analyze data; and until 2011, when it was shut down due to lack of funding, the large Allen Array in Northern California.

Apart from the general noise of radio and TV broadcasts leaving our planet, making us a loud little dot in the sky, we've been issuing intentional communiqués (METI) into space in one form or another since 1972. We have sent solid forms of data with every spacecraft. The *Pioneer* probes (1972, 1973) carried small, gold-anodized aluminum plaques featuring pictures of a male and female human, trajectory of launch, location in the galaxy according to our sun's distance from fourteen pulsars, and characteristics of hydrogen, the most abundant element in the universe (Figure 1).

*Voyagers I and II* (1977) bear the famous Golden Records with greetings and pictures of Earth; the *Voyagers* are close to exiting the heliosphere (the plasma “bubble” created by our sun) and will start their journeys into interstellar space this decade. On Mars, all of our rovers carry CDs with thousands of names.

The first radio message designed as METI communication was sent from Arecibo, Puerto Rico in 1974. This “Cosmic Call” had several authors including Carl Sagan and Frank Drake. In 2001, the Evpatoria Deep Space Center in Crimea transmitted the “1<sup>st</sup> Theremin Concert for Aliens.” And in 2009 the Canberra Deep Space Communications Complex in New South Wales, Australia sent text messages from around the world parsed from HelloFromEarth.net to a possibly habitable planet twenty light years from Earth, Gliese 581d. The latter is due to arrive in 2029, and it is hoped we might even get an answer within many of our current generations' lifetimes.<sup>2</sup>

Our METI communications, as opposed to our SETI activities, have suggested diplomacy. This activity has to continue to be targeted, considerate, and careful. However, I argue, what we could put forth specifically toward solar systems thought most likely to have intelligent extraterrestrial life, needs to be rethought. Every piece of

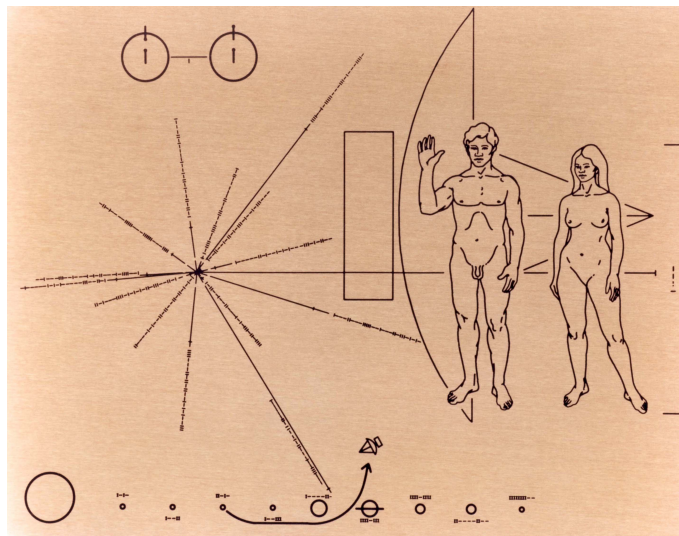


Figure 1 – *Pioneer* plaques. Wikimedia commons.

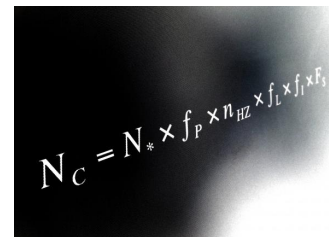
<sup>2</sup> HelloFromEarth.net.

our collective history, mistakes made, issues that have surfaced in conflicts around the planet, the legacies of colonialism, and the knowledge of our own biology, must inform what we send. Below I consider why it is just as important to present an honest portrait of where our species is in its development and evolution, which just as much includes the function of desire (perhaps a vestigial aspect of reproduction), and our consideration (or lack thereof) for our environment, as it does our so-called “advanced intelligence,” a false measure against which we have as yet found no comparison.

In lieu of any received ET signal, it has been widely observed that METI is like a time-capsule project. What we send reflects on the sender and the historical period. In this, with METI we are in the middle of a great humanistic exercise, sending messages primarily to communicate with ourselves and show ourselves who we think we are at that moment in time. The reflection we see looking back with hindsight is not particularly flattering, and may be even a little embarrassing, as technological advances speed us into a more and more sophisticated future and our social morays change.

METI signals are ultimately legacy projects—perhaps to be read long after the human species is extinct. The instigator for the first message on *Pioneer 10*, Eric Burgess, then with the *Christian Science Monitor*, wrote: “Once there was a planet called Earth that evolved an intelligent species, which could think beyond its own time, and beyond its own Solar System.”<sup>3</sup> There is a bittersweet tone and edge of sadness on the margins of all enthusiasm for METI. In fact, my take-away from *SETIcon I* (a conference held August 13-15, 2010 by the US organization “SETI” in the heart of optimistic Silicon Valley, California) was an underlying, unspoken mistrust of humanity to pull itself out of its path to extinction. To me, a hint of misanthrope is contained in METI efforts, relating to the fact of our wars, and constant upheaval, and inability to stay off the most inevitable fate for all of us, death. *SETIcon I* lectures suggested a desire to show “someone” humans were alive once, and I interpreted this to give comfort in the face of a scientific rationalism denying religion and “god.”

The existential crisis bordering METI is nevertheless, overshadowed by its central, supporting belief system—a blind conviction that SETI efforts will result in new information during the next thirty years. The Drake Equation (Figure 2) is a formula that conveniently determines a massive number of extra-terrestrial planets with characteristics that could bear life and communicate. While this seems totally logical, though now heavily critiqued,<sup>4</sup> it cannot be a coincidence that the



$$N_c = R_* \times f_p \times n_{HZ} \times f_l \times f_i \times f_c$$

Figure 2 – The Drake Equation.  $N$  = the number of civilizations in our galaxy with which communication might be possible; and  $R^*$  = the average rate of star formation per year in our galaxy;  $f_p$  = the fraction of those stars that have planets;  $n_e$  = the average number of planets that can potentially support life per star that has planets;  $f_l$  = the fraction of the above that actually go on to develop life at some point;  $f_i$  = the fraction of the above that actually go on to develop intelligent life;  $f_c$  = the fraction of civilizations that develop a technology that releases detectable signs of their existence into space;  $L$  = the length of time for which such civilizations release detectable signals into space.

Text: Aguirre, Lauren. “The Drake Equation.” PBS.org: NOVA ScienceNow. July 1, 2008. Graphic: The Open University. [Open.edu](http://Open.edu).

<sup>3</sup> Ballesteros. Page 141.

<sup>4</sup> The Drake Equation has been critiqued by many people—scientists to science fiction authors—since it was first articulated by Frank Drake in 1961. For a brief run-down on critiques and updates to the equation, see [en.wikipedia.org](http://en.wikipedia.org).

equation also supports the conviction *we will hear from someone within the lifetime of those advocating the SETI projects*. In the panel discussion “ET Aesthetics,” Doug Vakoch, Director of Interstellar Messaging for SETI, suggested the human experience to date of “struggle to survive” is a “precariousness” that “an old ET civilization may have surpassed,” and of which “they only have dim recollections.” The assumption here is that survival is ultimately possible, and the goal of civilizations.

In the early years of METI, an important role influencing the popular culture of belief in extra-terrestrials was played by astronomer Carl Sagan, who was inspired by the *Vikings*, which landed on Mars in 1976. The probes reported the existence of methane in the atmosphere. Methane is unstable due to ultraviolet radiation, so when it exists in large quantities as it does seasonally on Mars, it seems to be an important indicator for astrobiological life and future probes and analysis would yield similar hypotheses.<sup>5</sup> Unfortunately for Sagan the skeptics of the *Vikings*’ results reigned for nearly thirty years with readings dismissed as having too great a margin of error, certain experiments found to be not working and the fact methane does occur naturally through volcanism.<sup>6</sup> However, with sophisticated supercomputer modeling available to scientists in the twenty-first century, and large amounts of spectroscopic information, the idea of methane as a life signature on Mars has traction again.<sup>7</sup> What opens minds to considering the paradigm shifting possibilities of life beyond our planet? What creates the impetus for research and more importantly, money, being put in that direction?

At the risk of being superpower-centric, I have to ask whether there is a coincidence between enthusiasm for METI and traumatic US forays into “extra-American” environments. One must at least consider the bracket: 1970’s and 2010’s. The first signals and spacecraft bearing friendly greetings (Figure 3) occurred in parallel with the failure and atrocities of the war in Vietnam. The war and its resulting domestic problems, including the institution of martial law and killing of civilians, is a great shame in the American psyche, which was soon after introduced into popular culture as escapism clothed in filmic scenes of horror, violence, and fear<sup>8</sup> but also alternatively, “wonder” of the Carl Sagan variety. Meanwhile, the past nine years of US-led wars in the Middle East have resulted in financial ruin, the “other 1%” of returning soldiers with extremely high rates of suicide, physical and psychological problems; with the wars in Afghanistan, Pakistan, and Iraq, comes need for a great new hope. We cannot save ourselves from this morass, we do not like ourselves, and perhaps we think “someone” out there might “live” this precious life better. Reaching back further to the first onslaught of science fiction in American popular culture during the first Cold War space race and American shame in front of Yuri Gagarin’s great Soviet feat of being the first man into orbit, it is clear that space offers one utopian site of resolution/revolution which a secular society has to believe will help it survive.

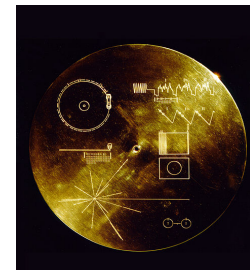


Figure 3 – The *Voyagers*’ Golden Records, 1977

<sup>5</sup> Ballesteros. Pages 44-47.

<sup>6</sup> Ibid.

<sup>7</sup> O’Neill, Ian. “Methane on Mars: The Signature for Life?” *Astroengine*. January 15, 2009.

<sup>8</sup> Interview with film critic Kurt Forman. South Pasadena, California. October 31, 2010.

What is the spirit of cooperation and “human” connection that accompanies our communication with extra-planetary realms? The Golden Records include greetings to an extraterrestrial presence in almost all languages spoken by a million people or more.<sup>9</sup> The greetings are all different—shorter, longer, more polite, less formal—all befitting the idea “humanity” is made up of a variety of societies and cultures.

The Cosmic Call, on the other hand, features our one great, shared “human code,” not of conduct, but DNA. While DNA seems quite representative of what makes us “human,” there are assumptions in this METI signal that need to be considered. As N. Katherine Hayles points out in *My Mother Was a Computer*, “code” is a particular kind of metaphor for the body that has grown out of a figuration of the body as mechanical dating to the Scientific Revolution and Descartes.<sup>10</sup> “Body-as-machine,” and now “body-as-code,” is dehumanizing, labor-oriented, and suggests improbably that we are always “on task.” As our tools become more-so a part of our flesh, with touch screen technologies and developments in haptics creating seamless interfaces to virtual realities, we are nevertheless returning as a species to our primary “cyborg” state, where we use our hands as primary instruments of communication, and our bodies as holistic sensory objects.

I argue that a sense of the whole body needs to be communicated to the stars, not just what we know through the genome, calculations of data, telemetry, and observation through ocular devices, all of which reinforce Cartesian power dynamics inherent in observer-observed relationships. As on the *Pioneer* probes, the Arecibo message (Cosmic Call) was a “picture” of the human body, rather than a “sense” of it. Its binary transmission when decoded would form a picture of human DNA, almost to the letter the kind of gesture that through Hayles we can determine as problematic. DNA might seem to be the most logical message to send—as a “code,” it describes us organically and our reproduction (solving, or in response to, the *Pioneer* probes’ limitations<sup>11</sup>). Cosmic Call consisted of 1,679 bits of information—the product of two prime numbers that form a grid to make a picture of, among other things, a pixilated human and a double helix (Figure 4).<sup>12</sup> Included were atomic numbers of most common elements in the universe: hydrogen, carbon, nitrogen, oxygen and phosphorus; chains of dioxynribose and phosphate, the backbone of DNA; with nucleobases encoded at the “top” of message.<sup>13</sup> The *Pioneer* and Arecibo examples are “pictures” at both the macro and micro level—“essentially”

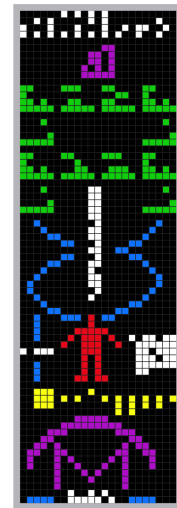


Figure 4 – Cosmic Call  
Graphic: Arne Nordmann, 2005.  
Wikimedia Commons.

<sup>9</sup> Sagan, Carl. *Murmurs of Earth*. Ballantine Books. 1978.

<sup>10</sup> Hayles, N. Katherine. *My Mother Was a Computer: Digital Subjects and Literary Texts*. University of Chicago Press. 2005.

<sup>11</sup> The *Pioneer* images of man and woman, designed by Carl Sagan and realized by his wife Linda Salzman Sagan, were also policed in interesting ways. The male and female appear without genitals, the woman’s breasts without nipples. Claims of “scientific pornography” and outrage by religious groups led to the censorship (Ballesteros, page 143). On the *Pioneers* there is thus no indication that we need two sexes to reproduce and subsequently without that basic information, it is not clear what kind of life forms we are.

<sup>12</sup> Ballesteros. Page 147.

<sup>13</sup> Ibid. Page 149.



speaking—but not about what motivates us, what we desire, why we want to have communion with extra-terrestrial beings, or anything that would compel an extra-terrestrial (ET) species to communicate back with us.

However, the Arecibo message presented the idea that chemistry, apart from math and physics, would be a common language to share with ET. Could it be more complex and more representative than what we've sent before, or even, what is being considered now? The current search for ET intelligence is currently being pursued by government and private agencies and will use primarily math and music.<sup>14</sup> While these seem most easily encoded in a signal, they only represent a fraction of human experience and there are embedded cultural assumptions in their proposals about beauty and harmony that stem solely from Western traditions.

Much can be gained in a reconsideration of METI by simply rethinking the simple initial presumption—that recipients will have eyes / vision to make out forms. Extra-terrestrials may not use photo-stimulation as their primary sentient trigger,<sup>15</sup> making the idea that “thought” itself manifests most intelligently as a result of vision worth reconsideration. What about touch/aural stimulation through sound vibrations? What about scent/taste, which are so important to humans living good lives? To represent all our senses, our “emissaries” into space might instead indicate the valued elements of our planet, our “gold,” like “frankincense and myrrh,” sage, jasmine, and roses, which all have meaning as offerings and connect to our cultural or even sacred pasts.

At the conference *Space: Planetary Consciousness and the Arts* in Switzerland, in May 2005, Alexander Zaitsev, the radio engineer and astronomer from the Evpatoria facility in Crimea that produced the “1<sup>st</sup> Theremin concert for Aliens,” postulated in a paper coauthored with Richard Braastad that METI could encompass three areas of the arts: the visual, music, and dance. The first two seem obvious, but the third is mysterious. How could one encode “dance”? The ramifications of the suggestion are profound. The suggestion is we send an art form that encompasses haptics, spatial awareness, choreography and rhythm. Zaitsev and Braastad are specifically addressing the role of the body in culture and provisioning sending the “sense” of our bodies to the stars.

Communication with *others* means going beyond one's body boundary. As an argument in favor of encoding the Fibonacci sequence, the Golden Mean, the fractal Sierpinski Gasket (Figure 5), and pentatonic (5-tone) vs. harmonic (12-tone) scales, music archivist Pierre Schwab remarked, “The beauty of numbers exists outside ourselves.” To design new METI signals, Schwab's comment promotes asking the following questions: Is it possible to design a signal that reflects something outside ourselves—like math—but also comes from within the frame of subjective experience? What is something of essential importance to us that would also be a common language? How could we construct a METI signal based on social human context? Can we define a contract that binds us together as a species—in

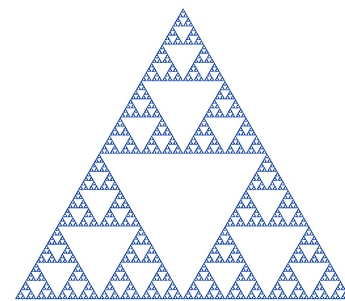


Figure 5 – Sierpinski Gasket.  
Wikimedia Commons.

---

<sup>14</sup> Vakoch. “ET Aesthetics.” *SETIcon I*. August 13-15, 2010. Santa Clara, California, USA.

<sup>15</sup> Ibid.

other words, what do humans have in common, beyond biological functions, that creates society?

My proposal is to create a METI signal that would be a sensual reflection of human culture. It would use complex chemical signatures of molecules that have a specifically recognizable scent and are meaningful to humans and other creatures such to better convey the cultures and environmental microcosms that make up Earth, and upon which we rely. Organic molecule signatures could also comprehensively represent our understanding of chemistry and the composition of the universe, something proposed by Frank Drake at *SETIcon I* would be not only important, but plausible. Drake considered sending a signal that was basically a march down the periodic table. A sleeper! The idea I was able to propose to Vakoch at the conference, with positive reception, is instead using symphonies of elements, without hierarchy, that relate something of us and at the same time, something of our knowledge of the universe.

A few key molecules encoded as part of the composition would reflect both the embodied experiences of terrestrial inhabitants and as well could reflect on our discoveries. To give a discrete example, ethyl formate was discovered by the Max Planck Institute for Radio Astronomy in great quantities in the interstellar medium in 2009; the molecule gives rum its scent and raspberries their flavor, but this simple scented molecule is also a precursor to amino acids, which form DNA.<sup>16</sup> This astonishing discovery occurred during a period of my own art making from 2008-2010, which helped me to interface with people at SETI and form the idea for this paper. At the time, I was making perfume bottles that model the solar system. They have references to the coincidence of micro and macro structures, to Plato's idea that the planets travelled around the Earth on hard crystalline spheres, to the Copernican revolution, and to atomic models (Figure 6).



Figure 6 – *Copernican System No. 1*. Copyright Carrie Paterson, 2009.

I have been intrigued by the spatial concepts in outdated models and scientific diagrams, which often get something very right about the *culture* of the science, even as

---

<sup>16</sup> Sample, Ian. "Galaxy's centre tastes of raspberries and smells of rum, say astronomers." *The Guardian*. April 20, 2009. Web.

on the whole they are proven wrong. What I discovered making this bottle was I had made a model of consciousness: self within the mind, within the body, within society, within the world, the solar system, the galaxy, within the universe, and beyond; some might even extend, within “god.” This three dimensional spatial model of what I will call “the embodied mind,” after Lakoff and Johnson’s Container Schema (Figure 7),<sup>17</sup> had something specific to say to science and particularly astronomy.

What is the embodied mind? Cognitive scientist George Lakoff suggests our neural connections structure our concepts; therefore, abstractions and philosophy are reflections of, and limited by, our brains. One might therefore extend the idea that bio-chemo receptors play a major part in how we think. We evolved from creatures with highly adapted olfactory sense and our olfactory bulbs are part of the reptilian brain—the oldest part of brain. Lakoff: “Anything we can think or understand is shaped by, made possible by, and limited by our bodies, brains and our embodied interactions with the world. This is what we have to theorize with.... Is it adequate to understand the world scientifically?”<sup>18</sup>

For a new METI signal, we can look to ideas generated by star maps. As we focus our attention on parts of the sky they become emblematic of our civilization and representational of our needs. Where does our current condition meet the star map? What is our environment and how do we reflect that outward? From personal care products to environmental engineering in shopping malls, synthesized environments of petrochemicals have left us bereft of our natural abilities to pick up common and important scents found in nature, attests artist/perfumer Gayil Nalls, to the detriment of culture and neuroreceptors,<sup>19</sup> and by extension, thought itself.

Presented with frequency at the conference *Heavenly Discourses: Myth, Astronomy, and Culture* were variations on star maps that can be understood as documented cultural projections. Maps and interpretations of star patterns differ greatly. To take one example, the “Southern Cross” (Figure 8) is also known as a stair in Quechua mysticism; it is a prominent part in the Centaur for the Greeks; the Maori think of it as an anchor; and in Java it’s a granary. Some early cave paintings in Southern France are now thought to be star maps, not the least of which is found in the famous caves at Lescaux, where the map of the Pleiades seems to sit on a shoulder of a Bison. There is some debate about this example, but I cite it because whether the Pleiades appear or not, celestial observations as simple as the fact the sky “moves” in coordination with the seasons—ie.

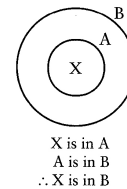


Figure 7 – Container Schema Logic

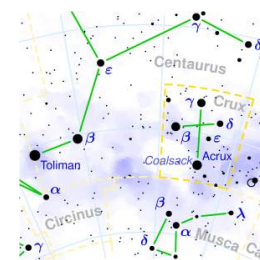


Figure 8 – The Southern Cross  
Astroblog.cosmobc.com

<sup>17</sup> Lakoff, George and Johnson, Mark. *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. Basic Books. 1999. Page 32.

<sup>18</sup> Brockman, John. “Philosophy in the Flesh: A Talk with George Lakoff.” March 9, 1999. Edge.org.

<sup>19</sup> Personal interview. October 4, 2011. Nalls is the creator of *World Sensorium*, a social olfactory sculpture/fragrance synthesizing natural essences from 230 different countries’ responses to inquiries as to the emblematic scents of their cultures. It was presented at millenium ceremonies in Times Square, Washington DC, and the Vatican, with the endorsement of the United Nations. Worldsensurium.com.



hunting—indicate that these cave drawings re-enforce the idea that our visual representations of our observations of the stars coincides with our earthly experiences. The interpretations stand after millennia, and are like visual DNA, connecting us back to our ancestors, to their campfires, to the smell of the Bison.

Before I met Gayil Nalls at *Scents and Sensibilities* in Washington DC in 2010, an exhibition where our artworks were both included, I had started playing with skeletal formulae from organic chemistry thinking that charting the stars in the sky using chemistry would be most reflective of our historical moment. This was in 2009, and my *Star Map* (Figures 9-10) has since been in development as a multi-sensory fine art print and installation.

Figure 9 - *Untitled Star Map*. 56 x 22 inches. Ink and fragrant oils on vellum. Copyright Carrie Paterson 2009.

Of the molecules that would have significant factors of human recognition and appreciation, I chose those I felt were best connected to culture in specific regions; for example, globulol, the scent of rose, and beta-caryophyllene, a cannabinoid. To go back to the Crux, there I placed indollal, a critical odor for humans—part of what we identify as a fecal smell. Oddly enough, this molecule is also used in perfumes—it acts on your receptors subtly under all those flowery and musky notes, making you crinkle your nose, sniff, and sniff again. Placement in the sky was also important; next to indollal is a large nebula—the “Coal Sack,” which I thought was a relevant association, as indollal is part of a suite of molecules used to make a “dirty” note.

Because the interstellar medium is teeming with organics, my *Star Map* includes not only significant stars but also interstellar gas clouds as points. Research in 2012 shows that plentiful in galactic systems are “aromatic” compounds (characterized by a benzene ring) and chains of hydrocarbons, many of which, like the rum-flavored ethyl formate, are crucial to the production of “life.”



Figure 10 - *Untitled Star Map*, detail Southern Sky.  
Copyright Carrie Paterson 2009.

The more astonishing connections made recently between the mechanisms of the universe and the chemistry of life comes in several confirmations that nucleotide bases can be found off-planet, specifically on Saturn's moon Titan and on meteors. In 2010 a research team from the University of Arizona announced at the Planetary Science Division of the American Astronomical Society's annual conference that nucleobases rain down on the surface of Titan, spontaneously forming in the upper atmosphere as deduced by production of such in similar laboratory conditions.<sup>20</sup> In 2011 it was confirmed that nucleobases are found on meteorites,<sup>21</sup> (Figure 11) and in 2012, the speculation has emerged that Earth itself in its earliest years, when the planet was just beginning to breed simple life forms, was struck by such a bombardment that life-bearing Earth ejecta could have been flung far and wide across the galaxy.<sup>22</sup>

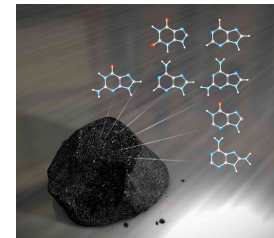


Figure 11 – Nucleobases and analogs found in carbonaceous chondrites. Image: NASA's Goddard Space Flight Center/Chris Smith.

This is exciting news for the star system of Gliese 581 and its super-Earth orbiting in what is thought to be the edge of the “habitable zone” (Figure 12). A team of Japanese physicists have calculated that “the probability is almost one” that our solar system contains microorganisms from another extra solar system, and that meteorites originating from the bombardment of Earth would only have taken one million years to reach Gliese 581.<sup>23</sup> Accreted molecules would need to be covered by ice or other elements in order to endure cosmic radiation,<sup>24</sup> but the hypothesis gives credence to the panspermia idea of life in the universe, making all efforts to message “others” not just a thought experiment, but one that may bring real results. Future SETI/METI activities are dependent on better transmission/reception sites, for example on the dark side of the Moon,<sup>25</sup> and will inspire more discussion about an appropriate a democratic response from citizens of Earth. In the meantime, we begin a deep consideration about how we think about our bodies and our environment, what communication is, and how we might go about it differently in our daily lives on Earth.

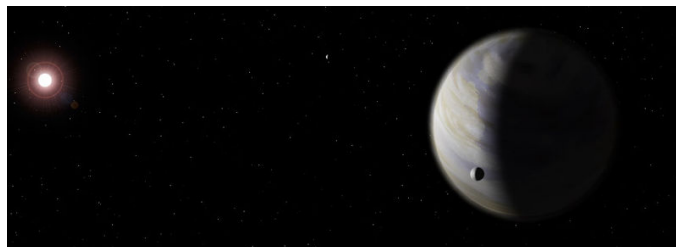


Figure 12 – Artist rendering of Gliese 581 star system with 581 d. super-Earth in foreground. Wikimedia Commons.

<sup>20</sup> *Astronomy*, Oct. 8, 2010. Web.

<sup>21</sup> “Carnegie: Meteorites – Tools for Creating Life on Earth.” From *Proceedings of the National Academy of Sciences*, August 8, 2011. Spaceref.com.

<sup>22</sup> Hara, Tetsuya; Takagi, Kazuma; Kajiura, Daigo. “Transfer of Life-Bearing Meteorites from Earth to Other Planets.” April 8, 2012. arXiv.org. Accessed April 29, 2012.

<sup>23</sup> Ibid.

<sup>24</sup> See Wallis and Wickramasinghe, 2004, as cited in Hara, et. al.

<sup>25</sup> TEOSETI (Tradate European Optical SETI) will be best suited for the dark side of the Moon. (Astro Tiare. “Interview with Bruno Moretti: A radio telescope on the far side of the Moon.” *SETI cl*. June 10, 2010. Seti.cl. Accessed January 10, 2012.)