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TASC

TASC's mission is to rebuild and strengthen the foundation of the Christian faith by increasing awareness of the scientific evidence supporting the literal biblical account of creation and refuting evolution.

September 2022

The Search for Extraterrestrial Intelligence (SETI)

By Rick Chiulli

On August 7, 1996 headlines across the country emblazoned the news that NASA had identified evidence of life on Mars. A meteorite named AHL84001 had been found in the Antarctic and was studied by a team of ten NASA and Stanford University scientists. Their conclusion was that life was present on Mars some 3.6 billion years ago.[1] The meteorite was thought to have been catapulted off the Martian surface into space by a comet or asteroid and eventually found its way to earth some 13,000 years ago. Microscopic examination of the specimen showed polycyclic aromatic hydrocarbons which they believed to be associated with fossilized microorganisms from Mars. Microscopic examination showed an elongated beaded structure thought to resemble a fossilized microorganism. The media roundly endorsed the findings, and then-sitting President Clinton celebrated its significance. However, I remember that I had a few questions about their conclusions.

The United States had previously landed both Viking 1 and Viking 2 space crafts on the surface of Mars in 1975. Both probes sent back panoramic photos of the Martian surface, which demonstrated only rocks and dust. The two probes also tested soil samples. There were no signs of life. I was also puzzled how one could assure that an Antarctic rock originated from Mars rather than from some other source. Even a thermonuclear explosion here on earth does not catapult debris into outer space. How did the rock get here from Mars? Also does the finding of polycyclic aromatic hydrocarbons guarantee that the only source was a living organism?

Remarkably, the response by the scientific community did not endorse NASA's conclusion. Several scientists claimed that "polycyclic aromatic hydrocarbons" can be formed naturally and do not support the presence of life on Mars.[2] Since 1996, there have been several Mars Rovers placed on the Martian surface which have completed more advanced chemical analysis of soil and rocks. No signs of life have been identified. The stunning announcement of 1996 has since fizzled and is no longer a topic of discussion. However, the incident raises several questions to ponder.

The first issue is why the media so willingly endorsed the claim of extraterrestrial life? Perhaps our culture is inundated with movies, books, television programs, stories of UFOs etc. that depict aliens of various sorts and make this belief easier to accommodate. Perhaps Darwinism is so widely accepted that the presence of life on Mars would only serve to verify the theory. The second issue raises the age-old debate: Are we alone? Is there life out there? There has been an ongoing effort by scientists and some government-sponsored entities to detect extraterrestrial life or intelligence since the 1960s.

In our own solar system "neighborhood," the effort to look for extraterrestrial life has resulted in placement of probes on the surface of the moon, the planets Venus and Mars, and the Saturn moon Titan. The Apollo moon landings five decades ago did not give evidence of life on the moon. The Soviet Union landed two probes (Venera 13 and 14) on the surface of Venus in the early 1980s. The Venera photos show a stark wasteland of rock and dust.[3] In 2005, the European Space Agency and NASA landed a probe on the Saturn moon Titan. Photos of the descent and landing show a deserted wasteland with no sign of life. There have been numerous probes that have either landed on or strolled across the surface of Mars, but life has not been identified in the search. There has been some discussion about the Saturn moon Enceladus being a possible habitat for life, as it has an ocean of water covered with ice. However, extraterrestrial intelligent life (or

[1] McKay DS, Gibson EK, Thomas-Keprta KL, Vali H, Romanek CS, Clemett SJ, Chillier XD, Maechling CR, Zare RN (1996) Search for past life on Mars: possible relic biogenic activity in Martian meteorite ALH84001. *Science* 273 (5277): 924–930. doi: 10.1126/science.273.5277.924

[2] Shearer CK, Papike JJ (1996) Evaluating the evidence of past life on Mars (Technical Comment). *Science* 274 (5295):2121

[3] NASA Science (2021 Mar 17) The surface of Venus from Venera 13. https://science.nasa.gov/surface-venus-venera-13 Accessed 2022 Jul 20.

microscopic life) has not been identified anywhere in our solar system.

The next frontier for exploration was to examine the stars. The search for extraterrestrial life came to the scientific forefront in the early 1960s by Professor Frank Drake working out of Cornell University. He was the first scientist to point a radio telescope at a star and listen for intelligent signals. Since that time, there have been numerous projects that have listened to outer space, with each project being more expansive and technically advanced than its predecessor. These endeavors stretch the expanse of our country, ranging from multiple cooperating locations and university affiliates. Project Big Ear Radio Observatory in Ohio listened for extraterrestrial radio signals from 1973 to 1995. This effort was continued by Project Phoenix which examined about 800 nearby star systems for intelligent signals from 1995 to 2015. The High Resolution Microwave Survey scanned millions of frequencies from 1992 to 1993. Under the direction of the University of California at Berkeley, Project Serendip worked out of the Arecibo Observatory in Puerto Rico from 2009 to 2016.

In 1984, the SETI Institute was created with the sole purpose of coordinating the search for extraterrestrial intelligence. Board members included Dr. Frank Drake and Dr. Carl Sagan. The institute continues today working out of the Carl Sagan Research Center in Mountain View California. The SETI Institute, in cooperation with the University of California at Berkeley, designed and built the Allen Telescope Array (ATA) in Shasta County California. The ATA, an array of 42 radio telescopes, functions for the sole purpose of searching for extraterrestrial intelligence. The ATA has been augmented and enhanced over the years and is currently still operating. It has the unusual capacity to scan large areas of the sky for signals in relatively short periods of time. The array generates an enormous volume of data which requires processing by complicated computer analysis. Computers peer into the data looking for signals that have either a narrow bandwidth or other signs of intelligence.

In 1999, SETI@home was launched by the SETI Institute to engage in open-source research and to allow access and use of personal computers to assist with their calculations. Personal computers are voluntarily accessed via the internet when not being used by the owner. As of March 2020, over 91,000 active users assist the project with their home computers.[4] This enormous computing capacity helps process the data in the search for signs of life. In 2016 project Breakthrough Listen, under the direction of the SETI Institute, started a 10-year survey of over one million of the closest stars in about 100 galaxies. Project Breakthrough Listen feeds small segments of their data to individual home computers for processing. Much of the accumulated signal has been able to be processed by the SETI@home network.

A typical signal from outer space represents a signal strength as a function of time, somewhat like a wavy line moving across a computer screen. A signal may be grouped in limited time periods lasting about 1–2 minutes to facilitate computer processing. The signals are then subjected to a mathematical transformation called "Fast Fourier Transform." This transformation results in a three-dimensional graph of signal strength as a function of both time and frequency in Hertz.[5] Each of the resulting signal spikes requires separate complicated processing. These mathematical manipulations necessitate a robust computing capacity. The reader may not be familiar with mathematical processing, but it underscores the need for a large computing capacity to analyze the data for signs of intelligence. It is somewhat akin to a computer finding the sound of a soft violin in front of the noise of Niagara Falls.

The scientists of project Breakthrough Listen have been processing signals from space for many years. Along with the numerous other SETI projects, the search for extraterrestrial life has endured now for 60 years. Have any of these multiple searches indeed found evidence of extraterrestrial intelligence? I will quote from the SETI website: "No." They are honest about their findings, and they anticipate that further searches will at some point be successful in identifying extraterrestrial intelligence.

This brings us to the famous Drake Equation put forth by Professor Frank Drake in 1961, which serves to calculate the number of extraterrestrial intelligences that might populate our universe. The equation is as follows:[6]

$$N = R_* \cdot f_P \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot L \,,$$

where:

N is the number of intelligent civilizations,

R_* is the rate of star formation,

f_P is the fraction of stars that have planets,

[4] See https://setiathome.berkeley.edu/top_teams.php for the extensive list of teams participating in SETI@home. Accessed 2022 Jul 20.

[5] See https://setiathome.berkeley.edu/sah_glossary/fft.php for a description of the SETI@home Fast Fourier Transform (FFT).

[6] Howell E (2018 Apr 05) Drake equation: Estimating the odds of finding E.T. https://www.space.com/25219-drake-equation.html

n_e is the number of planets that could support life,

f_l is the fraction of planets that develop life,

f_i is the fraction of planets with life that develop intelligence,

f_c is the fraction of civilizations that develop communication, and

L is the mean length of time that civilization can communicate.

Dr. Drake himself estimated that N represents about 10,000 intelligent civilizations. With the identification of numerous planets outside of our solar system by modern astronomers, it seems likely that our universe has a significant number of planets that could occupy the "habitable zone" of appropriate distance from a sun. Such planets would be neither too hot nor too cold to support the presence of life. A small percentage may actually have water. One can argue that all of the factors in the Drake equation represent a non-zero entity except one, f_l, the fraction which represents those planets that develop life. That is, the fraction of planets where life develops randomly from the inorganic chemicals found on that planet.

Science has advanced to the point where the exact chemical structure of proteins, enzymes, cell walls, cell receptors, energy cycles, DNA, ribosomes, etc. is known. The biochemical processes of an early primitive organism such as bacteria are known in exquisite detail. The DNA sequencing, the metabolic pathways, and the process of replication are all understood. So the question arises: In what sequence does the random addition of simple molecules lead to the development of life? In what order does random chance need to position the inorganic to result in the living? The question is not one of general theories, but of the specifics for each chemical step. Despite all the scientific community's collective efforts and resources, no one has the answer to this question.

We have a situation in which modern science does not have an answer for a basic factor of the Drake equation, but random processes are proposed to solve the problem for us. Science cannot answer the question, but randomization can. This is counterintuitive. Where in our experience do we see this happen? Do cars or cell phones randomly assemble themselves? Do bricks positioned on an empty property synthesize a house? Of course not. If f_l is zero, then N is zero also.

The search for extraterrestrial intelligence has been up to now unproductive for over 60 years. Extensive and complicated searches have not yielded evidence for other civilizations in the stars. SETI enthusiasts believe that their search will be successful in due time. Could it be that their lack of success is because there is no extraterrestrial life? The obstacle of inorganic molecules being incapable of organizing themselves into life would be the same obstacle in a distant galaxy. Are not the rules of chemistry the same throughout our universe?

The search for extraterrestrial intelligence will certainly continue in our current scientific climate. Nonetheless, their continued lack of success should stimulate questions about why this is the case.

The Apostle Paul in the last chapter of his final letter states:

> For the time will come when people will not put up with sound doctrine. Instead, to suit their own desires, they will gather around them a great number of teachers to say what their itching ears want to hear. They will turn their ears away from the truth and turn aside to myths. But you, keep your head in all situations, endure hardship, do the work of an evangelist, discharge all the duties of your ministry. 2 Tim. 4:3–5

In my personal view of this debate, all living things on earth were created in the first week by God Himself.[7] Science cannot reproduce His work. How much less can this be accomplished by mindless chance? The prospect of success for the SETI program seems analogous to a man standing before a mound of bricks, looking for an edifice to appear.

COMING EVENTS

TASC Zoom Meeting, Thursday, September 8, 7:00 pm EDT

With innumerable stars in the universe and the likelihood of multiple planets orbiting each star, modern science has assumed that life must be present elsewhere in the cosmos. The search for extraterrestrial life started in the 1960s and continues to this day. Much time, effort, and expense have been allocated to this ongoing search. Are we alone? is the question. A review of man's efforts to answer this question and the results of this search will be explored at the September TASC presentation: The Search for Extraterrestrial Intelligence (SETI).

Join Zoom Meeting
https://us02web.zoom.us/j/4490299372

[7] See Genesis 1 of the *New International Version*, Biblica, https://www.biblica.com/bible/niv/genesis/1/ Accessed 2022 Jul 20.

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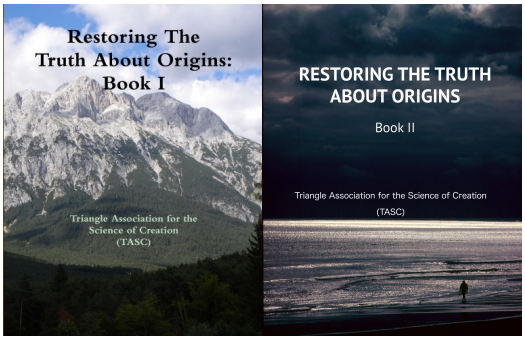

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