

INTELLIGENT LIFE IN THE UNIVERSE?

Scientific arguments suggest that life, and consequently advanced civilizations, should be common in our galaxy. If so, where is everybody? That question is today known as the Fermi paradox. In 1950, while working at Los Alamos National Laboratory, the physicist **Enrico Fermi** had a casual conversation with colleagues while walking to lunch discussing a recent spate of UFO reports and a cartoon facetiously blaming the disappearance of municipal trashcans on marauding aliens. **When Fermi suddenly exclaimed, OK, where are they?** He followed up on his comment with a series of calculations on the probability of Earth-like planets, the probability of life, the likely rise and duration of high technology, etc., and concluding, then, that Earth ought to have been visited long ago and many times over. Other names for the Fermi's question "Where are they?" include: the 'Great Silence' and *silentium universi* (Latin for "silence of the universe").

The first person to address this question seriously was Frank Drake, who in 1961 in an attempt to find a systematic means to evaluate the numerous probabilities involved in the existence of alien life. His equation considers the rate of star formation in the galaxy; the fraction of stars with planets and the number per star that are habitable; the fraction of those planets which develop life, the fraction of intelligent life, and the fraction of detectable technological intelligent life; and finally the length of time such communicable civilizations are detectable.

This so-called Drake Equation has been used by both optimists and pessimists with wildly differing results. **Carl Sagan**, in 1966 using optimistic numbers, suggested as many as one million communicating civilizations could be in the Milky Way. Drake himself has commented that the Drake Equation is unlikely to settle the Fermi paradox; he calls it: **just a way of "organizing our ignorance" on the subject.**

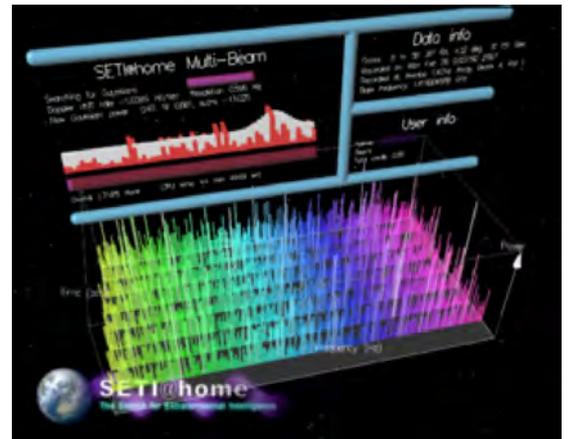
The Drake equation is: $N = R_* \cdot f_p \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot L$ where:
N = the number of Civilizations in our galaxy right now
R* = the rate of star formation in our galaxy
fp = the fraction of those stars that have planets
ne = number of planets per star
fl = the fraction of planets that could support life
fi = the fraction of those that develop civilizations
fc = the fraction of those that do cosmic communication
L = the length of years for which such civilizations exist

Taking our current best guess at those figures, we insert:

$$N = 10^{10} \times 1\% \times 2 \times 1\% \times 1\% \times 1\% \times 100 = 20,000$$

According to this formulae the number of planets in our Galaxy with advanced civilisations, capable of cosmic communication at the present should be 20,000. So, where are they? Why have we not heard from them, or seen them? The equation includes, of course, many assumptions, **including the historic fact that advanced human civilisations seem to have a limited life-time, that is, they flourish for a number of years through innovation and conquest, then somehow selfdestruct and sink back into oblivion.** 100 years is approximately the time since the invention of Radio Communication on Earth. Space communication started some 60 years ago with Sputnik. The search for extraterrestrial intelligence (SETI) has been systematically pursued now for over 50 years, in one form or another, with nothing to show for it. So, again, where is everybody? Life on Earth got going very shortly after the formation of our solar system, and it has wedged itself into every available niche, no matter how hostile.

AK, from Wikipedia Notes



Screensaver for SETI@home, a distributed computing project in which volunteers donate computer time to analyse signals for signs of extraterrestrial intelligence



Intelligent life in the universe? Phone home, dammit!