

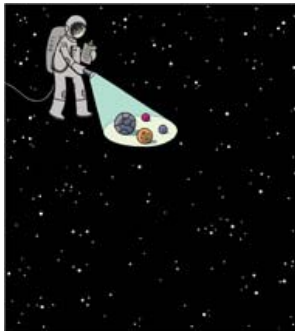
IDEAS & TRENDS

Please Call Earth. We Still Haven't Found You.

By DENNIS OVERBYE Published: March 2, 2008

NEARLY half a century ago, Frank Drake, a young radio astronomer with extraterrestrials on his mind, stepped up to a blackboard in Green Bank, W. Va., and scribbled a string of symbols intended to bring some clarity to the question of just how alone humanity is in the cosmos.

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Tom Gauld

The dozen wise men (there were no women) in the room were an elite group. Among them were Carl Sagan of Cornell University, as yet relatively unknown; the biochemist Melvin Calvin, who would learn during the meeting that he had won the Nobel Prize in chemistry; Barney Oliver, the research chief of Hewlett-Packard; and John Lilly, the dolphin expert, in whose honor the group dubbed themselves the Order of the Dolphin.

They sifted the variables in the light of what was then known or guessed, did the math, and concluded that there could be from less than a thousand to a billion other civilizations in the galaxy.

The Drake Equation, as it is known, has served as the bones of the search for extraterrestrial intelligence (SETI) and for the hopeful field of astrobiology ever since.

Since that meeting, in 1961, spacecraft have surveyed all the major bodies of the solar system, except for Pluto, and radio astronomers have listened for intelligent signals from more than 1,000 stars, so far in vain. Last month, a scaled-down version of our own solar system, with a pair of planets analogous to Jupiter and Saturn, was found orbiting a star 5,000 light years away in the constellation Scorpius, bringing the total number of known exoplanets, as they are called, to more than 250.

You might think we have made some headway in solving the equation, or rewriting it, or generally getting a handle on our cosmic loneliness. But you would be wrong. Astronomers today are as fuzzily optimistic (or pessimistic) as the Green Bank group.

"I get that question all the time," said Dr. Drake, 76, by phone from his office at the SETI Institute in Mountain View, Calif., where he is chairman emeritus and director of the Carl Sagan Center for the Study of Life in the Universe. "There hasn't been any great change. The equation still stands."

The discoveries of the last half-century, he explained, have confirmed what were just educated guesses on the part of the Dolphins.

Dr. Drake's equation consisted, and still consists, of seven factors, which range over all human knowledge and aspiration. Some are strictly astronomical, like the rate at which stars are born in the Milky Way and the fraction of those stars with planets — 10 per year and half, respectively according to the Dolphins. Others are impossibly mystical, like the average lifetime of a technological civilization — 1,000 years to 100 million years was the guess.

In between are more squishy details like how many habitable planets there are per planetary system (one to five they said), and what fraction of those habitable planets develop life, intelligence and the technology to communicate with other worlds. The Dolphins pegged those last three probabilities optimistically as, respectively, 100 percent, 100 percent, and 10 percent to 100 percent (dolphins, for example, don't build radio telescopes). Multiply all the factors together and you get the putative galactic census.

In the realms in which astronomers have actually gotten new data, the old guesses of the Dolphins have held up very well. Seth Shostak, an astronomer and spokesman at the institute, explained. In the more sociological and biological realms, where the data are ambiguous or nonexistent, you can't prove they were wrong.

"These guys were either enormously lucky or amazingly prescient," he said. One change, he said, was in the notion of a habitable world, that is to say, one with liquid water. In the old days "habitability" meant a planet had to be small and rocky and in a narrow Goldilocks zone around its star where the temperature would be just right.

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Astronomers say space missions like [NASA's Kepler](#), scheduled to be launched next year, will determine the frequency with which these Goldilocks planets occur in our neck of the galaxy. But the possibilities have expanded since spacecraft discovered evidence of water on or in some of the moons of Jupiter.

At the same time, scientists discovered that life on [Earth](#) was tougher and more versatile than scientists had thought, thriving in weird places like boiling undersea vents. "There is so much evidence for lots of pathways to the origin of life," Dr. Drake said.

But how often does intelligent and technological life actually emerge from such environments? Some evolutionists, like [Stephen Jay Gould](#), who died in 2002, have argued that intelligence is not inevitable. The dinosaurs did just fine for 150 million years without getting appreciably brainier.

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The advantages intelligence and technology confer, moreover, might also be outweighed by their dangers; thus the interest in the last term of the equation, the lifetime of a civilization. As Dr. Sagan would emphasize, this is the ringer in the works. Or, in Dr. Drake's words, "the real iffy one."

If the answer is less than a million years, said Geoffrey Marcy, an ace planet-hunting astronomer at the University of California at Berkeley, "Our Milky Way may be lit up only here and there during the past 10 billion years, and we may be the only lit bulb."

Dr. Sagan looked forward to finding an extraterrestrial signal as a sign that technological societies are not doomed to blow themselves up or poison themselves.

Once upon a time, the end of the cold war would have been seen as good news in that regard, but the possible advent of bioterrorism, genetical engineering mishaps and novel pandemics has led some otherwise sober thinkers, like Martin Rees, the Cambridge University cosmologist, to suggest that Civilization as We Know It won't make it out of the present century.

So the cosmic glass is still half full or half empty, depending on your personal inclinations. You can make your own guesses online, at msnbc.com/modules/drake/default.asp.

Dr. Drake, who conducted the first fruitless SETI listening tour, of a pair of stars in 1960, once said that the most likely aliens to hear from would be a race of immortals, who had plenty of time to wait for an answer. But he said now that he no longer expected to hear from ET in his lifetime. Under realistic estimates, he said, you would need to look at 10 million stars (there are 200 billion in the galaxy), and there is not enough time left.

"We could be wrong," he said. "The extraterrestrials have to help us a lot," he explained, by beaming powerful beacons our way.

But the trend might be in the opposite direction, if humans are any indication, he noted. Earth first became detectable in the 1950s, he said, when the planet was full of powerful television and radar transmitters beaming and leaking gigawatts of power into space.

"We assumed that was the way it was always going to be," both for us and, by extension, for extraterrestrials, he said. But now the big transmitters are being phased out in favor of cable and satellites that leak hardly anything at all out to space. It's very economical and it's the wave of the future. Earth is gradually going radio quiet.

"That's big change nobody anticipated," he said. Once the big powerful transmitters go off the air, he said, "We will still exist but we will be hard to detect."

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