Publisher's Page: Quantifying our Ignorance

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A standard tool of the SETI trade is under constant attack. And although I enjoy a good argument as much as the next SETIzen, it's clear to me that the detractors are clueless as to the very purpose of the tool they so eagerly denigrate. A case in point is a recent critique on the Forbidden Knowledge website:
http://www.velocitypress.com/f_knowledge.htm
describing the Drake Equation as "a statistical analysis of the number of possible 'intelligent communicating civilizations' there are in the universe."

This summary misses the whole point of a powerful scientific tool, which is not really an equation at all in the strictest sense, and was never intended for the solving. A brief history of the Drake Equation should help to illuminate its true utility.

The modern search for life in space began just over forty years ago, when in 1960 Dr. Frank Drake, a young astronomer at the newly established National Radio Astronomy Observatory (NRAO) in Green Bank, WV, launched a microwave scan of two nearby, sun-like stars. To nobody's surprise, Drake employed the very best ham radio microwave practices of his day, in seeking the ultimate DX. His Project Ozma search came up dry, but demonstrated practical techniques for seeking out intelligently generated signals from space.

A year after Project Ozma's brief tenure, Drake convened at Green Bank the first scientific conference devoted to modern SETI. The handful of scientists who assembled there called themselves the Order of the Dolphin, choosing recent studies into human-dolphin communication as a worthy metaphor for the challenge of interspecies communications on a grander, cosmic scale.

Drake chalked on a blackboard seven topics for discussion, which would comprise the agenda for the weeklong meeting. They included stellar formation, planetary formation, the existence of habitable zones, the emergence of life, the evolution of intelligence, communications technology, and the longevity of technological civilizations.

Then Drake did something almost whimsical, which assured his lasting fame: he strung these seven factors together into an equation.

The idea was to multiply seven unknowns together, and in so doing, to estimate N, the number of communicative civilizations in our Milky Way galaxy. The Drake Equation, as it is now called, appears in every modern astronomy textbook. It is a marvelous tool for quantifying our ignorance: never intended for quantification, but quite useful in narrowing the search parameters. We still use it, not to seek a solution, but rather to help us in designing our searches for life.

Drake's seven factors are cleverly ordered, from solid to speculative. Today's astrobiology meetings are similarly sequenced. When first published, only the first factor (the rate of stellar formation) was known to any degree of certainty. In the intervening decades, the Equation has guided our research in an orderly manner, from left to right, so that today we have a pretty good handle on Drake Factors two and three (planetary formation, and habitable zones). The remaining four factors are still anybody's guess, and it may well take decades more before our research begins to quantify those areas of our ignorance. But the Drake Equation is most valuable in guiding our research, because it asks the important questions. It is still up to us to answer them.

Although the Drake Equation detractors miss the mark with regard to the intent of the tool, they do raise a valid point which is central to astrobiology: how can life, the chance result of a painfully long chain of highly improbably events, have possibly evolved elsewhere? One testable hypothesis, which the SETI experiment contemplates, is that it didn't have to.

The odds of life evolving elsewhere may be pretty long indeed. The best chance for SETI success may depend on the idea that life did not evolve independently, but was seeded everywhere through the mechanism of panspermia. No bioastronomer has yet disputed the possibility that microbial life can successfully traverse the distance between the stars, and may be able to thrive in a new planetary environment. So life need not generate in disparate regions independently -- a universe teeming with life merely requires one genesis event, coupled with a transport mechanism. That mechanism has been tentatively demonstrated in research by Chandra Wickramasinghe and the late Sir Fred Hoyle.

To me, microbial panspermia is a far more compelling explanation than the alien-progenitors-in-spaceships scenario, because it does not require that we warp the laws of nature, or contemplate technologies not in evidence. Perhaps we really are all brothers beneath the skin.

Were it not for Drake's Equation, astrobiologists today wouldn't even know which of these assumptions to attack. As it stands, Drake has given us a handle on where to start. Meanwhile, there remain those who quibble about quantifying seven factors that Drake intended us merely to contemplate. They help us to establish a low value for at least one Drake Equation factor: the fraction of life forms that manifest intelligence.

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