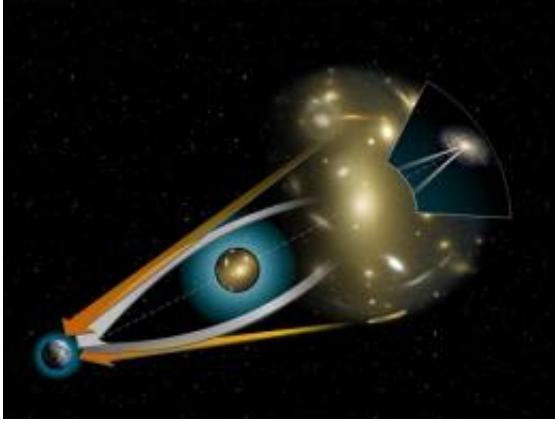


SETI Redux: Joining the Galactic Club

May 24 2010, by David Schwartzman



Alien telescopes could use the gravity of stars - using a technique called gravitational microlensing -- to help them view the Earth. Image credit: NASA

In this essay, David Schwartzman, a biogeochemist at Howard University in Washington D.C., explains why he thinks the aliens are out there, despite the fact that the search for extraterrestrial intelligence (SETI) has only found silence. He also outlines what we need to do for planet Earth to be initiated into the Galactic Club.

The Great Silence, the failure to detect signals of extraterrestrial intelligence (ETI) by the observational SETI program for the last 50 years, has continued to generate a lot of noise. I am not referring to the galactic noise which may hide a weak ETI signal, but rather all the old arguments revived again and again, ad infinitum. More books, more articles, more silence, more speculation. The latest is Stephen Hawking's

warning to Earthlings: keep silent or alien imperialists will devour us when they find out we exist. Has Hawking been watching too many Star Wars DVDs? Rather, I suspect the world's greatest living theoretical physicist is having a laugh at our gullibility.

At first sight, Paul Davies in his new book *The Eerie Silence* proposes some fresh ideas. He suggests the approach of observational SETI - which tries to detect narrow-band signals directed at [Earth](#) by an extraterrestrial civilization -- is probably futile, because the existence of a communicating civilization on Earth will not be known to any alien community beyond 100 light years. Instead, he argues “we should search for any indicators of extraterrestrial intelligence, using the full panoply of scientific instrumentation, including physical traces of very ancient extraterrestrial projects in or near the solar system. Radio SETI needs to be re-oriented to the search for non-directed beacons, by staring toward the galactic center continuously over months or even years, and seeking distinctive transient events ('pings'). This 'new SETI' should complement, not replace, traditional radio and optical SETI.”

But on second thought, maybe these ideas are not all that fresh. I've read these suggestions before in the SETI literature. Indeed, I found most of them cited in his footnotes. Nevertheless we should thank Davies for assembling them in his stimulating and lucid new book.

What are the possible reasons for the “Great Silence”? The following list is of course not original:

- 1) We are indeed alone, or nearly so. There is no ETI, nor a “Galactic Club” -- radio astronomer Ronald Bracewell's name for the communicating network of advanced civilizations in our galaxy (GC for short).
- 2) The GC, or at least ETI exists, but is ignorant of our existence (as

Davies has once again suggested).

3) We are unfit for membership in the GC, so the silence is deliberate, with a very strict protocol evident, “No Messages to Primitive Civilizations!” Only inadvertent, sporadic and non-repeated signals - for example, the "Wow" signal can be detected by a primitive civilization, with opaque signal content not distinguishable from natural signals or noise.

The first explanation is contrary to the subtext of astrobiology, the belief in quasi-deterministic astrophysical, planetary and biologic evolution. This view of life’s inevitability in the cosmos is a view (or, shall I admit, a prejudice) I heartedly endorse. Most scientists active in the astrobiological research program would support an optimistic estimate of all the probabilities leading up to multicellular life on an Earth-like planet around a Sun-like star.

I happen to be an optimist on this issue too. I have argued that encephalization - larger brain mass in comparison to body mass -- and the potential for technical civilizations are not very rare results of self-organizing biospheres on Earth-like planets around Sun-like stars. Biotically-mediated climatic cooling creates the opportunity for big-brained multicellular organisms, such as the warm-blooded animals we observe on our planet. Note that several such animals have now been shown to pass the “mirror test” for self-consciousness: the great apes, elephants, dolphins and magpies, and the list is growing.

But some, like my occasional collaborator Charley Lineweaver, an astrophysicist at Australian National University, are deep pessimists regarding the chances for other technical civilizations to emerge in the galaxy. He has argued, "humans and dolphins have 3.5 billion years of shared common ancestry. For 98 percent of our history, humans and dolphins were the same. The genes needed to develop those big brains

had been fine-tuned over billions of years of evolution and were already in place." Lineweaver says that if advanced civilizations do emerge elsewhere in the galaxy, we can't expect they'll have human-like intelligence. This deserves an essay in itself.

But if the pessimists concede just one of the millions if not billions of Earth-like planets is the platform for just one technical civilization that matures to a planetary stage, advancing beyond our present primitive self-destructive stage, just one advanced civilization with the curiosity to spread through the galaxy, at sub-light speeds with Bracewell probes to explore and document an Encyclopedia Galactica, then what should we expect?

First, the galaxy should be thoroughly populated with surveillance outposts on a time scale much smaller than the time it took on Earth to produce this cosmically pathetic civilization we call the nearly 200 member nation states of the United Nations, with humanity now hanging under two self-constructed Swords of Damocles: the twin threats of catastrophic global warming and nuclear war.

Second, THEY, or at least their outposts, surely know we exist, since to believe THEY are ignorant of our existence is to assume they somehow bypassed us in their expansion into the galaxy, a scenario I simply find unworthy if not unbelievable for an advanced civilization, especially one in existence for millions if not billions of years. It is important to note that this conclusion is informed by present day physics and chemistry, not a post-Einstein theory that transcends the speed of light.

So we are left with option 3: the aliens are deliberately avoiding communicating with our primitive world. I submit this is by far the most plausible given our current knowledge of science and the likely sheer ordinariness of our chemistry and planetary organization.

Why would we be considered primitive? This should be a no-brainer, even for an Earthling. The world spends \$1.4 trillion in military expenditures while millions of our species still die of preventable causes every year. Carbon emissions to the atmosphere continue to climb, even though presently available renewable technologies such as wind turbines exist and are sufficient to completely replace our unsustainable energy infrastructure. As J.D. Bernal once put it, “There is a possibility that the oldest and most advanced civilizations on distant stars have in fact reached the level of permanent intercommunication and have formed...a club of communicating intellects of which we have only just qualified for membership and are probably now having our credentials examined. In view of the present chaotic political and economic situation of the world, it is not by any means certain that we would be accepted.” (The Origin of Life, 1967)

Lee J. Rickard and I have put forward a scenario for eventual entrance of Earth into the Galactic Club in our paper published in 1988 (Lee J Rickard is a radio astronomer and I am a biogeochemist). We proposed that at some future time, our terrestrial civilization might achieve sufficient maturity to proceed with a program to detect so-called leakage radiation - the electromagnetic TV, radio and other broadcast signals that are inadvertently sent out into space (military radars are the strongest, a possible universal signature of a late stage primitive civilization).

This proposed program has a critical distinction from virtually all of observational SETI: detecting a targeted beacon from ET requires that they intended to send one. The absence of evidence is not necessarily evidence of absence, if intention is lacking. On the other hand, for a relatively short time, primitive civilizations like us leak radio waves to space, unintended signals that we could potentially detect.

The technical requirements for a galaxy-wide search are dictated by the size of the radio telescope, with the detection range proportional to the

effective diameter of the telescope. A large enough radio telescope situated in space could potentially set meaningful upper limits on the rate of emergence of primitive Earth-like civilizations ('N/L' in the Drake equation), without ever actually detecting the leakage radiation of even one ET civilization.

But just how big a telescope is required for this project, and at what cost? Our 1988 paper provided such estimates: a dish diameter on the order of 500 kilometers, at a cost of roughly \$10 trillion. Perhaps the cost has come down somewhat (but note the estimate was in 1988 dollars). This is surely a project with a vanishingly small chance of implementation in today's world. I could only conceive of a demilitarized newly mature planetary civilization, call it Earth-United (Finally!), with any intention of implementing such an ambitious project that has no apparent immediate practical benefits. Then and only then would we successively detect a message from the GC, presumably faint enough to be only detectable with a huge radio telescope in space.

On the other hand, the GC may be monitoring biotically-inhabited [planets](#) by remote Bracewell probes that have programmed instructions. Such a probe would plausibly be now hiding in the asteroid belt (as Michael Papagiannis once suggested). If the GC exists, there was ample time to set up this surveillance system long ago. Surveillance probes so situated in planetary systems would send welcoming signals to newly mature civilizations, with the potential for a real conversation with artificial intelligence constructed by the GC, if not reconstructed biological entities.

If this proposed surveillance system is absent, we should expect the GC to use highly advanced telescopes to monitor planetary systems that have prospects for the emergence of intelligent life and technical civilizations. These alien telescopes could use gravitational lenses around stars. Planetary system candidates to the GC could expect to receive

continuous beacons, but the signals would be very weak or disguised so that they would only be decipherable by newly mature civilizations that just pass the entrance requirements. The problem with this scenario is there would be a fairly long communication delay with the GC, because they would be so far away. Nevertheless, reception of a rich message from the GC is possible. The material and/or energy resources needed for these signals to be recognized must correspond with great probability to a newly ripe mature civilization. Hence, cleverness in itself cannot be the criteria for successful detection and decipherment, otherwise a brilliant scientist on a primitive civilization might jump the GC protocol.

I submit that if we want to enter the Galactic Club, the challenge lies in reconstructing our global political economy. A few minor side benefits should result, like no more war, no more poverty, a future for all of humanity's children with a substantial proportion of biodiversity intact. We should not expect the Galactic Club to save us from ourselves.

More information: Reference: Schwartzman, D. and L.J. Rickard, Being Optimistic about SETI, *American Scientist*, 76, No.4, 364-369.

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