J Mol Evol (1990) 31:249–250

Journal of Molecular Evolution

Random Walking

Search for Extraterrestrial Intelligence Detects Only Low Levels in Congress

Popular support for space exploration has always been aided by the fundamental human interest in possibilities for extraterrestrial life. This interest is a manifestation of the desire for knowledge of the unknown. The explorer Fridtjof Nansen said, "Man wishes to know, and when he stops wishing to know, he stops being man." This cessation of wishing to know has now been reached by U.S. Congressman Ronald Machtley (R-RI) who said, "Money ought not to be spent on curiosity." (*Congressional Record,* H4356, June 18, 1990) He went further: he said "our constituents would agree" with this statement. Perhaps he thinks he is representing Lower Slobbovia, rather than Rhode Island. Machtley was supporting Representative Silvio Conte (R-MA) in deleting $6 million earmarked for the SETI (Search for Extraterrestrial Intelligence) program in NASA's request for funds. Originally the sum was $12 million, but the House Appropriations Committee cut it in half. Mr. Machtley's amendment, which reduced it to zero, was passed.

NASA's exploration of the solar system was highlighted by the Viking mission to Mars in 1976, and its inclusion of experiments for life detection. The search was for microorganisms, not intelligent life, and several hundred million dollars was spent for this, without perceptible opposition by Mr. Conte. The instrumental procedures for culturing microorganisms worked successfully on the Martian surface by remote control. Life was not detected. Norman Horowitz (1986) said:

> "Since Mars offered by far the most promising habitat for extraterrestrial life in the solar system, it is now virtually certain that the earth is the only life-bearing planet in our region of the galaxy [the solar system]. We have awakened from a dream. We are alone, we and the other species, actually our relatives, with whom we share the earth."

The absence of life on Mars showed that Earth was the only inhabited planet in the solar system. This left the remaining possibility that life existed elsewhere in space. Investigation of these remote regions has devolved on SETI, as proposed by Cocconi and Morrison (1959) for the detection of radio signals of extraterrestrial origin at frequencies near the hydrogen line at 21 cm. This idea has been pursued, investigated and expounded (Morrison, Billingham and Wolfe, 1977) so that it has reached a new and exciting stage which would employ an instrument capable of monitoring 20 million radio channels every second. In its first minutes of use, the scan would cover more space than has been searched in the past 30 years.

Philosophically speaking, I regard SETI as a necessity, for, if nothing is found, our responsibilities to preserve the Earth become even more compelling, and, if extraterrestrial intelligence *is* detected, these responsibilities are in no way diminished, but we shall have achieved the greatest discovery ever made by human beings. Indeed, if the search finds nothing, it will not have failed, because it will enhance our perception of solitude in a frozen waste.

Nevertheless, Mr. Conte, in the finest tradition of political anti-intellectualism, said (*Congressional Record,* loc. cit. 1990):

> "At a time when good people of America can't find affordable housing, we shouldn't be spending precious dollars to look for little green men with misshapen heads . . . . Of course there are flying saucers and advanced civilization in outer space . . . . But we don't need to spend $6 million this year to find evidence of these rascally creatures. We only need 75 cents to buy a tabloid at the local supermarket."

This was a complete distortion of the SETI proposal, which Mr. Conte was misrepresenting in ludicrous terms.

Perhaps his most amazing statement is his assertion that, although he believes there are "flying saucers and advanced civilizations in outer space"

he is unwilling to approve any expenditure to investigate these portentous—and conceivably dangerous—artifacts.

He then subjected his fellow-Congressmen to an assortment of banner headlines from the journalistic subculture. "Blimp Scared UFOs Away From Stadium" (Chicago), "Noah's Ark was Built by Space Aliens" (Turkey), "Space Aliens Stealing Our Frogs!" (California), "UFO Flies out of the Ocean" (Sri Lanka) and "Magic Ray from This UFO Cures 22 People!" (Western Turkey). The verbal garbage accompanying these headlines was reproduced in the *Congressional Record* at public expense at the behest of Mr. Conte. Mr. Machtley said "Since we have survived for 15 billion years without knowing whether there is extraterrestrial life, we may just survive a few billion more." This places the age of the human species as 3 times that of the solar system, 4 times that of the origin of life and 150 times that of other mammals. He also said "We are just beginning to realize the costs associated with the Savings and Loan bailout. Might we spend some of this NASA money to find where the absence of intelligence was that led to this failure."

Since he brought up this matter, let us suggest that he examine his own record. What did he and the rest of Congress do to forestall this catastrophe, which is going to cost about a hundred thousand times as much as he vetoed for SETI? He then said "if there is such a superintelligence [sic] form of life out there, might it be easier just to listen and let them call us?" This, of course, is just what SETI proposed, and evidently Mr. Machtley did not even read the proposal that he eliminated.

So the law-makers voted cancelling SETI's program, which had not been discussed, but actually, they presumably intended their vote to be against a program of looking for flying saucers and little green men invented by Mr. Conte.

The debate about extraterrestrial intelligence has been long and interesting. One viewpoint is that human beings are a singularity, also that an Earth-like planet would be a necessity for intelligent life and that only a very small fraction of stars could be suitable in size and length of life, for harboring an Earthlike satellite. Such stars would have to be on the *main sequence* of surface temperatures and absolute magnitude, and would have to be in a stable state. Our sun is in the middle of its main sequence time of 10 billion years (BY). One argument goes like this: The number of stars in our galaxy is estimated at between 100 and 400 billion. The fraction on the main sequence is 0.9 and the fraction of single (non-multiple) stars is 0.3. The great majority of stars would be entirely unsuited to support an Earth-like planet that could maintain water in the liquid state for 3 to 4 B.Y. The fraction of single stars with mass between 0.9 and 1.1 that of the sun, which are the probable limits for a central star supporting an Earth-like planet, and with an age between 3 and 4 B.Y. is about 0.01 of these. The estimated fraction of these, with a planet of mass between 0.25 and 2 times the mass of the Earth, in an orbit of suitable radius and eccentricity (allowing for seasonal variations), and with spin angular velocity and orientation needed for tides would be 0.005 to 0.0002. So the number of stars with an Earth-like planet would be only between 1 and 100 within a distance of 1,000 light years.

A more optimistic viewpoint is that there are 400 billion stars in our galaxy, 10% of these are "sun-like," planets are "the rule," there is a high probability that life will originate on earth-like planets, Darwinian evolution leads to complex life which in turn leads to technological civilization. Therefore there may be large numbers of civilizations in our galaxy. If we estimate, very conservatively, that only one in a million sun-like stars has a planet with such a civilization, there would still be 40,000 of them.

No one knows if such a viewpoint is merely wishful thinking but since there are so many billions of stars and galaxies, surely we are presumptuous if we consider ourselves the only intelligent form of life in the universe.

The SETI program would use existing antennas including the Arecibo Observatory dish in Puerto Rico and also radioastronomy installations in the 34-meter antennas of the Deep Space Network. The new SETI signal analysis system is planned to be ready for use on Columbus Day in 1992. It would be a dual-mode search strategy: A Targeted Search will examine nearly 800 stars to a very high degree of sensitivity and a Sky Survey will search the entire sky to moderate sensitivity for continuous signals over a wide range of frequencies. An important feature will enable distinguishing actual signals from the large background of radio frequency interference (RFI). It is necessary to start soon because RFI is increasing. There is much international interest in the NASA SETI program. This interest is obviously not shared by Mr. Conte as he reads his way past the cash-register at the supermarket.

References

Horowitz, N. H. *in to Utopia and Back: The Search for Life in the Solar System* New York, W.H. Freeman and Company, 1986.

Cocconi, G. and Morrison, P. Searching for interstellar communications. Nature 184:844, 1959.

(P. Morrison, J. Billingham and J. Wolfe eds.) *The Search for Extraterrestrial Intelligence*, Ames Research Center, NASA, 1977.

Thomas H. Jukes
August 9, 1990