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Next Question

For several years radio astronomers have been speculating about the existence of intelligent beings in the "radio" stage of civilization in planetary systems other than our own. As G. Cocconi and P. Morrison pointed out in *Nature* (19 September 1959), no theories yet exist which make possible "a reliable estimate of the probabilities of (1) planet formation; (2) origin of life; (3) evolution of societies possessing advanced scientific capabilities." Current astronomical theory suggests that planetary systems may be the rule rather than the exception in the universe. If this should be so, then there is a certain incalculable probability that x planets suitable for the evolution of living beings exist, and that on some of these, living beings may not only have evolved but have become highly intelligent.

Cocconi and Morrison assume that "To the beings of such a society, our Sun must appear as a likely site for the evolution of a new society. It is highly probable that for a long time they will have been expecting the development of science near the Sun. We shall assume that long ago they established a channel of communication . . . and that they look forward patiently to the answering signals from the Sun which would make known to them that a new society has entered the community of intelligence."

On the assumption that it is worth a try, even though the chance of success is extremely slight, early next year a small part of the operating time of the 85-foot telescope at the National Radio Astronomy Observatory at Greenbank, W. Va., will be devoted to a systematic search. The program is described by the director of the project, Frank D. Drake, in the January 1960 issue of *Sky and Telescope* (published 21 Dec. 1959). The most promising frequencies for exploration would be from 1000 to 10,000 megacycles per second. Within this range, Drake thinks (in agreement with Cocconi and Morrison), any being attempting interstellar communication would select the hydrogen line—a frequency at which radio telescopes would be operated most intensively anywhere in the galaxy during the early developmental phase of radio astronomy. The signals would presumably be confined to a narrow band width (the narrower the band width the greater the range) and should show a varying Doppler shift, since the source would be in orbit. The instrument will first be focused on Tau Ceti and Epsilon Eridani, sun-type stars about 11 light-years away.

What kind of signals might we expect? Radio astronomers agree that pulses to communicate prime numbers or some simple arithmetical problems might be suitable. A more sophisticated possibility would be, as Drake has suggested privately, for the "others" to send out pulses in clusters—a series of pulses followed by a pause, another series, another pause, and so on. The number of signals in each pulse could stand for intensity of light or dark, and we could build up a picture on the basis of the information received.

A final consideration remains. We must in addition assume that the intelligent beings with their highly developed radio technology have developed a kind of interstellar Point Four program for underdeveloped planets and that they are willing to devote a considerable effort to maintaining a long-term program of beaming messages to our hitherto unresponsive system.

Consider our own program. If you ask radio astronomers why we ourselves don't start to broadcast, you learn that they think the fiscal authorities would not approve. This leads to an unhappy thought: May not other civilizations (if they exist) have evolved analogous fiscal authorities? And may they not likewise be waiting in silence for our signal before they give their response?—G.DuS.