Tuning in on Other Worlds

What kind of radio programs do they have on distant planets? We may find out if the Soviet Academy's plan to search for extraterrestrial intelligence succeeds.

BY DIETRICK E. THOMSEN

Ever since people became aware that the universe is not geocentric—that there are other earthlike bodies out there—the question of the possible existence of other forms of life, and especially intelligent life, on some of those bodies has fascinated many imaginations. Lately some searches have been made and international programs proposed. American astronomers have urged the U.S. Government to get into it, and now the Soviet Academy of Sciences outlines a plan to last to the year 1990 or beyond (ICARUS 26:377).

Do such creatures exist? Are they superior to us in technology? Have they visited us? Are we perhaps unwittingly under their control? These questions are staples of science fiction, and often dispassionate scientific attempts to look for evidence of such beings have gotten hopelessly mixed with fantasy.

There was the famous moon people hoax in the middle of the 19th century that originated from supposed telescopic observations done at Capetown. Schiaparelli, a sane and reputable observer, reported "*canali*" on Mars. The Italian word means simply, channels, and does not require engineering artifacts, but the *canali* gave science fictioneers ever since Edgar Rice Burroughs a very long boatride. The willingness of ordinary people to believe in extraterrestrial beings was discovered by Orson Welles in 1938. The present writer's parents, who lived not far from Grover's Mills, N.J., where the Martians were supposed to have landed, spent a number of anxious hours wondering whether to flee. Panicky people ran up and down the streets praying to the Virgin and the saints for aid. Almost 40 years later, the current rash of UFO cults testifies to the same psychological bent.

Thus the subject of CETI (Communicating with Extraterrestrial Intelligence) is subject to the jeers of cynics, the slick talk of hoaxers and the cloying and often dangerous devotion of cultists.

Nevertheless, in recent years CETI has commanded the attention of prominent scientists and humanists. A few attempts to listen for alien radio signals have been made. One can look either for recognition signals beamed by the aliens or eavesdrop on their domestic transmissions, which form an ever-widening halo around their planet. (Somewhere, 63 light-years from earth, someone may be listening to the Titanic's distress signals and wondering why the Californian does not respond.)

In spite of a lack of success, the attempts here and there have led to a number of international conferences on the subject that have proposed a systematic program of CETI. Some of these suggestions have been urged in the United States by American participants. Now comes the Soviet Academy with its program.

"Efforts to detect extraterrestrial civilizations should proceed smoothly and systematically, and should extend over a prolonged period of time," is the first basic principle. . . . "It would be a great mistake to build a program in contemplation of rapid and easy success." Existing radio telescopes should be utilized as much as possible. The report also points out that astrophysical information will be gathered as a by-product of such a search, thus giving it some justification in the eyes of astronomers who are skeptical about intelligent aliens.

There's no telling what frequency an alien civilization might use to broadcast, so the Soviet Academy proposes listening over the entire shortwave portion of the radio astronomy range (1 to 100 gigahertz frequency). The principal antennas to be used in the USSR could be the RATAN-600 for the wavelengths between 0.8 and 21 centimeters and for the shorter, millimeter range, the antenna being developed at the Gor'kii Radiophysics Institute.

Three different kinds of search are urged. The first is to check each star within 100 light-years of the sun, and possibly if time permits out to 1,000 light-years. The second is to examine the different galaxies in the local cluster. Finally there should be an all-sky survey for signals from anywhere.

The survey of local stars, if several years were allowed for one antenna to do the work, would allow one or at most a few hours per star. It would thus be desirable to use several antennas with an effective area of about 1,000 square meters. Since natural radio emission from solar type stars is weak, a strong signal might indicate an artificial source. "In the future one might hope to search for signals by sending automated space probes to the nearest stars."

Tuning in on external galaxies allows tens to hundreds of billions of stars and their associated planetary systems to be looked at at once. "Since the number of objects is small, a continuous monitoring service could be organized, with observations extending over several years."

For a general sky survey, the farther apart the telescopes are, the fewer there need be. One of the more imaginative suggestions is to put them in orbit around the moon, "because when they pass behind the moon, maximum suppression of terrestrial interference would be assured." If they were placed at the Lagrangian points of the moon's orbit, only two would be required.

Civilizations would betray their presence not only by radio signals deliberately generated but also by infrared generated by heat from their engineering works. The Soviet Academy proposes searches for such emanations in the range between 20 micrometers and one millimeter. For this work the Academy proposes building a special mountain observatory with a telescope of about 2.5 to 3 meters diameter. A specialized satellite carrying analogous equipment should also be launched.

Instrumentation and surveying are divided into two overlapping ten-year plans, CETI 1 (1975-1985) and CETI 2 (1980-1990). In CETI 1 a ground-based system of eight stations would survey the entire sky as would two space stations. A system of low-directivity, ground-based antennas probably located in the same places as the sky-survey antennas would look at nearby galaxies.

In CETI 2 there would be a further satellite system with antennas of large effective area for monitoring the whole sky. There would also be two widely spaced stations with large (one-square-kilometer effective area) semirotatable antennas for synchronized searches of specific objects and analysis of selected sources. "These instrumentation complexes could be used not only for CETI work but for a variety of important astrophysical problems."

Once a message is received, of course, it must be deciphered. The message could come pictorially (like the one U.S. astronomers recently sent out with the Arecibo telescope), linguistically (like a terrestrial language) or formalized (like computer languages or algorithms). If the message is linguistic or formalized, its grammar and semantics must be determined, lexicons prepared and translations worked out. Such exercises could benefit many fields besides astrophysics. For example: "Some of the algorithms worked out in the decipherment analysis might be applied to studying the structure of branches of the national economy."

The report continually stresses the usefulness of CETI to other branches of human endeavor: "Even in their initial stage, investigations of the CETI problem can be of important cognitive and applied value, and can serve as a source of useful information and a stimulus in many fields of science and technology." □