

POSSIBILITY OF INTELLIGENT LIFE
ELSEWHERE IN THE UNIVERSE

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REPORT

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SUMMARY

The long-standing belief that the only intelligent life in the universe exists on our planet, Earth, is gradually disappearing. As early as the 13th century, philosophers ruminated on the possibility of other planets in the celestial void supporting intelligent life. Once it was discovered (and accepted) that Earth was not the center of the solar system, let alone the universe, speculation intensified. At first it focused on the planets of our own solar system, but current scientific thought maintains that if any life other than our own does exist in this small corner of the universe, it is of a simple biological form only, not what could be classified as intelligent. Recent estimates by some of these same scientists, however, suggest a probability of as many as 1 million advanced civilizations existing in the Milky Way galaxy alone. The Milky Way is the galaxy which contains our Sun and its solar system; astronomers calculate that there are approximately 100 billion other stars in the Milky Way, as well as 100 billion other galaxies in the universe. There are, then, 10^{22} (10,000,000,000,000,000,000,000) stars in the known universe which could conceivably have planets orbiting them, possibly supporting some type of life.

Scientists have already begun to identify methods for contacting other civilizations that might exist in the universe. Of the methods available, two categories can be identified: electromagnetic waves, and spaceships (manned or unmanned). There are advantages and disadvantages to both. Electromagnetic signals (either radio or light waves) can travel at the speed of light, but convey only small amounts of information at a time, therefore requiring very long periods of time for two-way communication. Ships can carry artifacts or passengers to communicate a more complete picture of Earth, its peoples and cultures, but according to currently accepted laws of physics, cannot travel at the speed of light (see chapter 4). In addition, technology is now available for sending or receiving electromagnetic signals, but spaceships travel at a mere fraction of the speed of light and we do not know how to alter the human life-cycle so that manned ships could travel through space without regard for our short life span. Unmanned probes have already been launched into space which carry greetings from planet Earth (Pioneer 10 and 11, Voyager 1 and 2), but it seems more than likely that technology will develop to such a point that future ships will pass these vestiges of present-day technology on their way through interstellar space, much as jets pass propeller airplanes.

There are, of course, certain risks involved in coming into contact with an alien, probably superior, intelligence, and the consequences depend in part upon whether the contact is a face-to-face encounter in which "they" have arrived at our doorstep, or if we have intercepted a radio signal from them. We have no control over the first situation, but in the latter case, we are fairly safe since there is no requirement for us to respond. Although we have been transmitting radio signals

for 40 to 50 years, only extremely sensitive receivers could detect them, so our existence may well be unknown. In intercepting a signal, then, we have the option to respond or not, and by listening to their transmissions could learn their nature and intentions toward other species. A complicating factor would develop if they wanted to deceive us by transmitting messages that appear beneficent, while their intentions were malevolent.

Possible benefits that might accrue from establishing communication include areas such as language, culture, basic science, and survival itself. We would necessarily have to be cautious in accepting any advice initially, but in the long run the possibilities are titillating. A 1971 report on a design study of a system to detect interstellar signals by Stanford University and the National Aeronautics and Space Administration commented:

We cannot assert that interstellar contact is totally devoid of risk. We can only offer the opinion that, in all probability, the benefits greatly outweigh the risks. We cannot see that our security is in any way jeopardized by the detection of signals radiated by other life. It is when we respond to such signals that we assume any risks that may exist.¹

To emphasize its commitment to receiving signals rather than establishing two-way communication, NASA now uses the acronym SETI, for Search for Extraterrestrial Intelligence, rather than the more common CETI, for Communication with Extraterrestrial Intelligence.

Before a major search program can be initiated, however, target planets having a strong probability of supporting intelligent life must be identified. The first step in this process, selecting those stars which have planetary companions, is the work of astronomers. There have been, in fact, several "discoveries" of planetary companions in the past, although all of these have now been questioned by other astronomers who claim that the data collection techniques were faulty. In moving or repairing a refracting telescope (the type used for these observations), the lens can shift slightly, yielding data similar to that produced by a companion (either planetary or stellar) to the star under study. It is hoped that new refractors can be designed to remedy this defect.

Scientists can currently search for signals from other civilizations with radio telescopes, but they are limited not only by the technology of the receivers, but also by interference from radio waves emanating from earthly devices, such as satellites and commercial radio and television. The frequency band which many scientists conclude is the most likely to carry messages from other intelligences (1420-1700 megahertz, or the "waterhole" region) is becoming increasingly crowded with other services. If the present pace continues, receivers may not be able to distinguish between man-made interference and a signal arriving from space, regardless of how advanced radio telescope technology becomes. If a search is to be conducted, then, either the waterhole will have to be reserved for such activities, or the receiving antennas must be located outside the zone of interference from Earth-related systems (perhaps on the far side of the Moon).

¹ Project Cyclops: A Design Study of a System for Detecting Extraterrestrial Intelligence. Moffett Field, Calif., NASA, rev. ed., 1973: 32.