

## If We Are Alone, What on Earth Are We Doing?

IMAGINE the Earth 65 million years ago. Suddenly an asteroid hurtles out of the sky. The resulting explosion fills the air with dust. A series of subtle physical and chemical processes then wipes out the dinosaurs and half of all other living species. But what if the asteroid had missed? For all we know, mammals might still be running around under the dinosaurs' feet. Clearly, we are here now as a product of countless effects — some of them catastrophic — that have painted the canvas of life on Earth. This forces us to think the unthinkable: an intelligent, technological species like our own may be unique in the galaxy.

We have become the dominant form of life on Earth through a very specific chain of events. For example, consider the role of the Moon. Recent research suggests it grew from debris created in a glancing collision between Earth and a Mars-size impactor about 4½ billion years ago. What if the object had missed, or if it had struck at a different angle? Earth's rotation axis might well be tilted at something other than 23½°, perhaps causing seasonal variations hostile to the development of life as we know it.

Furthermore, without the stabilizing effect of the Moon's gravity, Earth's orientation in space might change dramatically over millions of years. This could result in long-term climate changes deadly to organisms that evolved under different conditions. And what of the tides? Evidence suggests that early life got its start from the growth and interaction of complex organic molecules in tide pools. If it weren't for the Moon, the tides in Earth's seas would be minuscule.

My point is that our understanding of the development of life on Earth is riddled with unknowns about the relative importance of various effects. I find it astonishing that many scientists are able to compound all these uncertainties and conclude that there must be intelligent life on other worlds.

In fact, planets in the galaxy should be as unique as human fingerprints. There is nothing in our study of astronomical objects to compel us to think otherwise. No other planet is likely to have the same physical characteristics as Earth. Yet primitive life must surely have emerged on millions of planets of various sizes and

axial tilts, and with various numbers and sizes of moons. These bodies will have suffered diverse numbers of asteroid impacts or nearby supernova explosions capable of destroying life again and again. Surely millions of ecological systems have developed in the Milky Way at one time or another. Yet not one could be *precisely* like ours, sharing an evolutionary history dominated by the development of humanoids capable of building radio telescopes to signal similar beings on other planets.



Today there is widespread interest in the search for extraterrestrial intelligence, or SETI. But arguments for spending millions of taxpayers' dollars in this quest for twin civilizations in space are only expressions of faith. SETI is a technological search for God. For example, some proponents claim that through contact with extraterrestrials we will learn answers to fundamental questions about the nature of life and death, issues that once were God's bailiwick. One SETI fan writes, "If we find evidence of extraterrestrial intelligence, that will mean that somebody elsewhere has avoided self-destruction." Is self-destruction our greatest fear? If so, the possibility that we are alone is a good reason to face this fear head on.

The vast majority of inhabitable planets in the Milky Way may be teeming with microbial life. And our galaxy may even be populated by countless intelligent beings. But *all* extraterrestrial species are, by definition, *alien*, as exotic as tube worms in the ocean depths. Thus we should not expect to communicate meaningfully with extraterrestrial cultures any more than we should expect to converse with any of the

half billion or so species that have habited Earth since life began.

Obviously it is more fun to dwell in hope that millions of extraterrestrial civilizations exist and that we can learn something from them. To encourage this sort of mind some scientists wish to spend \$100 million on SETI. They admit that even a minute chance of success in so vast a galaxy as ours requires a typical technological civilization to last 10 million years. Yet this assumption carries with it remarkable implications. It suggests that evolution — both cultural and biological — ceases once a civilization reaches the equivalent of our 20th century. (Otherwise, how could a million-year-old extraterrestrial culture understand us?)

In fairness, this may be true; we're on the verge of bringing life under control in the laboratory, so natural selection for *homo sapiens* may have come to an end. But if so, how do we plan to survive in the seemingly endless future? Can we really expect E. T. to help us? No, we must acknowledge that we hold the destiny of terrestrial life in our own hands.

Of course, nature is quite capable of causing our extinction no matter what we do. As a reminder, an asteroid whizzed at close range last March, just one hazard of sitting in this exposed place. What then, do we add to the danger by plunging recklessly, unthinkingly, into our technological future?

We hope that something, someone, will come to our aid, just as many people still implore their God for assistance in everyday matters. In an age when we project many of our deepest needs and fears in space — consider, for example, the popularity of UFO's and astrology — the idea of SETI is very seductive. Above all, we hope we are not alone.

However, I believe that until we have unambiguous evidence to the contrary, it is our duty to act as if we are indeed alone in the galaxy. Every dollar we would ever dream of giving to ill-founded search for extraterrestrials should be directed toward confronting the really basic question. It is not whether anyone is out there. It is this: who is down here, and what are we doing to ourselves and our planet?

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