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Why Do I Believe in ETs?

ETs, extra-terrestrials that is, feature commonly in science fiction. One of the most dramatic encounters with them was described by H.G. Wells. When the announcement that 'the Martians have landed' was broadcast in the radio play based on his story, it created waves of panic amongst the listeners. Today the popularity of TV serials like *Star Trek* or movies like *Star Wars* underscores human curiosity about life outside the confines of our Earth.

Are we alone in the universe? Or, are we mere newcomers on the lower rungs of the ladder of development that already has several other civilizations much more advanced than us?

These questions are no longer left to the free (albeit imaginative) speculations of science fiction writers. Till the mid-fifties scientists would not touch the subject: there was no vestige of evidence for it. When Fred Hoyle proposed the idea that the interstellar space is filled with vast clouds of molecules, he was ridiculed. For, astronomers believed that nothing more complex than light atoms exist out there. So he put the idea in a science-fiction novel *The Black Cloud* and it became an instant success.

Subsequent events showed that Hoyle was correct. Microwave technology was able to construct receivers in the early sixties, that picked up unmistakable signals emitted by molecules. Today astronomers accept the existence of giant interstellar clouds harbouring complex organic molecules. The very same ones that are found in life here on Earth.

So we have some circumstantial evidence. If the building blocks of life are present in space, can we expect the complete product — the ET that everyone is looking for?

SETI — Search for Extraterrestial Intelligence was launched as a scientific activity by Cocconi and Morrison in 1958. They felt, even in those early days, that part of the astronomer's efforts could be well spent in search of animate rather than inanimate systems. In particular they signed out the budding science of radio astronomy to launch SETI. However, more of that later.

In the late 1960s the national academies of USA and the USSR jointly sponsored a symposium on how scientists could meaningfully (and realistically) discuss the existence of ET. As one may imagine this new branch of science is interdisciplinary. It brings in experts from astronomy, biology, computer science, artificial intelligence, communication and social sciences. And of course, with so many experts, there was bound to be more heat than light in SETI discussions.

To bring order into this field astronomer Frank Drake from Cornell University wrote out an equation — now famous as the 'Drake equation' which describes the total number of developed ET civilizations in our Galaxy as a product of several factors most of which are crudely known, if at all. If we know them well we can answer the question: 'How many ET civilizations are out there?' Till we know the factors well we can only speculate.

Scientists vary in their responses to this question. By and large, the astronomers tend to be optimistic and the biologists pessimistic. The former point to the vastness of the universe. Our Sun is one amongst some two hundred billion stars that go around in our Milky Way Galaxy. Our galaxy is one amongst tens of billions that our telescopes pick out in an apparently boundless universe. So is it not presumptuous on our part to imagine that we, the humans (and our fellow species) are the only living creatures around

Perhaps, say the biologists who point to the extreme complexity of construction involved in making 'life'. The arrangement of organic molecules in the DNA — the basic structure found in all forms of life — is so complex that it is hard to conceive of it arising purely by chance. More probable is the event of a monkey hitting, at random, the keyboard of a typewriter and producing a Shakespearean play. So, the biologists say that life has a very small chance of occurring and it will not be a surprise if even in this vast universe we are alone.

As an astrophysicist I tend to be an optimist. We know how vast the universe is; we don't yet know how life is made. When we do know (may be in the twenty first century) we may find that quite a few planets around quite a few stars in our galaxy harbour life. And of those living systems some may well have evolved far beyond us humans on the way to superior stages. 'Some' how many? My guess is — and I cannot really justify it except very crudely — about a 'million' in our galaxy.

How do we measure superiority? There are two measures, summarized in the words 'brain' and 'brawn'. We have already constructed computers that store vast quantities of information and process it fast. Only, they cannot programme themselves, they cannot think. Imagine a brain that can think and has the abilities of a supercomputer, and there you have a superior ET.

The other criterion is energy. Today a human being in an advanced society uses far more energy than the primitive caveman. Still, our total energy requirements are less than ten thousandth part of the energy that sunlight brings to us. Imagine a society that uses up as much energy as it receives from the parent star. Still higher in this energy-ranking is a society that uses as much energy as the star itself! For such a society interstellar travel across the Galaxy in peanuts.

But if there are so many supercivilizations, why don't they spread out and colonize the entire galaxy? Why have we escaped being dominated by superior

ETs? Calculations tell us that, if they wish, supercivilizations are capable of spreading their colonies to all habitable planets in the Galaxy in a few million years. A few million years is long by human standards but a mere fleeting instant in the life of the Galaxy estimated to be at least ten billion years old. So, argue the pessimists, that the ETs, don't exist.

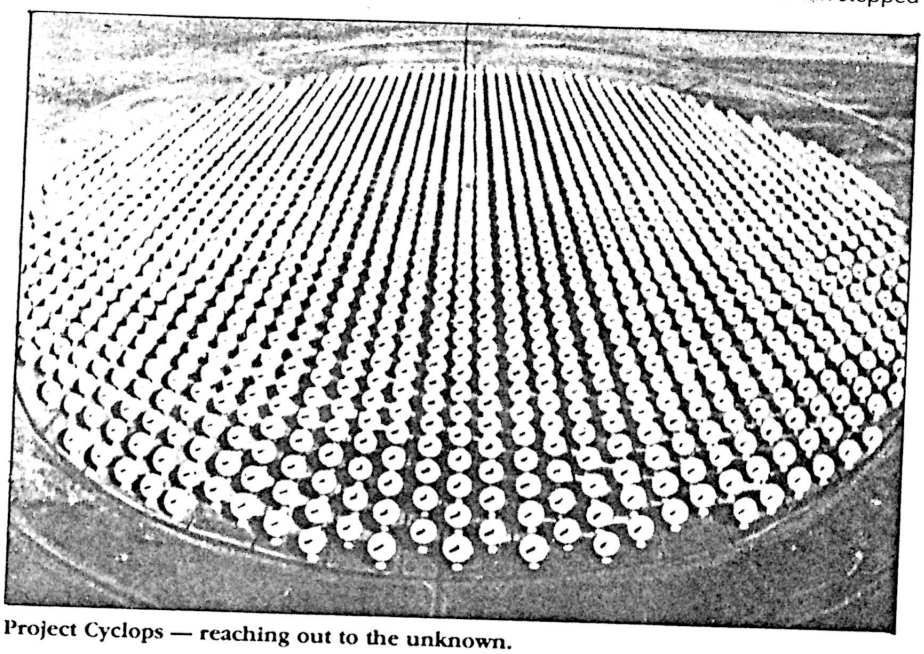
Maybe, the urge to colonize is not there in the ETs if they are so advanced, and they may have stayed put on their mother planet. Which is why we have not seen them. This is one way the optimists counter the above criticism. The other reason why the ETs have not come our way is the so called 'zoo hypothesis'. This states that the ETs know about us but they want to leave us alone to see how we evolve under natural conditions. To them the Earth is an enormous zoo or a sanctuary. So we are being watched but not to be disturbed by the ETs.

What about the UFOs, the flying saucers, the Bermuda triangle and the lot? If you read about these sensational things you will feel certain that we are indeed being visited. Unfortunately, no UFO incident has so far withstood scientific scrutiny to show that here was a proven case of the ETs having visited us. Even the so called strange events in the Bermuda triangle do not turn out to be unnatural or supernatural after all.

So far as the UFOs are concerned, the reports that have been analyzed by scientists fall into several categories. First there are cases of optical illusion (like mirages) wherein effects on light propagation by unusual atmospheric conditions produce strange images. Or, planet Venus just above the horizon produces the impression of a flying saucer. Some witnesses of UFO events turned out to suffer from hallucinations. Other perpetrated frauds including clever photographic ones to impress those who think that a camera cannot lie.

Discounting all such cases, we are still left with genuine spacecrafts which are man-made; the numerous sky satellites that encircle our planet. Their existence is known but very often denied officially for reasons of security.

So, can we ourselves go out in search of the ETs? We have, after all started the space age here on the Earth. Man stepped on the Moon in 1969. Man-made Viking spacecrafts successfully landed on Mars. The Voyagers mission is sending man-made instruments on a 'grand tour' of the outer planets of the Solar System.



Project Cyclops — reaching out to the unknown.

All this sounds and reads impressive but is puny achievement compared to what is required. The nearest star is so far away that light takes four and quarter years to travel the distance. By comparison light takes a mere eight minutes to reach us from the Sun. With our present technology man will take millions of years on a Columbus type journey to look for the ETs. If he does find them or, rather, if ETs receive the man-made spacecraft they may discover fossilized remains inside!

No. Our best (and cheapest and quickest) bet for the locating the superior ETs is through communication. Coded messages have already been sent about us to specific and plausible stars from the giant 1000-foot radio dish at Peurto Rico. No return signals have come so far! Nor have we picked up any messages being exchanged between two supercivilizations. But the day of interstellar wire-tapping is not far off.

Can we do better than the 1000 foot dish? Present technology is capable of building a gigantic telescope that can systematically search the cosmos for intelligent signals. One such project was thought out by Bernard Oliver a few years ago. Known as Project Cyclops, this receiver of signals is made up of some 1000 steerable dishes of 100 metres diameter each. Today, the radio telescope at Bonn with a 100-metre dish is the world's largest steerable telescope. You have to imagine this (Project Cyclops) multiplied by 1000. This entire combination can be computer-controlled to make the receiver point towards the target star. Like the one-eyed monster in Greek mythology after which it is named, the telescope should be able to pick out intelligent signals being exchanged between two (or more) ET civilizations, simply by staring hard enough.

What are the likely sources of such signals? I personally like to imagine, these could be SOS signals from a civilization on a planet that is under threat. From what? From its own star, as we ourselves will be at a later stage when the sun becomes a 'Red Giant' and swallows up the Earth as it expands to more than 200 times its present size. For us the danger is not imminent — it lies 5 to 6 billion years ahead. But there are other stars which might be becoming giants now. As such, the ETs on their planets may be desperately trying to locate other hospitable planets. Maybe, we should be on the lookout for signals from them.

Scientists believe that the 21 centimetre wave band is most likely to be used by the ET for communication. This is the natural wavelength of radiation for neutral hydrogen. It is known to pervade the entire galaxy. Just as we know this fact, so do the ETs. Thus our search strategy suggests tapping this waveband to listen to private interstellar dialogues.

If we do succeed in this (unethical?) experiment, it will be the greatest and most exciting discovery made by the human race. So, to hell with ethics; let us tune in our best antennas to search for the ETs.

I am sure, one of these days we will find them.

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