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THOUGHTS ON EXTRATERRESTRIALS PROMPTED BY TWO CONTRIBUTIONS IN A RECENT ISSUE OF QUARTERLY JOURNAL

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The account of the work of Tsiolovsky (**1**) and the comments on extraterrestrial technology (**2**) were interesting and show that thoughts on the subject still flourish. The Fermi Question (If 'they' are there why have 'they' not been here?) or the modified form (If 'they' are there why have we not at least heard from 'them'?) have been answered over the years by many authors in many ways. One extreme contends that there are no extraterrestrials anyway and we are in the Universe alone (**3**). The other extreme is that 'they' have decided collectively to keep us isolated in innocence as in a 'zoo' (**4**): Well if we are 'innocent' whatever are 'they' like? Certainly, attempts to eavesdrop using the electromagnetic spectrum have not been successful so far, but then it is not likely that they would be (**5**). The sensitivity of our equipment is not high enough to detect local domestic signals from afar. Certainly, if one wishes to know if others are there, the simplest approach is to listen. However everybody listening leads to no conversation! Listeners could wish for isolation: on Earth the Japanese chose isolation until forced out of it during the 19th century by the pressures of world trade. Lack of positive evidence for the existence of extraterrestrials is not, then, in itself evidence that they do not exist.

Our only experience to help understand these problems is here on Earth where we find the scale of the Solar System intimidating even though it extends little more than 10^{-3} light years. As one example of the restrictions we face, it has not yet been possible even to visit Pluto. The distances between neighbouring stars are measured in numbers of light years and the distances to the slightly more remote regions in tens or hundreds of light years. Travelling beyond our Solar System therefore presents the most extraordinary problems for us. The energy required to approach speeds comparable to that of light are uneconomic to attempt in practical travel. Ten per cent or even 1 per cent of the speed still presents formidable problems for space craft propulsion but a 10 lightyear journey at these lower speeds would take 100 years or 1000 years respectively. For creatures with a life span of order 70 years (and active life rather shorter) such journeys into a hostile and unknown environment provide logistical problems that can only be imagined. It is likely that *homo sapiens* will find excitement filling the Solar System with life but will not branch out into space exploration within the present limits of physics and engineering. What happens to the Viking automatic probes, now leaving interplanetary space and entering space proper, is up to chance. Would the situation be greatly changed if they were

under remote control with communication times of many years? As the distance increases, the speed of light (the ultimate speed) quickly ceases to be fast enough for our human purposes.

Is it not possible that these same problems would face extraterrestrials should they exist? Could the answer to the Fermi Question not lie in the enormous distances involved in space travel? However unbelievably advanced technology may be, the laws of physics pertain and the mean lifetime of the individual must be a controlling factor for long-term projects. Missions that involve the birth of new members and the death of old ones during the mission must present important sociological problems whatever the technology. Extraterrestrials would avoid these problems if their mean lifespans were very long – perhaps measured in many thousands of our years. This may not be impossible but one answer to the Fermi Question could be that the extraterrestrials do not, in fact, live long enough.

These considerations could imply that life, whether elementary or advanced, is by the nature of things everywhere a purely local phenomena. Contact between different groupings at distances apart (assuming they exist) can have little other than curiosity value. The elucidation of problems of language and culture at enormous distances involving communication over many 'earthling' lifetimes would be a new experience – even more frustrating than communicating on Internet at a busy time. We, and other extra-terrestrials, can explore the wonders of the Universe with our sciences and by our thought. It may be that, by accident, we might communicate in a restricted sort of way, but to expect a cosmic exploration society and coffee club waiting 'there' to be joined by us is not, it might seem, realistic. But realizing this tells us very little.

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