

48th IAA SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) –
The Next Steps (A4)
SETI 1: SETI Science and Technology (1)

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SELF-REPLICATING THE HART-TIPLER ARGUMENT AGAINST THE EXISTENCE OF
EXTRATERRESTRIAL INTELLIGENCE

Abstract

During the early 1980s, an oft-heated scientific debate raged regarding the Fermi paradox between two stalwarts of science – Carl Sagan favouring the existence of ETI on the basis of the Copernican principle and Frank Tipler favouring the non-existence of ETI on the basis of the Occam’s razor principle. Tipler’s subsequent descent into theological pseudoscience effectively torpedoed his scientific reputation and, as a consequence, his argument. It was an expansion of a similar argument by Michael Hart, himself a politically controversial figure. However, crucial to the Tipler argument was the role played by self-replicating interstellar robot probes. Any technologically capable species will develop self-replication technology which represents the most economical means of exploring space and the Galaxy as a whole with minimal investment. There is no evidence of such probes in our solar system including the asteroid belt, ergo ETI do not exist. This is a powerful and cogent argument. Counter-arguments have been weak. We present a Copernican argument that ETI do not exist – humans are developing self-replication technology today. We present ongoing research in self-replication technology based on 3D printing. We are developing the capability to 3D print entire robotic machines from extraterrestrial resources including electric motors and electronics as part of a general in-situ resource utilisation scheme. Indeed, we have almost completely 3D printed electric motors with structural panels which can be potentially leveraged from extraterrestrial material that should be available in every star system. From a similar range of material, we have identified a means to 3D print neural network circuitry. From this capability, self-replicating machines and indeed universal constructors can be 3D printed. We describe technological signatures of processing of asteroidal material (expected to be similar in all star systems), and, in particular, the excess production of certain types of clay minerals. There is evidence of clays on asteroids (including their detection by OSIRIS-REx on the C-type asteroid Bennu) but these can be attributed to natural processes rather than technological ones. Nevertheless, self-replication technology is under development and imminent. If humans are pursuing self-replication technology, then by the Copernican principle, so would any technologically savvy species elsewhere. There is no evidence that they have.