

Permanence – An Adaptationist Solution to Fermi’s Paradox?

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A new solution of Fermi’s paradox sketched by SF writer Karl Schroeder in his 2002. novel *Permanence* is investigated. It is argued that this solution is tightly connected with adaptationism – a widely discussed working hypothesis in evolutionary biology. Schroeder’s hypothesis has important ramifications for astrobiology, SETI projects, and future studies. Its weaknesses should be explored without succumbing to the emotional reactions often accompanying adaptationist explanations.

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The work of the Spirit of earth, as he weaves and draws his threads on the Loom of Time, is the temporal history of man as this manifests itself in the geneses and growths and breakdowns and disintegrations of human societies; and in all this welter of life and tempest of action we can hear the beat of an elemental rhythm whose variations we have learnt to know as challenge-and-response, withdrawal-and-return, rout-and-rally, apparentation-and-affiliation, schism-and-palingenesia. This elemental rhythm is the alternating beat of Yin and Yang; and in listening to it we have recognized that, though strophe may be answered by antistrophe, victory by defeat, creation by destruction, birth by death, the movement that this rhythm beats out is neither the fluctuation of an indecisive battle nor the cycle of a treadmill.

Arnold J. Toynbee, *A Study of History*, Vol. I, Chapter III, (4) [1]

We use our intelligence to investigate the issue of hypothetical intelligences elsewhere in the Galaxy—so much is uncontroversial. Is it conceivable, however, that exactly this obvious and unavoidable selection effect causes systematic errors in our judgment on the perennial problem summarized in the famous Fermi’s question: *Where is Everybody?* This is not to indicate—as many SETI-detractors have indeed done—that the search for extraterrestrial intelligence is misconceived or founded on false premises; instead, we ask a deeper question about the **intelligibility of our very concept of intelligence**. Without it, we are left in the strange position of the ancient Chinese philosopher who concluded that, since nobody knows what a unicorn really is, he might have already seen a unicorn without noticing it. In this essay, we shall briefly investigate such a proposal in the modern astrobiological context.

Fermi’s question has recently become more pertinent than ever. For the first time in the millennia-long history of speculation on extraterrestrial life, in the last

couple of years we got the numerical hold on the age distribution of possible life-bearing sites in the Galaxy. Seminal results of Lineweaver and his collaborators [2,3] show that Earth-like planets began forming in the Milky Way about 9.3 Gyr ago, while their average age is 6.4 ± 0.9 Gyr. This is significantly larger than the age of Earth (measured to be 4.56 ± 0.01 Gyr [4]), indicating that the difference between evolutionary ages of other biospheres in the Galaxy and ours should—on the Copernican assumption of our average location and properties—be more than a billion years. It becomes then especially hard to answer the question why we do not perceive any manifestations of Galactic supercivilizations, more than a billion years older and unimaginably more advanced than we are. A billion years ago, very simple organisms, like bacteria and acritarchs, were the only inhabitants of our planet; shouldn’t we be like them to an **average** extraterrestrial intelligent community in the Milky Way? What about those which are even more advanced than the average? What about **the first** Galactic civilization? It is becoming increasingly difficult to assert that condi-

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References

1. A.J. Toynbee, *The Study of History – Abridgement of Volumes I-VI* by D. C. Somervell, Oxford University Press, Oxford, 1974.
2. C.H. Lineweaver, "An Estimate of the Age Distribution of Terrestrial Planets in the Universe: Quantifying Metallicity as a Selection Effect", *Icarus*, **151**, pp.307-313, 2001.
3. C.H. Lineweaver, Y. Fenner, and B.K. Gibson, "The Galactic Habitable Zone and the Age Distribution of Complex Life in the Milky Way", *Science*, **303**, pp.59-62, 2004.
4. C.J. Allègre, G. Manhès, and C. Göpel, "The age of the Earth", *Geochim. Cosmochim. Acta*, **59**, pp.1445-1456, 1995.
5. S. Webb, *Where is Everybody? Fifty Solutions to the Fermi's Paradox*, Copernicus, New York, 2002.
6. M.M. Ćirković, "Book Review: Where is Everybody? Fifty Solutions to the Fermi's Paradox by Stephen Webb", *Origin of Life and Evolution of the Biosphere*, **34**, in press, 2004.
7. K. Schroeder, *Permanence*, Tor Books, New York, 2002.
8. S. Conway Morris, "Late Precambrian and Cambrian soft-bodied faunas", *Annual Review of Earth and Planetary Sciences*, **18**, pp.101-122, 1990.
9. P.D. Ward and D. Brownlee, *Rare Earth: Why Complex Life Is Uncommon in the Universe*, Springer, New York, 2000.
10. F.J. Tipler, "Extraterrestrial Intelligent Beings do not Exist", *Q. Jl. R. astr. Soc.*, **21**, pp.267-281, 1980.
11. F.J. Tipler, *The Physics of Immortality*, Doubleday, New York, 1994.
12. T. de Chardin, *The Phenomenon of Man*, Harper & Row, New York, 1975.
13. R. Hague, *Toward the Future*, Harvest Book, New York, 1975.
14. R. Dawkins, *The Selfish Gene*, Oxford University Press, Oxford, 1989.
15. E. Sober, *Philosophy of Biology*, Westview Press, Boulder, 1993.
16. D.C. Dennett, *Darwin's Dangerous Idea*, Simon & Schuster, New York, 1995.
17. A.R. Wallace, *Man's Place in the Universe*, Chapman & Hall, London, 1903.
18. S.J. Gould, "Wallace's Fatal Flaw", *Natural History*, January 1980, pp.26-40.
19. R. Hanson, 1999, "Great Filter", (preprint at <http://hanson.berkeley.edu/greatfilter.html>).
20. G.D. Brin, "The 'Great Silence': the Controversy Concerning Extraterrestrial Intelligence", *Q. Jl. R. astr. Soc.*, **24**, pp.283-309, 1983.
21. P.E. Griffiths, "Philosophy of Molecular and Developmental Biology," in *Blackwell's Guide to Philosophy of Science* ed. by P. Machamer M. Silberstein, Blackwell Publishers, London, 2002.
22. S.J. Gould, *Time's Arrow, Time's Cycle*, Harvard University Press, Cambridge, 1987.
23. D.M. Raup, *Extinction: Bad Genes or Bad Luck?*, W. W. Norton, New York, 1991.
24. D.M. Raup, "The role of extinction in evolution", *Proc. Natl. Acad. Sci. USA*, **91**, pp.6758-6763, 1994.
25. J. Blish, *The Seedling Stars*, Orion/Gollancz, London, 2001; first edition 1957.
26. G. Egan, *Diaspora*, Orion/Millennium, London, 1997.
27. V. Khlumov, "Kulpovskij Memorandum", *Zemlya i Vselennaya*, No. 1, 95, 1987. In Russian.
28. V.M. Lipunov, "On the problem of the super reason in astrophysics", *Astrophys. Space Sci.*, **252**, pp.73-81, 1997.
29. D.M. Raup, *Unconscious intelligence in the universe* at IAF, International Astronautical Congress, 38th, Brighton, England, October 10-17, 1987, p.5.
30. M.J.S. Rudwick, "Caricature as a source for the history of science: De la Beche's anti-Lyellian sketches of 1831", *Isis*, **66**, pp.534-560.
31. S.J. Gould and R.C. Lewontin, "The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme", *Proc. R. Soc. Lond. B*, **205**, pp.581-598, 1979.
32. M.M. Ćirković, "Earths: Rare in Time, Not Space?", *JBIS*, **57**, pp.53-59, 2004.
34. N. Eldredge and S.J. Gould, "Punctuated equilibria: an alternative to phyletic gradualism," in *Models in Paleobiology*, ed. by T. M. Schopf, Freeman, Cooper, San Francisco, 1972, pp.82-115.

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