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Our galaxy might not be teeming with humanoid life forms

Early in 2012, I published an essay on extraterrestrial life (Duarte, 2012). Here, I will quote from that essay and will also include some recently disclosed thoughts on this issue, by other authors, in *Astrobiology*. The 2012 essay stated:

"Since everybody seems so interested about the possibility of finding extraterrestrial life, I spent a couple of lectures per semester on this subject. Given the enormous vastness of the cosmos, with estimates of over 10^{11} galaxies, it appears easy to reach a conclusion in favor of the existence of extraterrestrial life. Indeed, the search for extraterrestrial intelligence (SETI) has become a respectable academic pursuit. As a premise, it is reasonable to accept the existence of extraterrestrial life. However, my guess is that this life is most likely in bacterial forms and morphologies yet unknown to the human experience."

"To estimate the likely probability of finding *human-like* extraterrestrial life, in our own galaxy, I engaged in a simple approach using published astronomical figures while ignoring temporal issues. The approach adopted was based on the usual multiplication of probabilities. However, the question that I posed was quite specific: "What is the rough probability of finding a planet *almost exactly like Earth* somewhere else in our galaxy?"

The answer is rather discouraging if you are an advocate of extraterrestrial humanoid life. The essay goes on:

"A crucial element, not included in the previous discussion, is the fact that the Moon plays an essential role in regulating the climate on Earth. We also know that the Moon ended up there following a very unique cataclysmic event. What is the probability for that event? That decreases the odds even further."

"As discouraging as this seems it gets even worse if you extend the question to consider *humanoid life forms*. Thanks to the genius of physicist Luis W. Alvarez (1987), we know that the Earth was struck by a giant asteroid some sixty five million years ago. It was that collision, that wiped out the dinosaurs, it was that collision that eventually gave us a chance. Without that miraculous collision the Earth would belong [to] the reptiles.

Finding a planet like ours won't be easy, finding extraterrestrial life like ours, will be even harder."

And the essay goes on:

"Thus, it can be argued that **our galaxy might not be teeming with human life forms** albeit this argument does not exclude other life forms. Further, it can be argued that even if planets like our Earth are found out there they might well be populated by alternative life forms… like ferocious alligators, for instance."

A recent study on the biology of habitability performed at The Australian National University concludes that… "the **Universe does not seem to be teeming with life**. The most common explanation for this is a low probability for the emergence of life (an emergence bottleneck), notionally due to the intricacies of the molecular recipe" (Chopra and Lineweaver, 2016).

Albeit our conjecture refers to humanoid life forms (Duarte, 2012) the work of Chopra and Lineweaver (2016) refers to life in general. It should be noted that our high-level back of the envelope probabilistic approach is quite brief and straight forward and thus quite different to the detailed biological approach of Chopra and Lineweaver (2016). However, the conclusions are not just compatible… but they reinforce each other.

Thus, we are inclined to maintain the argument that **our galaxy might not be teeming with humanoid life forms**. Finally, it should be mentioned that the uniqueness of the Earth as a habitable planet had already been highlighted, using biological and geological arguments, by Ward and Brownlee (2000).

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