We Are Alone, We Are Precious

This essay attempts to answer - and make accessible to a general audience - the questions: are we alone in our galaxy, or universe; are there actually aliens out there?

There is something called the 'Drake equation', which is an equation that estimates the number of alien civilizations in any galaxy. To use it, you basically plug in several important variables, such as 'number of stars in the galaxy' and 'percentage of stars that harbor planets suitable for life' and 'chance of life forming on a suitable planet' and 'chance of this life becoming intelligent enough to communicate and travel through space'. From these variables, we are essentially calculating how many species are in (our) galaxy, and then we can reason the likelihood of us ever meeting the aliens.

Although this equation is very famous in cosmology, it is practically useless considering that every variable is highly speculative, since humans have precisely no knowledge of how likely it is that life will form on a suitable planet. We can take guesses, but our estimates vary by amounts from 100% to 1 thousandth of a percent. This is a known fact; the equation is used more to ask, “What knowledge should we collect and research when trying to see if other species exist in our galaxy?” We do have answers to some of these questions: we have a decent knowledge of how many planets can sustain life in our galaxy, considering our knowledge of habitability zones, but we don't even have the slightest clue of how life will evolve on said planet, or if an intelligent species will appear from simple bacteria. There is clearly a lot of guesswork in 'solving' the Drake equation.

My best guesses are as follows. Out of the billions of planets that could sustain life, very few actually harbor life. That is to say, the chance of life forming randomly from basic chemicals is probably extremely low, possibly less than a thousandth of a percent chance. However, once life springs up initially, I believe it will definitely form into an intelligent species after several billion years of evolution. Arranging atoms is difficult, but considering that life in any form adheres to the Darwinian principle of 'successful randomly acquired traits are retained' and that intelligence is a

successful trait that we observe in hundreds of species, I think bacteria will almost always form into a communicating species on a suitable planet. I also, being an **extreme optimist**, believe that even with extremely advanced (and potentially destructive) technology, intelligence would not usually destroy itself, and would have at least several million years in which it could spread throughout the galaxy and begin communicating with other life, including us humans. According to my calculations, probably around 100 intelligent species exist in our own galaxy, and in each galaxy. The scientists from SETI calculate 1000 civilizations, but they are very optimistic about the likelihood of life forming on a given planet, but think for some reason that we will communicate for about 10,000 years and then will just completely disappear, despite the fact that our technology would be 10,000 times as advanced as it is now, and that we'd surely have started colonizing other planets by then. I'll use my estimates, because they make more sense according to my logic. Either way, given that there are around 100 billion planets in the galaxy, even the most extreme optimistic guesses already indicate that the fraction of planets that develop life is such a low number that most humans cannot comprehend it.

Even with these conservative guesses, and even with the size of the galaxy, shouldn't we have been visited numerous times already? I mean, with 100 intelligent civilizations in the galaxy (about 100 thousand light years in diameter), we'd be about 5 thousand light years apart on average, but that's nothing considering that stars were forming billions of years before our own in our very galaxy, so that life should have also evolved billions of years before ours did. Hell, even if there's only one species per galaxy, the (relatively huge) Andromeda galaxy is only about 2.5 million light years away, which is still practically nothing, since an intelligent species there has had probably billions of years to travel here, with the type of technology you'd expect humanity to develop in a billion years. And I'm a firm believer that intelligent species will likely travel interstellar distances at light speed (the absolute limit, sadly) in all directions, visiting every star along their way. This is because I believe all intelligent species eventually develop artificial intelligence, which basically makes it free for a civilization to spread out: if you have free, intelligent labor under your control, and you can use as much energy as is available

around you to take on such an endeavor (and the universe is very energy abundant with respect to sending small vehicles at light speed), you can automate galactic colonization. It may sound absurd to consider that aliens would be spreading out so quickly, but does it seem absurd that (if we don't blow ourselves up) we will have intelligent robots capable of performing whatever labor we command them to in a hundred years? What about a thousand? A billion? I require this as the only necessity for intergalactic travel: as Ray Kurzweil might say, the last invention we need to develop is an artificial intelligence, because after that point, the machines will think for us (under close supervision, mind you). It's crazy, but this is thousands of years from now, and it is very relevant. Thus, even if we are totally alone in the galaxy, stars forming billions of years ago in Andromeda should have yielded some life, and we'd be visited by them by now, and more likely millions of years ago. And if not Andromeda, then what about one of the billions of galaxies within a billion light years of our own? Honestly, absolutely no species from any of these billions of galaxies (trillions of stars) has developed an artificial intelligence? What's the deal?

There's really only one explanation that I can think of to explain this disparity – which was called the Fermi Paradox by the way, and is not my own idea. We are extremely rare, and extremely precious. All of the data indicate it. We must be either the first intelligent species within the neighboring billions of galaxies, the only species in this massive region, or in general, intelligent species reliably and inevitably destroy themselves, everywhere. Carl Sagan did fear the latter, but it seems unlikely to me that this is the major source of such a lack of intelligent life, because even if you do get a good amount of totally crazy sadistic people in our society, a vast majority of us are extremely concerned for the continuity of our species, even if we don't all think about it on a day to day basis, and we will do anything and everything in our power not to die – this is a basic feature of life in general. Even though this is an assumption I cannot prove at the moment, this is my general guess, being a notoriously optimistic person. Thus, I conclude that we are basically the only species within a relevant distance.

Going back to my equation, it's easy to see where the error could have been made, and this can be explained from a religious and a non-religious perspective. A religious (Christian, mind you) perspective could indicate that we were created, and are unique, and this is honestly an equally reasonable explanation to the non-religious one, and the two might exist side by side. A non-religious person (like me) could say that life is pretty damn complex, and that even the most basic replicating chemical or organism would likely require hundreds of specific chemicals to interact in a specific way; considering that before life, the only driving forces on Earth were practically random, the chances might be one in trillions, quadrillions that this would happen anywhere, if it even happened more than once in the universe. This, called the Rare Earth Hypothesis, is the only logical explanation I can ascertain from the data we know. We don't see aliens, and we should, so maybe life is much, much rarer than we might be led to believe. Or rather, life is much rarer than we want to believe.

I personally don't think aliens are something that humans should be concerned about anyways. Basically, I figure that by the time our society gains the ability to travel millions of light years, we will already have a complete understanding of the galaxies' workings, and will gain almost nothing from an alien interaction. If this alien species is grounded to a planet and hasn't visited us already, while we're up in space colonizing **galaxies**, what does this sort of interaction even mean to us? Of course by that logic, you'd argue that aliens wouldn't care to visit us even if they do pass by, which is why we don't see them. They would interact with us, no doubt, but it just wouldn't mean much to them compared to how important it would be to us. No doubt we'd stop by an alien planet and use our technology to better them, considering that they present no threat to us, being millions of years behind us even if they utilized the (likely limited) technologies we gave them of course. It just wouldn't mean anything to us at that point, because we'd have traveled across thousands of planets and stars by that point, and would be much more knowledgeable than them. I actually think we'd be more pissed off if anything that the aliens never bothered to advance their society to the point where they even cared about space travel, if they were intelligent. And no, I don't think we'd care about competition at that point, considering that

we'd obviously have engineered machines to do our work for us, and that unless we were extremely racist, we'd probably not mind sharing the entire universe with a few species. So basically, while we might find aliens if we ever do get to exploring the universe in however many thousands of years, our interactions with them will be totally pointless except for being an interesting curiosity. We will be interested in them, but we gain nothing but an infinitesimally small sense of satisfaction in finding and helping them – just something people would consider cool.

So what can we actually gain by this analysis? We are certainly very, very rare, unless the kind of technologies I was talking about are absolutely impossible, even in thousands of years. We might be the only intelligent species we will ever know to exist. From my irreligious perspective, it's hard to deny that seemingly nothing matters at all, and that our death means little compared to the grandiosity of the universe. But just the fact that I can think about such a complex thought means I'm probably a more advanced form of matter than anything in this (barren) grand universe. I'm speaking on behalf of the agnostics here: even if our thoughts don't seemingly mean anything objectively, their level of complexity essentially defines the limit of what the universe can assemble (randomly), and in this, we are absolutely unique. We might be the most important things in the entire universe. We must all appreciate, even if our lives seem dull and terrible at times, how beautiful it is to be a human.