

# REFLECTIONS

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## THE PLURALITY OF WORLDS: A CONTRARIAN VIEW

Last issue I propounded my belief—not for the first time in these pages—that the universe is full of planets, that many of these planets are suitable for life-forms analogous to those that live on Earth, and that in fact many of those planets *are* inhabited by life-forms analogous to those that live on Earth.

My argument was strictly a probabilistic one, based on the size of the universe and the number of stars therein. In a 2004 column, I calculated just how many inhabited worlds were likely to be out there. I figured there were twelve billion stars in our local galaxy alone that are neither too big nor too small to provide the energy that life-forms of our sort require. “If half of these have planets,” I wrote, “and half of those planets lie at the correct distance to maintain water in its liquid state, and half of those are large enough to retain an atmosphere, that leaves us with a billion and a half potentially habitable worlds in our immediate galactic vicinity. Say that a billion of these must be rejected because they’re so large that gravity would be a problem, or because they have no water, or because they’re in some other way unsuitable. That still leaves five hundred million possible Earths in the Milky Way galaxy. And there are millions of galaxies.” By way of supporting the idea of an inhabited cosmos, I offered a thought that was put forth about three hundred B.C. by the Greek philosopher Metrodoros the Epicurean: “To consider the Earth the only populated world in infinite space is as absurd as to assert that in an entire field sown with millet only one grain will grow.”

I am neither an astronomer nor a philosopher, but these arguments seem incontrovertible to me. The alternative is the medieval Christian one, put forth most vigorously in the thirteenth century by Thomas Aquinas, who based his ideas to some extent on the teachings of Plato, seventeen hundred years before him. St. Thomas argued that the Earth was the unique and special creation of God, the center of the universe and the only place in the cosmos where life existed. This became the established dogma of the Roman Catholic Church, which means it was the only permissible way of thinking about these things in Western Europe for hundreds of years. But, since the existence of God Himself gradually became a matter for dispute rather than automatic acceptance, it was more and more difficult for serious thinkers to rely purely on the faith that the Church fathers had a perfect understanding of His intentions. Gradually, under the assaults of such men as Copernicus and Galileo, the idea of the Earth as the center of the universe was weakened, and by 1686 it was possible for the French poet and philosopher Bernard de Fontenelle to publish a clever little book called *A Plurality of Worlds* that not only portrayed the Earth as one of many inhabited planets in the universe but also set forth a view of the heavens that was essentially the one we know to be correct: the Sun at the center of our solar system, the various planets in orbit around it, their various moons in orbit around them.

There can no longer be any doubt that the solarcentric view of things is the right one, and from the Kepler telescope and other sources has come proof of the existence of hosts of extrasolar planets orbiting stars far and near. One would think, then, that the last vestiges of the theory that the Earth is the center of everything and that mankind is the crown of creation have been laid to rest, and that one can accept as a scientifically established fact that the universe is full of other worlds, many of them,

in all likelihood, inhabited by highly evolved life-forms. But now I find it necessary to point out that the old theory still has at least one powerful advocate who is not in any way a medieval theologian, who is, indeed, using scientific data in support of his contrarian ideas about the uniqueness of Earth and of the human species.

This contrarian philosopher is John Gribbin, the Cambridge-educated astrophysicist and the author of a great many challenging and award-winning books exploring the boundary between science and science fiction. His 1977 book *White Holes* explored the latest cosmological theories. In 1979, he gave us *Timewarps*, which examined the possibility that time travel might actually be feasible. This was followed by 1983's *Spacwarps: Black Holes, White Holes, Worm Holes, Quasars, and the Universe*, 1992's *Unveiling the Edge of Time*, and so on, through book after book, to 2007's *The Universe: A Biography* and 2008's *From Here to Infinity*. He's also written many books on climate change and even eight science fiction novels, so his credentials as a speculative thinker are in excellent order and his scientific background is impeccable.

And from Gribbin in 2011 came a book called *Alone in the Universe: Why Our Planet is Unique*, which provides the strongest case in favor of our solitary position in the universe since St. Thomas Aquinas set forth his ideas eight hundred years ago. "The Milky Way," Gribbin says, "contains a few hundred billion stars, but almost certainly contains only one intelligent civilization." Unlike the Church fathers, though, Gribbin doesn't call upon divine revelation to bolster his thesis. Ultimately he gets to the same position as Aquinas, or something fairly close to it, but he gets there by way of scientific data alone.

Gribbin bases his case on the supposition that a "supercomet" collided with Venus six hundred million years ago, setting in motion a chain of cosmic events that culminated in the crash of a planet or asteroid into the Earth. The invader, liquefied by the impact, sank to the Earth's metallic core and greatly increased its size. The collision also generated enough heat to melt the surface of our world and to send a huge chunk of matter off into space to become the Moon, thus creating conditions uniquely favorable for the emergence—eventually—of life on Earth.

One primary factor in creating these conditions, he says, is the large size of the moon that the (hypothetical) collision created. It is bigger, relative to its primary world, than any other satellite in the Solar System, and the gravitational effect of having so big a moon is to keep the Earth stable on its axis instead of being subject to disruptive axis-tilting caused by gravitational interaction with Jupiter and the Sun. It would be difficult for life to evolve on a planet where axial shifts kept transforming tropical zones into Arctic ones, and vice versa, whereas the relatively mild climatic effects stemming from Earth's pronounced but stable axial tilt have contributed to an orderly development of terrestrial life.

Gribbin adduces many other factors responsible for the unique presence of us in the universe. Earth lies in the "habitable zone" of the Solar System, where temperatures are mild and liquid water is able to exist. Earth is shielded from further cosmic collisions by Jupiter, whose gravitational field gobbles up most wanderers that might otherwise come our way. Earth has just the right combination of organic compounds needed to develop carbon-based life. And so on and so on, a series of fortuitous events that added up to the wildly fluky creation of human life on Earth—a set of events so improbable, taken all in all, that, as Gribbin puts it, we are "certainly" the only intelligent life-form in the universe. "We are alone," he tells us, "and we had better get used to the idea."

Well, no. I still don't think so. That "supercomet" theory bothers me, because it sounds too much like the idea put forth by Immanuel Velikovsky in his 1950 book, *Worlds in Collision*. Velikovsky wanted us to believe that a huge comet burst forth

from Jupiter a couple of thousand years ago, banged around in the Solar System for a while, and ultimately turned into the planet Venus, nearly colliding with the Earth in the process. The cataclysmic consequences of all this activity were responsible, he claimed, for such Biblical events as the slowing of the Earth's spin that caused the parting of the Red Sea and allowed the Israelites to make their Exodus from Egypt, etc., etc., etc. Velikovsky had no astronomical or geological evidence for his theories, only the Biblical tales and some Mediterranean-area legends, and they were long ago discredited as pseudo-scientific speculation. The trouble is that Gribbin, who, of course, puts his big cosmic event much earlier in the Earth's history, can't adduce any real proof for it either. It's simply the hypothesis on which all the rest of his theory depends. Using it as the foundation for the rest of his thesis doesn't strike me as very different logically from employing the notion that Earth is the center of the universe because God wanted it that way. Either way, there's no tangible proof to bring forth.

Even if we accept Gribbin's collision notion, there's still the problem of our uniqueness in a vast universe. There's another logical jump here that I can't follow. Let us stipulate that the conditions that made Earth habitable are rare to the point of improbability. Even so, in a universe so big as to be essentially infinite, the improbable and even the highly improbable are going to happen many times over. In just a few years we have found a great many nearby extrasolar worlds. There surely are billions more. Can it really be that our sort of life-form developed on only *one* of them? Gribbin is asking us to believe a negative hypothesis: that there are no inhabited worlds anywhere except right here. But there is no good way to establish a negative proof when there is an infinite amount of evidence to be sifted, since the existence of a single extraterrestrial civilization would destroy the whole thesis.

We are alone in the Solar System, yes: the Martians and Venusians and Jovians of the science fiction of my childhood belong in the realm of fantasy now. But I cling to my probabilistic belief that the universe is just too big to have generated just one intelligent life-form out of all that near-infinite multitude of stars and planets. If we haven't been getting visits or even messages from our neighbors out there, it's for the same reason: the universe is just too big. The inhabitants of some planet fifty or fifty thousand light-years away are too distant to be able to make contact with us, but that doesn't mean they aren't there.

John Gribbin believes that only by a miracle, a wild stroke of luck—a rogue lightning strike, let us say—did intelligent life emerge on our planet. It's an interesting idea and he defends it with carefully marshaled arguments. But I don't buy it. I don't like supposedly scientific theories that are founded on one-of-a-kind miracles. In a cosmos filled with a virtual infinity of stars and (as we are discovering now) a vast number of planets, the odds are, I think, that lightning would strike more than just once. I don't expect transgalactic travelers to drop down on my doorstep tomorrow—or ever, in fact—but I still believe, John Gribbin to the contrary, that there are inhabited worlds out there, great multitudes of them. Is this a mere act of faith on my part, as Aquinas' theory was on his? Or is it simply an acknowledgment of overwhelming mathematical probability? I can't say. No one can. But I think the odds are on my side.