Reflections
The Plurality of Worlds

Robert Silverberg

A decade ago—it was the column published in the January 2004 *Asimov's*—I wrote an essay titled "Neque Illorum Ad Nos Pervenire Potest," which is Latin for "None of us can go to them, and none of them come to us." The phrase was that of the twelfth-century philosopher Guillaume de Conches, writing about the supposed inhabitants of the Antipodes, the lands that lay beyond the fiery sea that was thought to cut Europe off from the as yet unexplored Southern Hemisphere. I used it to express my belief that we are never going to have any close encounters with the inhabitants of other solar systems. They're just too far away. Despite the best efforts of such people as my friends, the brothers Jim and Greg Benford, who even now are working to drum up interest in an interstellar voyage, the distance even to the nearest star is so great that only by magical means (a faster-than-light drive, for instance) are we likely to get to an extrasolar planet and return.

"It's disheartening," I wrote back then. "I've spent five decades [six, now] writing stories about other worlds and other intelligent life-forms, and I don't like the idea that I've simply been peddling pipe dreams all this time. I *do* believe . . . that the universe is full of populated worlds. I *d*o want to know what those alien races look like, how they think, what kind of cities they live in. I'd love to read alien poetry and look at alien sculptures. I might even want to risk dinner at a five-star alien restaurant. But none of that is going to happen . . . The speed of light is going to remain the limiting velocity not just for us, but for all those lively and interesting people out there in the adjacent galaxies, and that puts the kibosh on the whole concept of a galaxy-spanning civilization."

That there are worlds out there for the finding, plenty of them, if only we could find a way of getting to them, and that those worlds are inhabited, is something I have never doubted. The comic books I read as a small boy, seventy-plus years ago, were full of gaudy tales of "Martians" and "Venusians." Then, in 1948, when I discovered such pioneering collections of science fiction as the great Healy-McComas anthology *Adventures in Time and Space* and Groff Conklin's splendid *A Treasury of Science Fiction,* such stories as Eric Frank Russell's "Symbiotica," A.E. van Vogt's "Black Destroyer," and Arthur C. Clarke's "Rescue Party" lit up my adolescent mind with visions of galaxy upon galaxy filled with an infinite number of intelligent nonhuman beings. The thought of those infinities still stirs me, so many decades and so many stories later, whenever I look toward the night sky.

In my 2004 essay 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 were 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 500 million possible Earths in the Milky Way galaxy. And there are millions of galaxies."

Half a billion possible Earths in our little galaxy alone? That isn't just a hopeful hypothesis any more. And it may be a very conservative one. In January 2013, scientists at Cal Tech in Pasadena who had been studying the results sent back by NASA's Kepler Space Telescope offered an estimate of at least 100 billion habitable

extrasolar planets just in the Milky Way galaxy—and our galaxy is only one of a nearly infinite number in the universe. They based their findings on a view of a five-planet system called Kepler-32, all of them similar in size to Earth and orbiting their star (M-type, smaller and cooler than our own) closely enough to ensure sufficient warmth. Since there are 100 billion M-type stars in the galaxy and the Kepler findings show planets around many of them, the Cal Tech people believe it's reasonable to think that they average one habitable world apiece—100 billion more or less Earth-type planets, and that's *billion* with a *b.* A billion, remember, is 1000 million. Somewhere in all those billions and billions, surely, dwell the alien beings I was reading about in the thick SF anthologies of the 1940s.

In fact, the whole idea of an inhabited cosmos was anticipated as early as 300 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." And it was developed most entertainingly in a lively little book, *A Plurality of Worlds* (1686), by the French poet and philosopher Bernard de Fontenelle, which I've just been reading in the elegant English translation that John Glanville produced the following year.

Fontenelle's book is one of the earliest attempts to make current scientific knowledge accessible to the lay reader, and it achieves that triumphantly. It is cast in the form of dialogs set at a French country estate, one per night for five nights, in which a philosopher who was probably very much like Fontenelle discusses astronomy and the nature of the universe with his hostess, a witty and somewhat flirtatious countess who is eager to understand the motions of the planets and stars.

What he sets forth is essentially a picture of the universe as we understand it today—the Sun at the center of the solar system, the planets in orbit around it, their various moons in orbit around them, and the stars an immense distance away, each one a sun in its own right and very likely having planets of its own. In all this Fontenelle risked flying in the face of the traditional Christian belief that the creation of life has taken place only once, in the Garden of Eden, on Earth, and that Earth was the center of the universe. For some fifteen hundred years it was deemed heretical, and downright dangerous, to disagree with that position, until the work of the great astronomers Copernicus, Kepler, and Galileo had shown the Earth is merely one of many worlds surrounding the Sun. As recently as 1633 Galileo had been called before the Inquisition and forced to declare that Copernicus's "opinion" that the Earth moved around the Sun was false. (There is a story, probably apocryphal, that Galileo, after swearing to his denial, turned aside and muttered under his breath, *"Eppur si muove"*—"Even so, it does move!")

In the years immediately following, the Church reluctantly began to accept the notion that Copernicus might have been right and that the Earth was not the center of all creation. Serious speculation about the possibility of life on other worlds became a widespread philosophical pastime. But Fontenelle remained cautious. In his preface he apologized in advance for any offense he might give the religious, and asserted that if the Moon were inhabited, as he supposed, its inhabitants must be products of a separate creation, for "none of Adam's posterity ever traveled so far as the Moon, nor were any colonies ever sent thither; the men then that are in the Moon are not the sons of Adam." The same, he said, was true of the inhabitants of Mars, Venus, and other nearby worlds, all of whom he described in a playful and inventive manner while taking care to say that he was merely speculating, not claiming any special revelation of truth. ("The people of Mercury are so full of fire that they are absolutely mad; I fancy they have no memory at all . . . and what they do is by sudden starts, and perfectly haphazard . . . As for Saturn, it is so cold that a Saturnian brought to Earth would perish from the heat, even at the North Pole.")

In his discussion of the stars, which Fontenelle, like most people of his time, believed were fixed in the heavens and fastened to the sky "like so many nails," he recognized that they were vastly farther away than the familiar planets: "The fixed stars cannot be less distant from the Earth than fifty millions of leagues; nay, if you anger an astronomer, he will set them further. The distance from the Sun to the farthest planet is nothing in comparison of the distance from the Sun, or from the Earth, to the fixed stars; it is almost beyond arithmetic."

And the stars were suns, he said, shining by virtue of their own fires, not by reflection of our Sun's light. "I will not swear that this is true," he said cautiously, "but I hold it for true, because it gives me pleasure to believe it." And around those distant suns were a multitude of other worlds, each held to its own sun by what he called a "vortex," which in an approximate way equates to what we call a gravitational field. Those planets, he thinks, are inhabited, not by humans but by beings of some other creation. In one of his most delightful flights of fancy he says that in some parts of the universe—the Milky Way, for instance—the stars are so close together "that the people in one world may talk, and shake hands, with those of another; at least I believe, the birds of one world may easily fly into another; and that pigeons may be trained up to carry letters, as they do in the Levant."

All this is set forth lightly, as a mere outpouring of the imagination, but Fontenelle leaves no doubt that he is serious. "When the Heavens were a little blue arch, stuck with stars, methought the universe was too strait and close," he wrote. "I was almost stifled for want of air; but now it is enlarged in height and breadth, and a thousand and a thousand vortexes taken in; I begin to breathe with more freedom, and think the Universe to be incomparably more magnificent than it was before."

And now we have proof, thanks to NASA and the Kepler telescope, that that multitude of worlds that Fontenelle imagined more than three hundred years ago is really out there. The trouble is that we can't reach them, because the speed of light is likely always to be the limiting velocity not just for us, but for all the inhabitants of those other galaxies, and, barring the development of some quasi-magical means of faster-than-light travel, that makes the idea of intergalactic contact improbable.

So, as I said a decade ago and am forced still to believe, there won't be any Galactic Federation; there'll be no Bureau of Interstellar Trade; no alien wines or artifacts will turn up for sale in our boutiques. Nor will we meet the real-life equivalents of George Lucas's Wookiees, Doc Smith's Arisians, Fred Pohl's Heechees, Larry Niven's Kzinti, or—just as well, perhaps—A.E. van Vogt's terrifying Coeurl. The aliens exist, I'm sure, but the sea that separates us from them, and them from us, is just too wide. And as Guillaume de Conches said in a different context, long ago, "Nullus nostrum ad illos, neque illorum ad nos pervenire potest." None of us can go to them, and none of them come to us.