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## The Doctrine of Innumerable Worlds

By **Hiram Crespo**, editor.

*I am sending you, in accordance with your request, the arguments concerning an infinite number of worlds. This doctrine came to be better articulated as a result of being turned over between the two of us face to face; for our agreements and disagreements with one another, and also our questionings, rendered the inquiry into the object of our search more precise. The dialogue began something like this: "Diogenes," said Theodoridas, "that the doctrine laid down by Epicurus on an infinite number of worlds is true I am confident"*  
– Extant Fragments of Diogenes' Letter to Antipater

Epicurus, and it seems all the atomists, believed in the doctrine of innumerable worlds. The doctrine is not expounded in any of the extant writings by Epicurus, who wrote about 300 scrolls, but a prominent Epicurean by the name Diogenes of Oeananda, who built a large wall in his home city and adorned it with Epicurean inscriptions, mentions the doctrine in his letter to Antipater.

### The Drake Equation and Other Mathematical Models

Materialist philosophers appear to have derived this idea from the infinity of the cosmos: mathematically, such a cosmos would inherently carry within it countless possibilities. Now that we've cited the source for this fascinating aspect of Epicurus' teaching, let's assess and update this doctrine in light of contemporary research.

As the centuries have advanced, scientists and mathematicians have made progressively more accurate attempts at identifying how many worlds are out there, although we have been able to confirm only several hundred exoplanets (outside our solar system).

According to calculations carried out by Charles Lineweaver and Daniel Grether at the University of New South Wales, at least 25 percent of Sun-like stars have planets, which would mean there are at least 100 billion stars with planets in our galaxy, and with about 100 billion galaxies in the observable universe, there would be at least 10 trillion planetary systems in the Universe.

In addition to mathematical models employed to determine how many planets, or how many planets with life might exist, there is one model used to determine how many civilizations able to communicate exist in the cosmos: the Drake Equation was devised by Dr. Frank Drake. However, depending on what numbers we choose to enter as its variables, we may get wildly diverging amounts of habitable planets.

Harvard scholars suggests that we have 50 million habitable planets in the Milky Way Galaxy alone, based on their proposed values for the variables required in the Drake Equation. Never mind other galaxies: we'll never live long enough to even hope to ever make contact, so that the question is most likely irrelevant.

Corroboration on the existence and number of exoplanets have been coming in since the 1990's. Some of these have been discovered by astronomers and researchers working independently in all parts of the world, and other exoplanets have been discovered as part of exoplanetary research being carried out by Kepler and other telescopes specifically created for such a task. In only a few years, Kepler has already found over 1,200 exoplanets –over 50 of them orbiting within the habitable zone—, and that was only by observing a small fraction of the sky.

But if it's life we're looking for, then we would need to account for the amounts of habitable moons in our galaxy. Some of the planets in our own solar system have dozens of moons. What if there IS a moon like Pandora out there, or like the Star Wars' forest moon of Endor? Adding moons to the equation would again multiply the final results.

By even the most conservative estimates, the cosmos has trillions of planets and is teeming with potentially habitable worlds.

### **On the Philosophical Repercussions of the Doctrine**

We Epicureans represent a challenge to anyone who argues that scientific insight does not create human values, that only a subjective system of ethics can do that. On the contrary, science is fundamental to our cosmology and to how we create our values.

The observable doctrine of the innumerable worlds, and in fact the field of astronomy, have a humbling effect on our values and both suggest that if we acquire an accurate sense of our dimension within the cosmos, we'll have no choice but to be humble. Genuine humility is born of this insight. Let's not forget that it was the scientists who first challenged the church's teaching on the Earth being the center of the universe and of all creation having been made for, and given to, mankind.

We truly are insignificant in the scheme of things. Carl Sagan made the exact same point in his scientific sermon titled [The Pale Blue Dot](#), where he shared the smallest picture of Earth that the Hubble telescope had been able to send back in his time from the orbit of Saturn. He argues that all of our petty wars, conflicts, passions, hatreds, occur within a quickly dissipating instant on a pale blue dot and are quickly forgotten; that these conflicts and hatreds, and our sense of self-importance, simply don't matter. I invite all my readers to take five minutes to ruminate on Sagan's wisdom.