The Scarcity of Life Bearing Planets

Source: http://sci.tech−archive.net/Archive/sci.physics/2005−07/msg00191.html

- *From*: "Button" <button@xxxxxxx>
- *Date*: Sun, 3 Jul 2005 10:01:06 −0400

The Scarcity of Life Bearing Planets

"Great spirits have always encountered violent oppositions from mediocre minds." − A. Einstein

There is considerable interest in the possibility that there may be a large number of planets in our galaxy that are suitable for life. In the hope that there may be intelligent life on planets lying within a reasonable distance, a project named SETI (Search for Extraterrestrial Intelligence) has been set up to search for evidence of that life. The idea behind the project is that intelligent life may be generating signals which can be received on Earth that are either a by−product of their civilization (such as our own radio broadcasts) or a deliberate attempt to communicate. Unfortunately, the probability of success of those programs is far lower than currently believed. If an Earth sized planet existed 93,000,000 miles from a star that was virtually identical to the Sun, it is extremely unlikely that it would be capable of supporting life. To see why this should be so, an examination of our own Solar System is order.

With the exception of Mercury, the Earth, Mars, and Pluto, all of the planets have enormous atmospheres (relative to the Earth). One can draw no conclusions about the original conditions on Mercury or Pluto. Mercury is too small and too close to the Sun to have prevented its atmosphere, regardless of its original quantity, from boiling away to space. (There may be a remnant of an atmosphere frozen at the poles.) At the other extreme, due to its distance from the Sun, any atmosphere that Pluto may have had at its beginning and which has not been lost by evaporation to space is of necessity frozen solid and is therefore unobservable. Observations have shown that Mars once had a significant atmosphere that supported running water (and, by implication, oceans) but has lost both. Apparently, its low gravitational mass has made it too easy for the Sun's radiation to cause Mar's atmosphere to evaporate to space. Of all the planets, it is Earth that is the anomaly.

Due to its location, Venus receives about twice the heat input from the Sun as does the Earth. Its gravitational mass is slightly less than that of the Earth and yet it has an atmosphere about 70 times as dense as the Earth. In addition, the atmosphere of Venus is alleged to consist of mostly carbon dioxide. Since, under the evaporation process, the other normal atmospheric

gases, having a lower molecular weight, will evaporate before carbon dioxide does, the initial Venusian atmosphere must have been significantly denser than it is now.