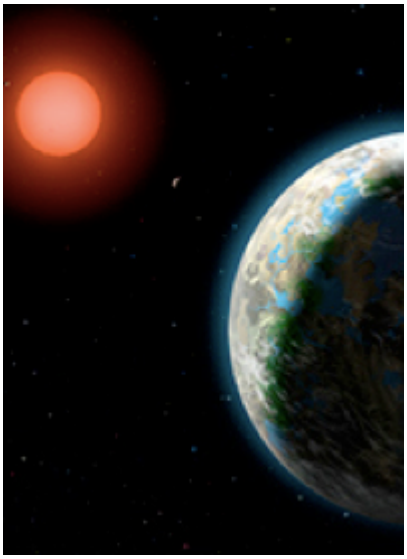
Written by **James Heiser** on October 2, 2010

Have Scientists Found an "Earth-like" Planet?



The discovery of a planet circling Gliese 581, a red dwarf star, has led to a round of press reports discussing the existence of an "Earth-like" planet.

The posting from DailyTech.com is typical of such stories. According to the posting: "Astronomers have found an Earth-like planet that they believe can support life. The newly discovered exoplanet Gliese 581g, dubbed Planet G, exists in the Gliese 581 system and is believed to be the right size and location for life according to a press release and webcast from the National Science Foundation."

A significant part of the problem is that terms such as "Earth-like" mean radically different things for scientists and their lay audience. In scientific terms, it may mean little more than that the planet is not a gas giant (such as Jupiter) and that it is near enough to a star to make the existence of liquid water possible. It does not mean that such a world has an atmosphere (let alone a breathable atmosphere), or gravity within the realm of what humans could endure. But whenever the term "Earth-like" is used in the media they, quite understandably, think of Star Trek or Stargate, where all "Earth-like" alien worlds look like either southern California or the environs of Vancouver, B.C.

In fairness to the report at DailyTech.com, several important points regarding Gliese 581g (the planet's official designation) have been published which make it quite clear that no matter how (scientifically) Earth-like the Gliese 581g might be, it most certainly is *not* "Earth-like." Since Gliese 581 is a red dwarf, the planet orbits a much smaller, darker sun, and it is in tidal-lock, which means the same side of the planet is always facing its star, and the side that *does* face the Gliese 581 may be warm, but rather dark; in fact the star's luminosity may only be 1.3% that of Earth's Sun. Thus the amount of visible spectrum light would be much less on the surface of Gliese 581g than on the surface of the Earth, and the sun is perpetually 'locked' at one point in the sky. This means that half the world is in perpetual darkness, and the other side in near darkness. (Thus life on Gliese 581g would probably have to exist without photosynthesis.) Any distribution of heat around the planet would depend on an atmosphere, and at present there is no way of knowing whether Gliese 581g has an atmosphere, let alone whether that atmosphere is "Earth-like" (i.e., breathable). And, adding to the non-"Earth-like" character of the planet: its mass is roughly three or four times that of Earth.

However, the absence of certain vital points of information has not stopped the flow of what some might view as hyperbole from members of the scientific community. For example, consider the following from the DailyTech article:

> "Any emerging life forms would have a wide range of stable climates to choose from and to evolve around, depending on their longitude," said Steven Vogt, professor of astronomy and astrophysics at UC Santa Cruz.
>
> Although it has not yet been determined whether or not water exists on the planet, scientists are

> one hundred percent certain that Planet G can support life.? “Personally, given the ubiquity and propensity of life to flourish wherever it can, I would say, my own personal feeling is that the chances of life on this planet are 100 percent. I have almost no doubt about it,” Vogt said.

Since the scientific community has refrained from such “certainty” regarding worlds where we have a vastly larger amount of scientific data (e.g., Mars), one must question how responsible it is to declare life to be a certainty when virtually nothing is known about the world in question. Could life exist under substantially different conditions from those experienced on Earth? It is impossible to prove a negative, and so one must concede that it is theoretically possible. Still, despite the excitement of the search, and the tremendous revelations which have been made, we must still wait for the discovery of a truly “Earth-like” planet.

Photo: Artist’s conception; National Science Foundation