



## ScienceWatch – Life on Other Planets?

**“This is the first really Goldilocks planet.” – R. P. Butler**

We have long wondered if we are alone. If we ever do discover life elsewhere it would be the biggest news story of all time. Evidence of life on other planets currently does not exist, so any depiction of aliens is pure make-believe. Scientists agree alien life is possible, but don't expect to find little green men. The most probable alien life forms would be microbes.

In our own solar system, only Mars might have life because of its similarity to earth. Liquid water necessary for life has not been found there, but subsurface frozen water has. Gravity on Mars is only one-third that of earth, yielding a thin atmosphere composed mostly of carbon dioxide with traces of oxygen.

While the existence of life on Mars remains an open question, most scientists would bet that life exists somewhere in the universe. Astronomers estimate there are about 10 sextillion stars in the universe. That's  $1 \times 10^{23}$ , or 1 followed by 23 zeros! Given such a vast number, scientists say, it is very likely that one or more stars are circled by a planet with the right conditions for life. Astronomers call these putative islands of life “Goldilocks planets”, not too hot, not too cold, but just right for liquid water to exist.

The search for exoplanets, planets outside our solar system, began in the nineteenth century, but only recently tools have been developed to find them. The first was discovered in 1992. As of October 2010 almost 500 have been found and that number likely will soon double.

Most have been detected using a spectrometer attached to a powerful telescope. This method relies on the fact that a star orbited by a planet wobbles because of the gravitational tug of the orbiting planet. When viewed from a distance, these slight movements affect the star's color. If the star is moving toward us, its spectrum is shifted towards the blue; if it is moving away, it is shifted towards the red. The spectrometer can detect these changes in color. Larger planets exert more pull causing more pronounced star wobble. So this technique has found mostly large gas giants like Jupiter.

Another technique is more likely to find smaller, more earthlike planets. It uses a telescope with an extremely sensitive light meter to measure the dimming of light,

### Planet Gliese 581g

Astronomers have announced the discovery of the most Earthlike planet found to date. Gliese 581g is one of several lettered planets orbiting very close to Gliese 581, a dim red star about 20 light-years away in the Libra constellation.



Source: Astrophysical Journal

known as a transit, as a planet passes across its sun. In hopes of finding such a planet, NASA in March 2009 launched the “Kepler” satellite. The Kepler telescope has been watching 100,000 stars for transits and is expected to find dozens of earthlike planets.

Expectations aside, NASA astronomers using the powerful Keck telescope in Hawaii, and not Kepler, announced on September 29, 2010 that, based on its wobble effect, they have found a likely “Goldilocks” planet, Gliese 581g. The team, led by Steven Vogt, UC Santa Cruz, CA, and R. Paul Butler, Carnegie Institute, Wash., DC, posted their findings on the NASA web site and will publish them in *The Astrophysical Journal*.

Gliese 581 is a small red dwarf star, cooler than our sun and about as old. The team has been studying the Gliese 581 star system for 11 years. Gliese 581g is one of six planets discovered to date that orbit the star. It has generated much excitement because its orbit is only 17 million miles from its sun, which places it right in that habitable zone where liquid water could exist. The team estimated that the average temperature on the planet is between -24°F and +10°F—a summer day at the earth’s South Pole. The planet’s surface gravity is about 1.5 times that of earth so it could hold an earthlike atmosphere.

The planet orbits its sun in 37 days and the same side faces the sun all the time, so there is no day/night cycle. This means that the temperature within any particular region of the planet should be fairly constant. According to Professor Vogt, “Any emerging life forms would have a wide range of stable climates to choose from and to evolve around, depending on their longitude”. Excited about the find he added, “. . . the chances for life on this planet are 100 percent. I have almost no doubt about it”.

Gliese 581g might fire up our imagination, but we won’t be able to check it out for life any too soon. Although fairly close as stars go, it is 20 light years away or about 120 trillion miles.

Saul Scheinbach