

What chance of life in other worlds?

A whole lot of things need to be just right for life, as we understand it, to evolve, says S. Ananthanarayanan.

Scientists have been finding that many suns in the universe have planets like our own sun. Could there be life on these planets too?

How hot, how cold?

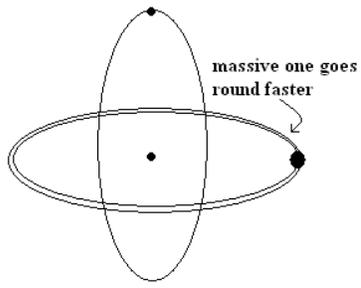
A first essential for organisms to eat, grow, reproduce, which are the hallmarks of life, is that the materials the organisms are made of be easily broken down, digested, excreted, regenerated. It is difficult to think of a life form that is all solid, like rock, to have these features. A robot, yes, can be all metal and wires, but even for the kind of 'life' that a robot represents, it would need things in liquid form. Lubricants, solutions for chemical reactions, cells and batteries, for instance. And then, for a robot life form to *evolve*, there would have been some form of cellular, *organic* life, which is unthinkable without matter in liquid form.

This need for liquid things then sets a lower limit on the temperature of a world where life has to develop. It cannot, in fact even get colder than the freezing point of water!

The next requirement is that things cannot be *all liquid*. This rules out temperatures that are so high that most things melt. In fact, even a temperature of 100 C may not be suitable because water does not stay liquid beyond that temperature. Even if some forms of vegetable oils, which remain liquid a little beyond 100 C, could take the place of water in these worlds, most other products would not be stable at such temperatures and any form of organic life would not be possible.

Limited scope

This leaves a narrow temperature range for planets where life could evolve. The current discovery of planets around distant suns has found only very massive planets, the size of Jupiter or Saturn and moving very fast, much closer to their suns than the earth is to ours

 <p>When 2 satellites are in orbits of the same size, the more massive satellite needs to move faster to counter the larger force of gravity pulling it into the sun. Conversely, if it is moving very fast, it must be very close to the sun, else it would fly away.</p>	<p>In fact, the large majority is around 1000 times the mass of the earth and going around in a tenth or even a hundredth of a year.</p> <p>This places these planets really very close to their sun. This should make the temperature on these planets really <i>scorching</i>, consisting of nearly all gas! There is little chance of life on these planets, outside the solar system, discovered so far</p>
---	---

Pulsar planets

But planets nearer the size of the earth *have* been discovered too. These are bodies found orbiting neutron stars, stars that are as massive as the sun but often just a kilometer across. Pulsars' matter can be crushed so close because of the pulsars' own tremendous gravity and because the matter itself is not in the usual atomic structure, where empty space thousands of times the size of the subatomic particles separate them! So there are earth-like planets around some pulsars. But pulsars bombard their planets with such intense X-Rays and Gamma Rays that the effective temperature is millions of degrees anyway. The radiation eliminates the possibility of life anyway.

Planets not found

This is as far as planets discovered so far goes. There may yet be earth-like planets somewhere out there, where the temperatures are within the limits that permit life. Maybe there are billions of these too, and maybe the one in a trillion (maybe) chance that the all conditions, not temperature alone is has materialized somewhere! There are ways to look for planets like these, using the slight dimming of starlight when the planets pass in front of their sun, and a NASA project to do this, the Kepler Mission, is to be launched in the year 2008.
