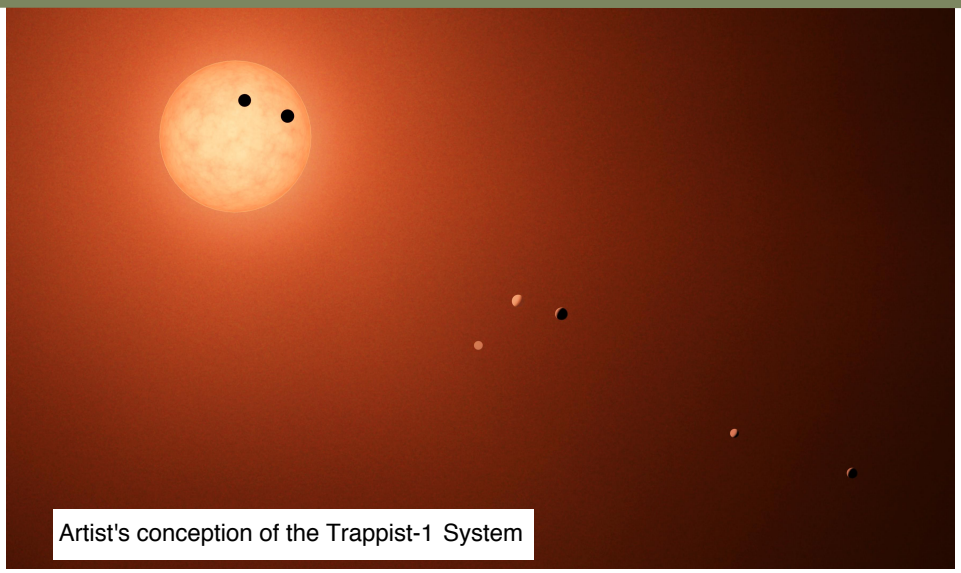
Issue 37 The Latest in Astronomy and Physical Science
Tessmann Planetarium, Santa Ana College

Tessmann Focal Points



Artist's conception of the Trappist-1 System

The Search for Life Expands

Tucked away in a corner of the Aquarius constellation is a tiny red dwarf star named Trappist-1. It has a radius about 1/10 of our sun's size. Since 2015, astronomers in Belgium and Chile have discovered seven planets orbiting in this system. Five of the planets are the size of the Earth and two more a bit smaller. What made these discoveries so exciting is that at least three of these worlds are in Trappist-1's habitable zone--an area where life could exist. Speculation rages on the internet over whether these worlds might support life.

But as observations emerged, the chances of life support diminished. All the planets in the system appear to be tidally locked, that is, one side of each planet always faces the star. This would mean one side of these worlds would be too hot for life and the other side too cold. Additionally, high-powered winds most likely are raging across these worlds. Solar flares and high intensity X-Rays and UV rays have been detected from the star. As the habitable zone for small stars such as Trappist-1 is very close to the star, these worlds would be bathed in high-intensity radiation and this all but negates any hope for a life nurturing system. There is still some possibility of life, but chances now seem very slim.

However, the real importance of this discovery is the fact so many small planets could be detectable by our telescopes and techniques at all. This means the possibility of discovering more and more Earth-sized worlds is now within astronomy's grasp.

But where might we search for life outside the Earth? Perhaps we need to look no further than Jupiter's moon Europa and Saturn's moon Enceladus. Both moons have already been singled out as having conditions that might support life. In early April NASA announced recent observations that have added new evidence to fuel to this search.

First, a 62-mile high geyser was observed on Europa. A 30-mile high geyser had been spotted by the Hubble Telescope in the same area of the moon about three years ago. These geysers indicate that Europa has a vast underground ocean capable of supporting life and the latest geysers strengthen this supposition.

The second significant discovery was the detection of molecular hydrogen in the geysers of Enceladus. Geysers have been spotted on Enceladus by the Cassini spacecraft for years now. Molecular hydrogen has been observed near volcanic vents at the bottom of Earth's oceans where it combines with carbon dioxide to form food that feeds microbial life. Speculation is that life may exist near vents at the bottom of the underground ocean of Enceladus.

NASA already has plans to explore Europa and scientists studying Enceladus are urging NASA to send a probe to study the geyser terrain of this moon of Saturn.

And what about worlds outside our solar system? Perhaps the most Earth-like world discovered so far is Kepler 452 B. This world is 1.6 times the size of the Earth. It orbits a yellow star only 10% bigger than our sun. It takes 368 days for it to orbit in the star's habitable zone. This is the top candidate for life on the list of exoplanets. Discovery of another rocky super-Earth was announced in late April. The world, LHS 1140b, is only 39 light years away, which in galactic distance is right next door to our Sun. The world has much more mass than the Earth, and therefore more gravity. If you weigh 200 lbs. on Earth, you'd weigh about 600 lbs. on LHS 1140b. This may be the upper limit for mobile life forms to exist.

Europa

Images courtesy of NASA, Cal Tech and the SETI Institute