Extrasolar planets with organic materials

Wayne Spencer

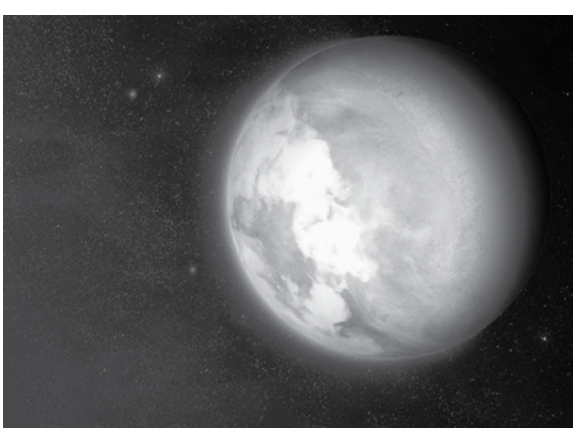
In March 2008 some simple organic molecules were detected in spectra from two extrasolar planets. Scientists have been excited about this discovery because they believe it suggests the possibility of life evolving on other planets. In previous articles I have argued for the existence of extrasolar planets but have pointed out many problems with theories trying to explain their origin.[1–3] Researchers using the Spitzer Space Telescope's Infrared Spectrometer detected some simple organic molecules in a star known as AA Tauri.[4] This star is believed to be less than one million years old. It is surrounded by a large dust disk, considered to be a protoplanetary disk that has the potential of forming planets. Gases that have been detected from AA Tauri are acetylene, hydrogen cyanide, carbon dioxide and water. The researchers are beginning to apply a new detection technique for looking at the composition of gases in planetary disks. This new technique focuses on the gases in the disk rather than the dust. The same measurements also found water vapour to be abundant in the disk.

In addition, the Hubble Space Telescope has detected methane and water in another extrasolar planet, referred to as HD 189733b.[5] The star is somewhat smaller than our Sun and the planet is estimated to be like Jupiter but slightly more massive. It is very near its star so its orbital period is only about 2 days.

The Hubble detection was done as part of a transit measurement in May 2007. In a transit, the star's light passes through the planet's atmosphere as the planet passes through the line of sight from Earth to the star. Transits allow some information to be gleaned about the planet and its atmosphere. Transits are relatively rare opportunities but a number of transit measurements have been done for various extrasolar planets. The NASA Planetquest website lists 35 planets that have been studied via transit measurements.

The amount of methane detected in the Hubble data was reported as surprising to astronomers, particularly because of the high temperature of this planet.[5] Methane tends to evaporate into space from a hot planet such as this one, or be used up in chemical reactions. Thus, based on current models, scientists would have expected it to show carbon monoxide more abundant than methane, but carbon monoxide is either not present at all or at surprisingly low concentrations. The presence of small quantities of ammonia is also possible but not conclusive.

In both the above cases, the discovery of substances like methane, acetylene and hydrogen cyanide merely shows that the extrasolar planets are similar to planets such as Jupiter in our solar system. In our solar system, the planet Jupiter and Saturn's moon Titan both have at least traces of methane, acetylene and hydrogen cyanide. Ultraviolet light from our Sun is likely responsible for driving chemical reactions that create substances such as hydrogen cyanide and acetylene in Titan's atmosphere. The same processes may be at work for exoplanets. The presence of these chemicals is not an indication that life is present or that life could evolve on these exoplanets. Simple molecules like methane (CH_4) and acetylene (C_2H_2) are far less complex and easier to form than the larger biomolecules that life depends on.



Credit: Hervé Piraud

Artist's impression of Gliese 581c, an extrasolar planet that has been thought to be able to support liquid water.

The search for biologically habitable planets is of great interest to astronomers today. We can expect to see more reports similar to the above as more extrasolar planets are studied in the hope (by some scientists) of finding planets where life could evolve and survive. Thus far, extrasolar planets have been found to be either too hot or too cold to be suitable environments for living things. Even if a planet were found to have a liveable temperature range, there are many other barriers to life evolving from simple chemicals. Important biomolecules such as proteins require the formation of long chain molecules with hundreds of carbons. These large complex molecules are not likely to naturally arise from conceivable chemical processes in planetary atmospheres. Furthermore, natural processes cannot explain the origin of the information content of molecules like RNA and DNA.

References

1. Spencer, W.R., The existence and origin of extrasolar planets, *Journal of Creation* **15**(1):17–25, 2001.
2. Spencer, W.R., Rapid planet formation, *Journal of Creation* **17**(3):19–21, 2003.
3. Spencer, W.R., Migrating planets and migrating theories, *Journal of Creation* **21**(3):12–14, 2007.
4. Carr, J.S. and Najita, J.R., Organic molecules and water in the planet formation region of young circumstellar disks, *Science* **319**(5869):1504–1506, 14 March 2008. Press release available at <www.jpl.nasa.gov/news/news.cfm?release=2008-042>.
5. Swain, M.R., Vasisht, G., Tinetti, G., The presence of methane in the atmosphere of an extrasolar planet, *Nature* **452**:329–331, 20 March 2008. Press release available at <www.jpl.nasa.gov/news/news.cfm?release=2008-046>.