

All About Astrobiology

- ☀ Astrobiologists are scientists who search for evidence of life on planets and planetary bodies beyond Earth.
- ☀ To exist, life needs liquid water, nutrients and a source of energy, and protection. While the ways that organisms get their nutrients, energy sources, and protection can be different, ALL life as we know it needs WATER!
- ☀ An extremophile is a living thing that thrives in "extreme" conditions, such as very high temperatures or very salty water. They can live where most others cannot because they have adapted mechanisms for survival.
- ☀ Some extremophiles are found in geothermal springs like the ones found at Yellowstone Park. Extremophiles can be found living at temperatures as high as 121 degrees C (250 degrees F).
- ☀ Some extremophiles survive in conditions – such as the desert or Antarctica - that have very, very little water, or only get water rarely.
- ☀ Anaerobic extremophiles can exist without oxygen – the first life on Earth lived without oxygen in the atmosphere. The microscopic *Methanococcus jannaschii* lives in hydrothermal vents on the floor of the Pacific Ocean. Thriving at pressures that would crush a conventional submarine, this heat-loving, methane-producing microbe lives without sunlight or oxygen.
- ☀ Some extremophiles may be similar to early life that has remained essentially unchanged for more than three billion years; these give us hints about conditions and life on early Earth.
- ☀ Scientists once thought that all life on Earth obtained its energy from the Sun – the life forms either photosynthesized (turning water and carbon dioxide and the energy from the Sun into food) – or the life forms ate the organisms that photosynthesized.
- ☀ Scientists now know that life forms can get their energy from other sources without sunlight, like chemical sources. Deep in the ocean, far from sunlight, ocean hydrothermal vents spew super-hot, mineral-rich water; entire ecosystems of bacteria, huge clams, crabs, and other organisms live here, consuming chemical energy.
- ☀ Extremophiles are important for many reasons. They help industry make new products, like detergents that clean better. They have expanded our knowledge of conditions in which organisms may live – and help our search for conditions on other planets that may be suitable for life.
- ☀ Two possible places in our solar system that may have or once had conditions for life to exist are Mars and Jupiter's moon Europa.