

# Case study example

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Astrobiology Astrobiology is concerned with studying the origin, evolution, distribution, and future of life in the universe (NASA). It engages in the search for alternate habitable areas beyond earth by deviating attention to planets outside of our solar system. The most identified body dealing with astrobiology is the National Aeronautics and Space Administration (NASA). The organization has established a program named Astrobiology. Through this program, the organization seeks to establish three fundamental issues. The main role of the program is addressing how life begins and evolves. The other issue seeks to implore on whether there is life beyond Earth, and lastly, the program seeks to understand the future of life on Earth. Astrobiology is the common denominator in all NASA space science activities. It bridges research in astrophysics, heliophysics and earth science. To further understand the principle interests of astrobiology, this discourse will look at the discipline in line with the three established issues. This is in recognition of the fact that the credibility and relevance of astrobiology lies in its pursuit to answer the fundamental questions of our origin, establishing our identity, and whether man is alone in the cosmos.

How does life begin and evolve

Scientists seem to still not come up with a clear definition of what life is; they are still not clear on what being alive means. In perhaps the simplest way, life on Earth swaps energy and material with the environment. The common characteristics of life being that life forms grow, excrete, reproduce and are made up of genes stored in DNA and RNA structures and passed on to the next generation. Life also changes. These changes result due to alterations in the environment. However, life also alters the environment. Finally, it is clear that life is based on the chemistry of carbon and needs liquid water.

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### Life beyond earth

An extremely constrained layer exists near the surface of Earth; this layer contains life in abundance as evidenced by microorganisms, plants, and animals. Unfortunately, this layer represents the only identified area that supports life in the entire Universe. Everyone by now acknowledges that the laws and concepts of chemistry and physics are in action all over the cosmos. This has led to constant enquiries on whether there is anything like general biology. More critically, there have been unending inquiries on life beyond Earth.

Advanced science has been able to reveal that there exist other surfaces beyond Earth which are represented by planets orbiting the Sun. In the past 15 years, the number of identified extra-solar planets has reached 450. The majority of these are gas giants such as Saturn and Jupiter. These discoveries have also led to identification of around to 20 planets of less than 10 Earth masses. These have shown that there exist other surfaces beyond Earth that have the capability to support life.

### Future of life on earth

NASA identifies that efforts to understand the future of life can only bear fruit if one starts with an absolute understanding of the principles that may determine life, both on Earth and beyond. NASA tries to explain the likely results of an alteration of the ecosystem. This is because the future of life ranging from a few decades to millions of years is embedded on the likely effects of any changes in the ecosystem. Further, the future of life is also studied based on the possibility of microbial life to adapt and evolve in surfaces beyond their origin (beyond Earth).

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