



Origins of Life

Characteristics of life

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What is Life?

Before moving on to the development of microscopic organisms on Earth, we must first describe the characteristics of life. All matter, both living and non-living, is composed of miniature chemical building blocks called atoms. Your body contains billions of hydrogen, oxygen, nitrogen, phosphorus and carbon atoms. The computer you are looking at is also composed of billions of various atoms. However, there is a very important distinction between yourself and your computer - you are alive.

What is life? What does it mean to be alive? How is something made "living"? These are all pertinent questions when discussing the origin of life. Scientists have identified seven basic characteristics of life. For something to be described as living, that something must display all seven of these characteristics. Although many different people have many different opinions about what "living" means, the following characteristics were designated "characteristics of living things" with the consensus of the scientific community.

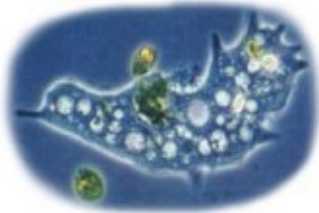


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All Living Things...

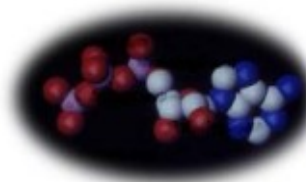
...Are Composed of Cells



Cells are the basic components of all living things. Some organisms are single-celled, like bacteria, or multi-celled, like humans.

A single-celled organism called an amoeba.

...Require Energy



Living organisms require energy, usually in the form of ATP. They use this energy to carry out energy-requiring activities such as metabolism and locomotion.

A molecule of ATP

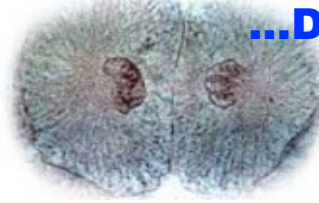
...Reproduce



All living organisms reproduce, either by sexual or asexual means.

A plant cell reproducing via mitosis (in metaphase)

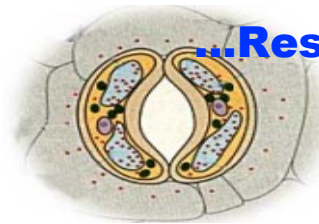
...Display Heredity



Living organisms inherit traits from the parent organisms that created them.

Two daughter cells containing identical genetic material.

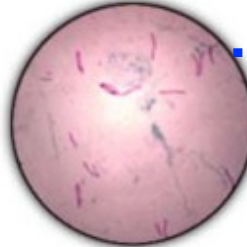
...Respond to Stimuli



All living things respond to stimuli in their environment.

A stomata opening in response to light stimulus.

...Evolve and Adapt



Living organisms adapt to their environment and evolve.

Tuberculosis bacteria. Antibiotics were once effective against TB but now it is growing resistant

...Maintain Homeostasis

All living things maintain a state of internal balance.

Using these characteristics, one can categorize things as living or non-living. Imagine if you were a biologist who had never been to Earth before. You have been sent on a mission to determine whether these things called "trees" are alive. How do trees satisfy the seven characteristics of living things?

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Are Viruses Alive?

This is a very interesting question which has instigated many heated debates in scientific circles. Why are viruses such a big deal? Well, viruses are interesting because they are neither inanimate nor living; a virus is "midway between brute matter and living organism" (Wolfhard Weidel). Because of this ambiguity, it is difficult to define and classify viruses. Although viruses are not composed of cells, they possess all the other characteristics of living things. They replicate, require energy (from living cells), adapt, respond to stimuli and display heredity. Because viruses satisfy six of the seven characteristics of living things, they are on the verge of being classified as a living organism. Perhaps the haziness surrounding our very definition of "living" is at fault for not including viruses as a form of life. As scientist Wolfhard Weidel once said, "nothing brings us so close to the riddle of Life - and to its solution - as viruses".

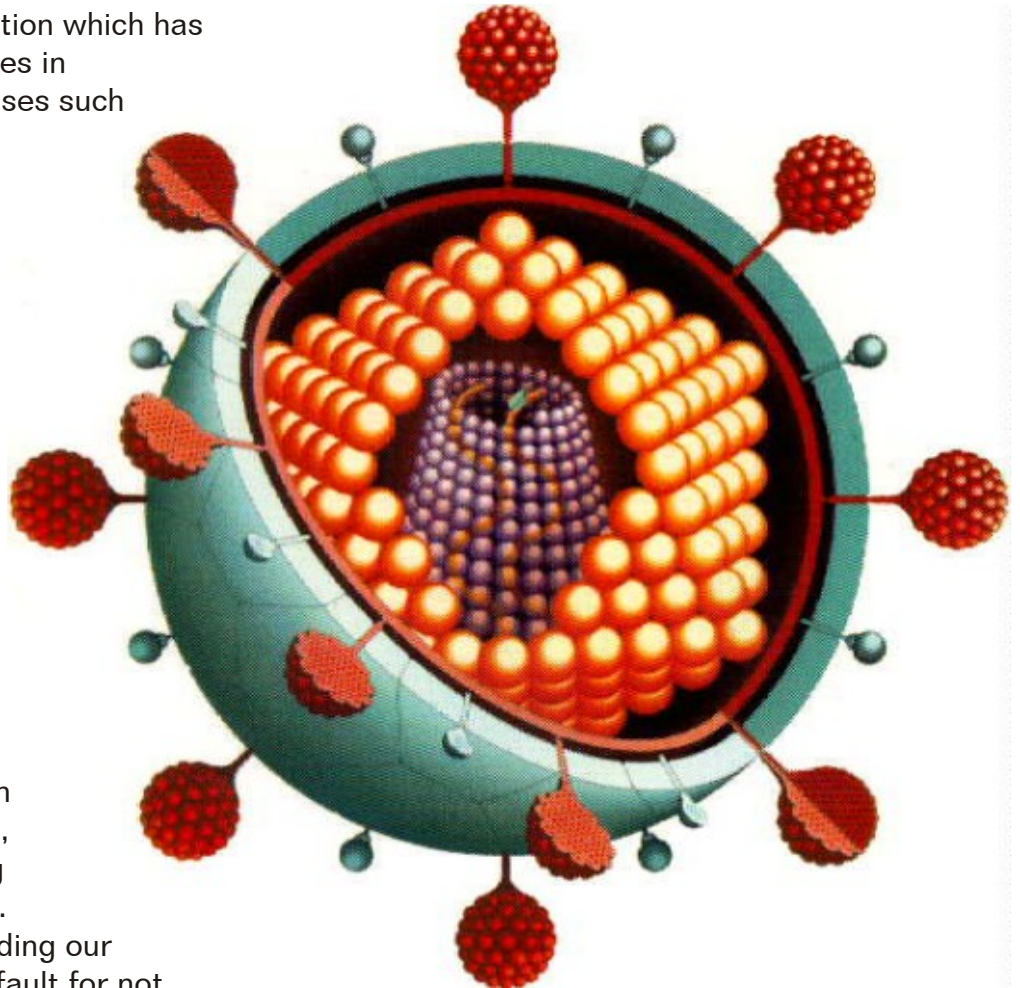


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