

## What is life?

There is no single undisputed definition of life. Therefore, most current definitions in biology are descriptive. Life is considered a characteristic of something that exhibits all or most of the following traits:

Homeostasis: regulation of the internal environment to maintain a constant state; for example, sweating to reduce temperature

Organization: being structurally composed of one or more cells – the basic units of life

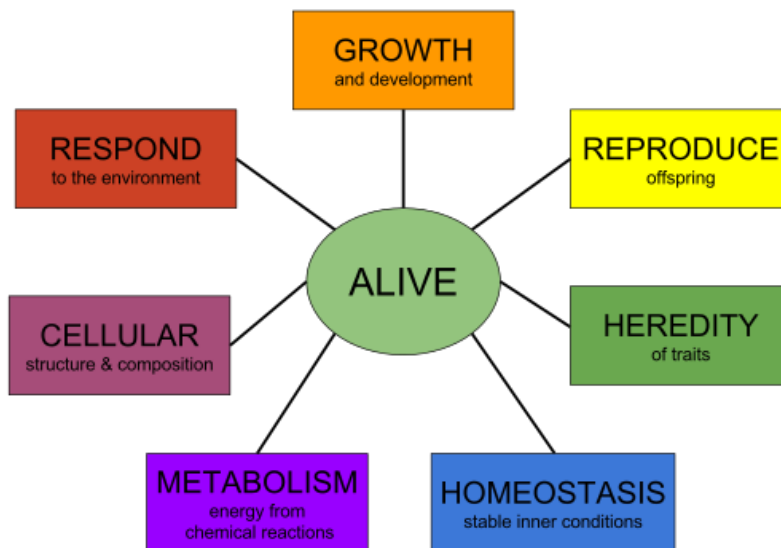
Metabolism: transformation of energy by converting chemicals and energy into cellular components (anabolism) and decomposing organic matter (catabolism). Living things require energy to maintain internal organization (homeostasis) and to produce the other phenomena associated with life.

Growth: maintenance of a higher rate of anabolism than catabolism. A growing organism increases in size in all of its parts, rather than simply accumulating matter.

Adaptation: the ability to change over time in response to the environment. This ability is fundamental to the process of evolution and is determined by the organism's heredity, diet, and external factors.

Response to stimuli: a response can take many forms, from the contraction of a unicellular organism to external chemicals, to complex reactions involving all the senses of multicellular organisms. A response is often expressed by motion; for example, the leaves of a plant turning toward the sun (phototropism), and chemotaxis.

Reproduction: the ability to produce new individual organisms, either asexually from a single parent organism or sexually from two parent organisms.

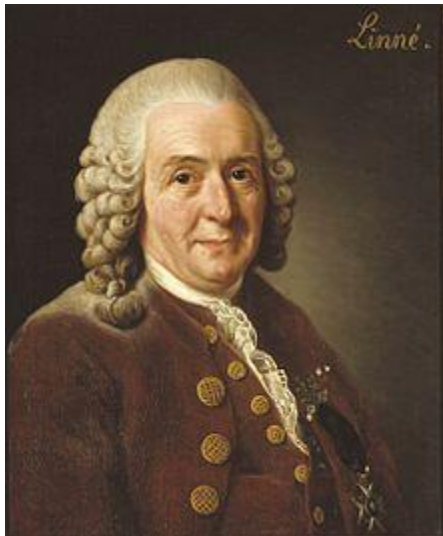


These complex processes, called physiological functions, have underlying physical and chemical bases, as well as signaling and control mechanisms that are essential to maintaining life.

From a physics perspective, living beings are thermodynamic systems with an organized molecular structure that can reproduce itself and evolve as survival dictates.

## Classification (taxonomy) of life forms

First scientific classification – Carl Linnaeus (1707–1778)



Species can be placed in a ranked hierarchy. Linnaeus divided all life forms into two kingdoms – Vegetabilia (plants) and Animalia (animals). Kingdoms were divided into phyla. Phyla were divided into classes, and they, in turn, into orders, families, genera (singular: genus), and species (singular: species).

**Carl Linnaeus, 1735 – 2 kingdoms - Vegetabilia and Animalia**

**Ernst Haeckel, 1866 - 3 kingdoms – Protista, Plantae and Animalia**

**Édouard Chatton, 1925- 2 empires – Procariota and Eucariota**

**Carl Woese, 1990 – 3 domains – Bacteria, Archaea and Eucaria**

Current taxonomy relies on DNA sequence data

