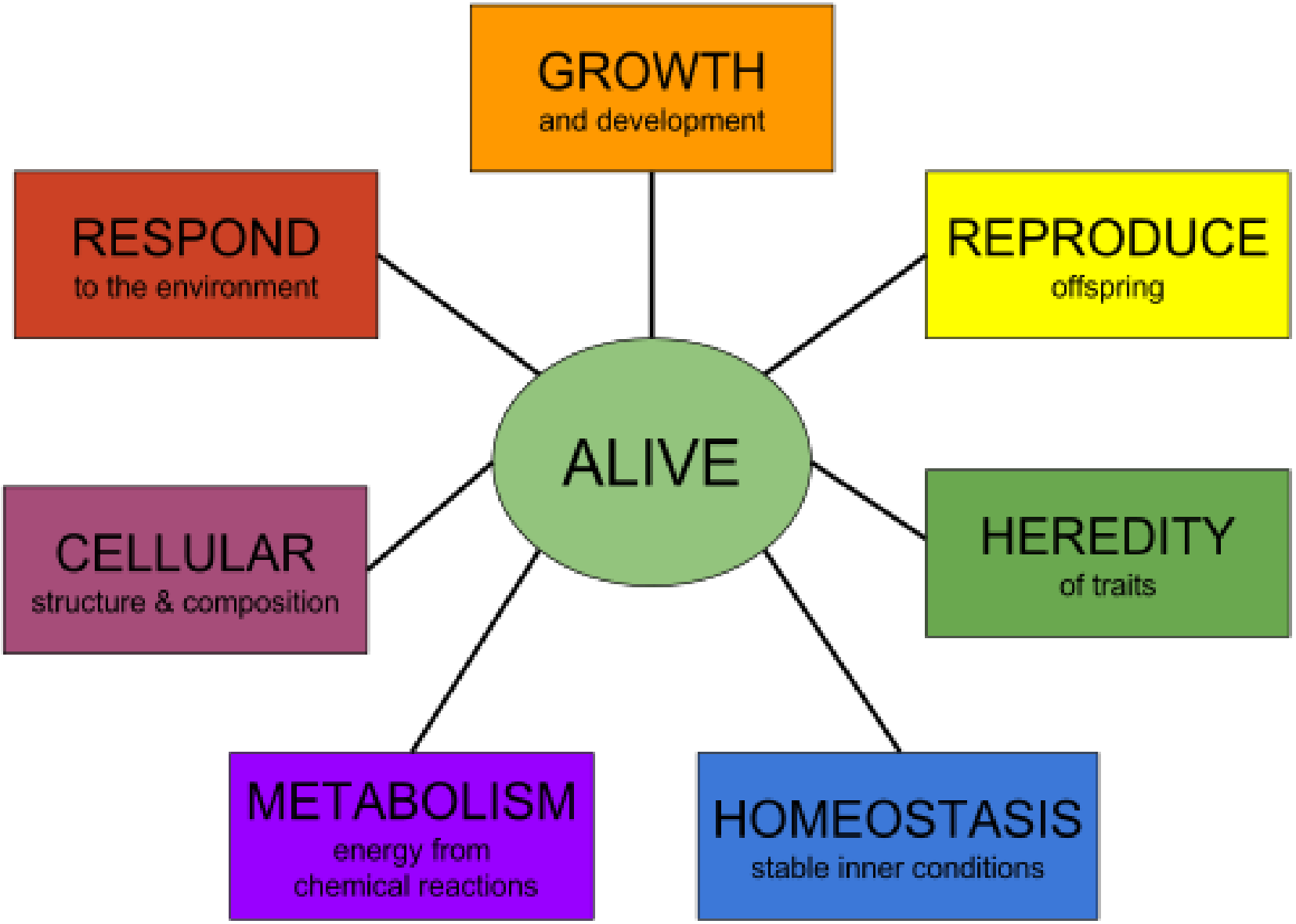
What is life?

It is a challenge for scientists and philosophers to define life. This is partially because life is a process, not a substance. Therefore, most current definitions in biology are descriptive. Life is considered a characteristic of something that exhibits all or most of the following traits:


GROWTH
and development
RESPOND
to the environment
REPRODUCE
offspring
ALIVE
CELLULAR
structure & composition
HEREDITY
of traits
METABOLISM
energy from
chemical reactions
HOMEOSTASIS
stable inner conditions

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.

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.

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

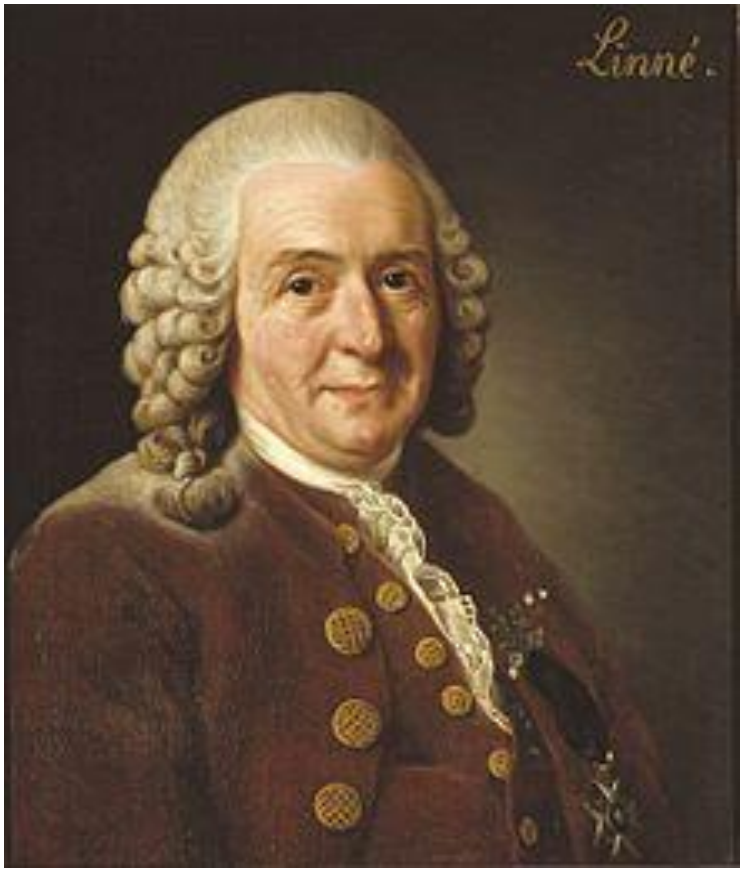
Heredity: also called inheritance or biological inheritance, is the passing on of traits from parents to their offspring.

Homework 1.

Technology often imitates naturally occurring processes. Please, think of an example of an artificial homeostasis.

Classification (taxonomy) of life forms

Carl Linnaeus (1707–1778)



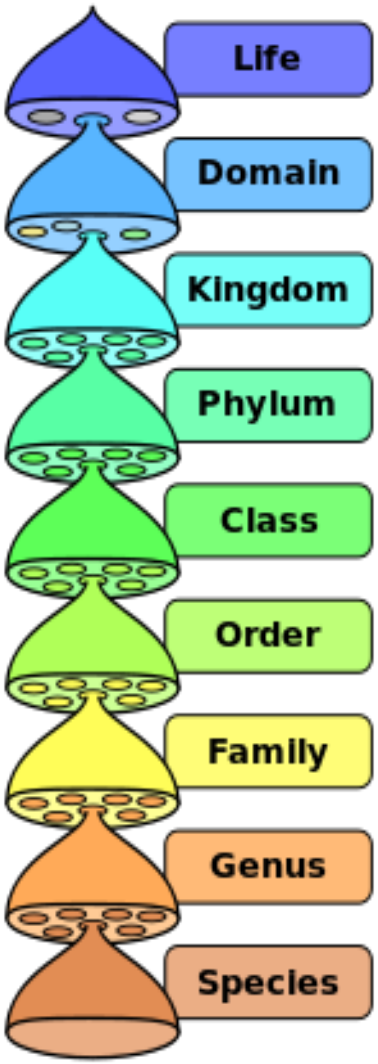
Species can be placed in a ranked hierarchy.

Carl 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/

Modern taxonomic ranks



Homework 2.

Organism	Human	Zebrafish	Fruit fly
Domain			
Kingdom			
Philum			
Class			
Order			
Family			
Genus	Homo	Danio	Drosophila
Species	H. Sapiens	D. Rerio	D. Melanogaster