



# Define Biology

The great thing about scientific terms and names is that you can almost always break them apart and find common roots, prefixes, suffixes.

Look at the word Biology it is made up of two parts:  
Bio and logy

Biology is formed from the German word *Biologie* and is made up of two parts

**Bio** meaning life and the suffix **logy** which denotes a field of study or academic discipline.

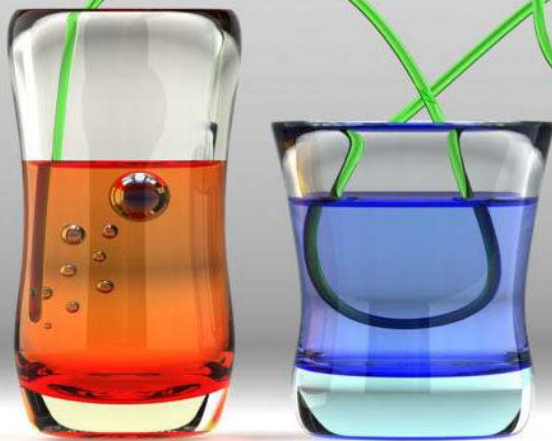
Words ending in **ologist** are used to describe a person who studies that field.

# Define Biologist

**A Biologist is someone who studies living or once living organisms.**

Biology is the branch of science dealing with the study of life. It is concerned with the characteristics, classification, and behaviors of organisms, how species come into existence, and the interactions they have with each other and with the environment.

All concepts in biology are subject to the same laws that govern the other branches of science



All sciences (such as biology, chemistry and physics) obey the laws of nature for example: thermodynamics and conservation of mass and energy.

# What is Biology?

Biology is branch of science that is involved with the study of all living and once living organisms.



Biology covers such a large range of information that no single biologist can know all that is to know.

(Although some students have claimed that Otterspool is close)

Instead biologists will choose to specialize in one of the hundreds of subdisciplines such as:



**Anthropology** is the branch of biology to study human beings

**Botany** is the study of plants

**Cytology** is the study of cells

**Ecology** the study of interaction organisms and the environment

**Herpetology** is the study of reptiles

**Mycology** the study of fungi

**Xenobiology** examines the possibility of life beyond the Earth.

**Zoology** is the branch of science that is concerned about the study of animals

## So we're done...right?

I suppose we could make sure that we know what each of the words in the definition of biology means... just to be certain that we really understand it.

**Biology is the study of all living and once living organisms.**

Lets start with the obvious new word: organism

Organism comes from the Greek word organon, which means instrument ...

so just incase that doesn't clear things up for you an organism is a living thing.

What does it mean to be living?



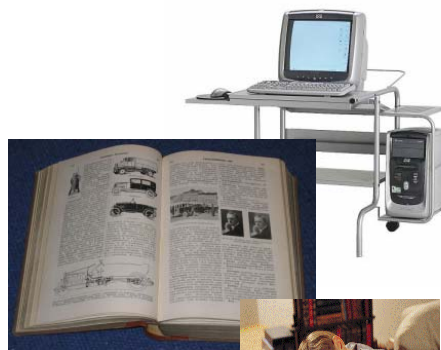
We know when something is not alive, we can feel it.

This desk... not alive,

this book... not alive,

the kid in back row....

Well alive but not awake :o)



We know he is alive but how...  
what does it mean to be alive?

# Define Living

It is hard to quickly and precisely define life so instead we classify organisms as sharing the following characteristics of life

1. Organized- has one or more cells
2. Use energy
3. Homeostasis
4. Irritability
5. Reproduction
6. Growth and Development
7. Adaptation and Evolution



## CHARACTERISTICS OF LIFE

### A. Life is highly organized

1. Protons, Neutrons and Electrons make Atoms
2. Atoms make molecules
3. Molecules form monomers (chemical building blocks)
  - Amino acids, Fatty acids, Nucleotides, Monosaccharides
4. Macromolecules
  - Proteins, Lipids, Nucleic acids, Polysaccharides
5. Organelles
6. Cells
  - Smallest unit of life
  - Organisms can be unicellular, colonial, or multicellular
7. Tissues
  - Groups of like cells that come together to perform a particular function
  - Muscle tissue contracts for movement
  - Nervous tissue conducts electrical impulses
  - Connective tissue connects tissues together
  - Epithelial tissue protects, absorbs, and secretes
8. Organs
  - Two or more tissue that come together to perform a particular function
9. Organ systems
  - Two or more organs that come together to perform a particular function
10. Organisms

## CHARACTERISTICS OF LIFE

### A. Life is highly organized - Continued

11. Populations
  - Members of a specific species in the same area
12. Communities
  - All species in the same area
13. Ecosystems
  - All species in the same area interacting with each other and the non-living environment
14. Biosphere
  - All living things and their ecosystems

## What is the largest living thing?

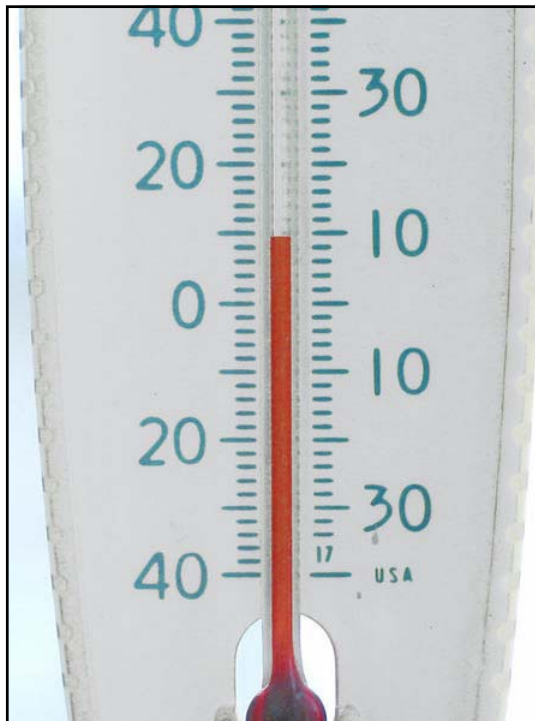
### Oregon

More precisely a fungus named *Armillaria ostoyae* growing in the soil of Malheur National Forest. It is over 2,200 acres in size and is around two thousand years old.



## B. Exchanges energy and materials with the environment

1. Energy is the ability to do work
  - 1) Types of work include mechanical, transport, metabolic
2. Energy is needed to maintain order- to fight entropy (the amount of disorder is always increasing)
3. Energy sources
  - 1) Phototrophs obtain energy from electromagnetic radiation (light)
    - a) Includes plants, algae, and some bacteria
  - 2) Chemotrophs obtain energy from chemicals
    - a) Animals, protists, fungi, and some bacteria
4. Materials
  - 1) Material may be broken down for energy by chemotrophs
  - 2) All organisms need materials for building blocks



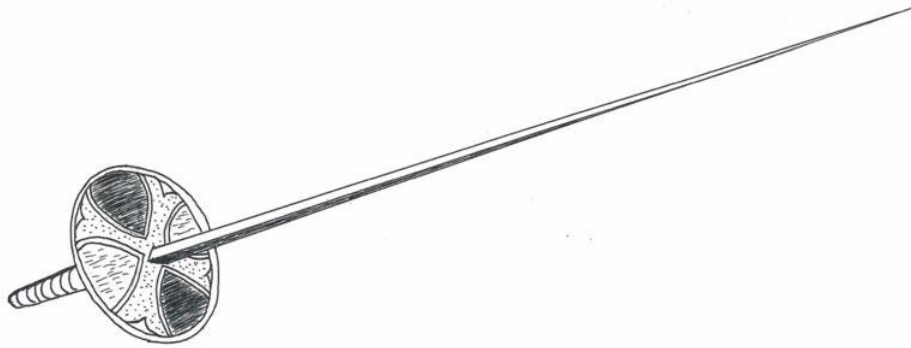
## C. Homeostasis

1. Internal environment is relatively constant
2. Many of the systems in our body are used to maintain homeostasis

Examples: body temperature around 98.6 in humans

#### D. Respond to stimuli- (irritability)

1. The response of an organism to the external environment (stimuli) constitutes an organism's behavior
  - a) Most of animal behavior is geared towards avoiding injury, obtaining food, and reproduction.





## E. Reproduce - pass on genetic information to offspring

1. Biogenesis theory = Life only comes from life
  - a) Biogenesis theory explains the **UNITY of life**
2. Types of reproduction
  - a) Asexual
    - (1) One parent
    - (2) Offspring will be exactly the same as the parent and siblings (clones)
  - b) Sexual
    - (1) Two parents
    - (a) Offspring receives some of its genes from each parent

## F. Develop and grow

- a) Living growth- Assimilation- Becomes part of the organism
- b) Nonliving growth- Accumulation- Dirty clothes, icicles, snow- no E used
- c) Development- is the changing from infant to adult stage of life

## G. Evolution and adaptation

1. Adaptation
  - a) Genetic modifications that make an organism better suited to its environment
2. Evolution
  - a) The process by which characteristics of a species change through time
3. Evolutionary adaptation explains the **diversity of life**.

The focus of this year will be to explore and hopefully begin to understand the Unity within the Diversity of life.

In other words how are all living things the same even though they appear to be very different.

## The Characteristics of Life

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