

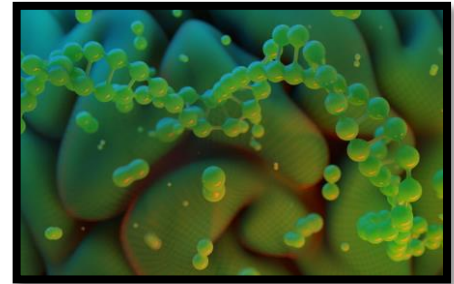
A scenic landscape featuring a river or lake in the foreground, surrounded by lush green grass and reeds. The middle ground is dominated by a dense forest of tall evergreen trees. In the background, a sun is setting or rising, creating a warm, golden glow over the scene. The sky is a mix of blue and white clouds.

Introduction to Biology

What is life?

Defining Biology

- **Biology** is the study of all forms of life.
- That is a pretty broad category.
- To study life we must understand what it means for something to be alive.



Characteristics of Life

- An organism is any living thing
- Scientists have developed certain criteria to help determine whether or not something is a living thing
- Though this might sound simple, you will see that defining life can be a complicated process



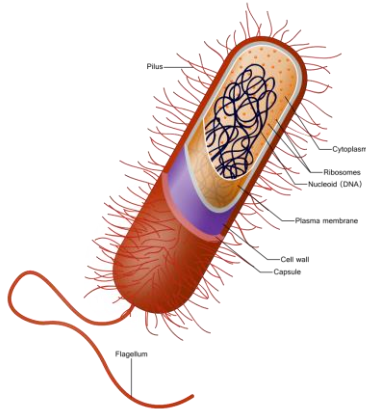
Characteristics of Life

1. Order
2. Heredity/DNA
3. Reproduction
4. Growth and development
5. Response to the environment
6. Evolutionary adaptation
7. Energy Processing
8. Regulation



Organization: Made of Cells

- All living things are made of cells and they may range from
 - unicellular organisms (Ex: bacteria)
 - multicellular organisms (Ex: blue whale)
- Cells make up tissues, which form into organs, which make up the organ system of an organism.



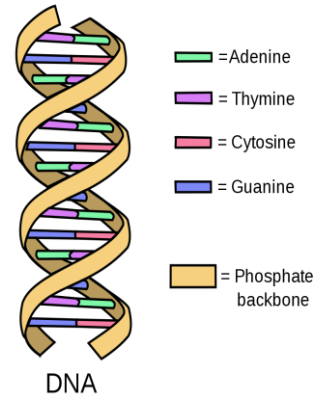
Ex: bacteria



Ex: blue whale

DNA

- Living things have genetic material in the form of DNA.
- DNA contains the information that determines the growth and development of organisms.
- This genetic material is passed on to the next generation (AKA it is inheritable).
 - Ex: You have a mix of physical features of your parents. This is because your DNA is 50% your mother's and 50% your father's.



Reproduction

- Members of a species must be able to produce **offspring** (new individuals).
- Reproduction can be:
 - Asexual: 1 parent
 - Sexual: 2 parents



Growth and Development

Inherited information carried by genes controls the pattern of growth and development of organisms.

Increase in size:

- Cells becoming larger
- Divide to produce more cells



To watch a timelapse of plant growth:

<https://www.youtube.com/watch?v=kX2RtDE9BBw>

Require Energy

- Living things require a source of **energy** in order to move or to carry out cellular processes.
- Obtaining energy varies between organisms.
 - make their own food (plants)
 - eat other organisms (humans)
 - break down dead material (fungi)
- All organisms must use energy to break down and build up materials in a process called **metabolism**.



Response to the Environment

- Living things must **respond** to the environment that they are in.
- Think about a plant growing towards the sun or a venus flytrap catching an insect.



To watch video: Life- Venus Flytraps: Jaws of Death- BBC One
<https://www.youtube.com/watch?v=O7eQKSf0LmY>

Regulation

Organisms need to maintain **homeostasis**-stable internal conditions

- Organisms remain stable inside regardless of outside conditions
- Ex: temperature, blood sugar, acidity, blood pressure



The large ears of the jackrabbit are used in cooling, radiating heat via an extensive network of blood vessels.

Read about it [HERE](#).

Evolutionary adaptation

- Living things change over a long period of time and certain changes (adaptations) help them to survive and reproduce → evolution.



Weird Adaptation Example: Horned Lizard

Biggest

Biosphere

Ecosystems

Communities

Populations

Organisms

Organs and Organ Systems

Tissues

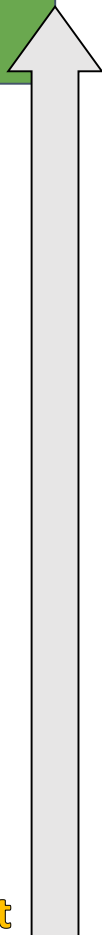
Cells

Organelles

Molecules

Smallest

Levels of Biological Organization



Think about it

If there is only one individual left in the species, and therefore it cannot reproduce, then is it considered to be alive? This is an interesting question especially with many species approaching extinction.

Example: Florida Panther

Now the estimated population of 230, recovered from a population of 20 in the 1970s

