



**Key Takeaways**

- Living vs Non-living: How to differentiate between living and non-living
- Defining characteristics of living organisms

**Living vs Non-living**

**Definite shape and size**

**Size and shape**

Morphous

Property of living organisms

Living organisms have a definite shape and size which may change within a narrow range.

Amorphous

Property of non-living things

**Growth**

- It is the increase in size, mass, or height of an organism. This occurs by cell division.

**Growth**

**Definite**



- Animals grow only upto a certain age.
- In the later years, there is only replacement and repair of worn-out cells.
- Hence, their growth is termed as **definite**.

**Indefinite**



- Plants, on the other hand, can grow throughout their lifetime.
- Thus, the word **indefinite** is used for growth in plants.

**Intussusception/  
Intrinsic growth**



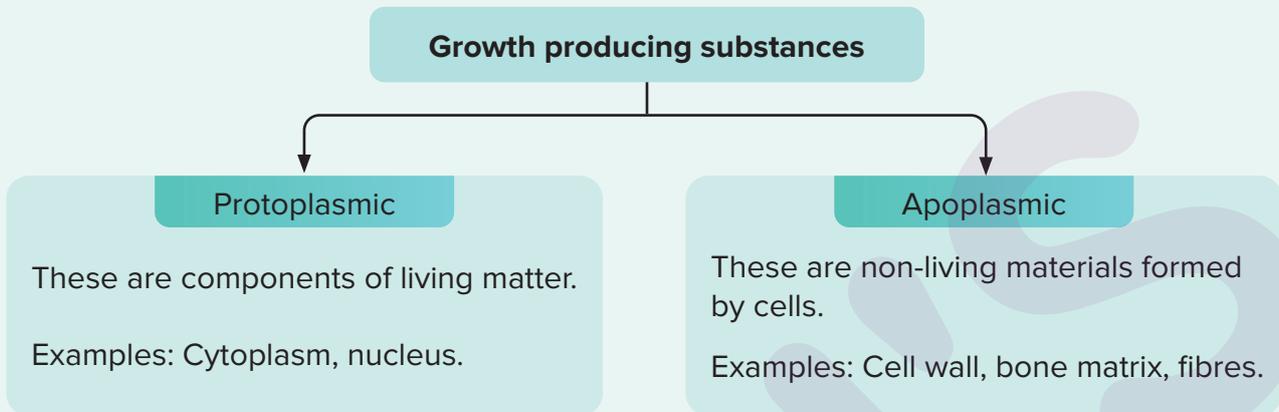
- Living organisms show **internal growth**
- Addition of materials and formation of cells **inside their body**

**Accretion/  
Extrinsic growth**



- Non-living things **increase in size**
- Addition of similar materials on their **outer surface**

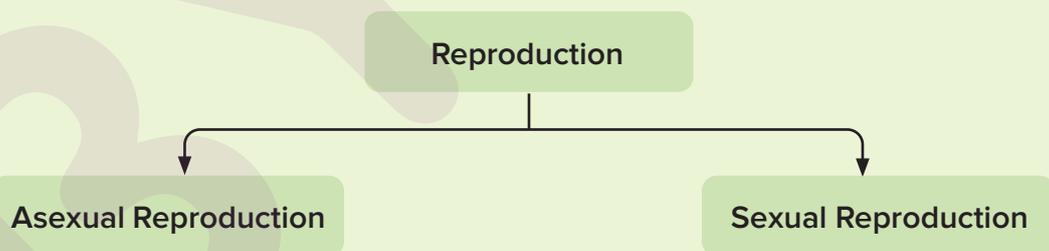
- In unicellular organisms, growth and reproduction are synonymous. When a unicellular organism divides into two, it is considered to be growing as well as reproducing.
- In plants and animals, growth and reproduction are two separate phenomena.



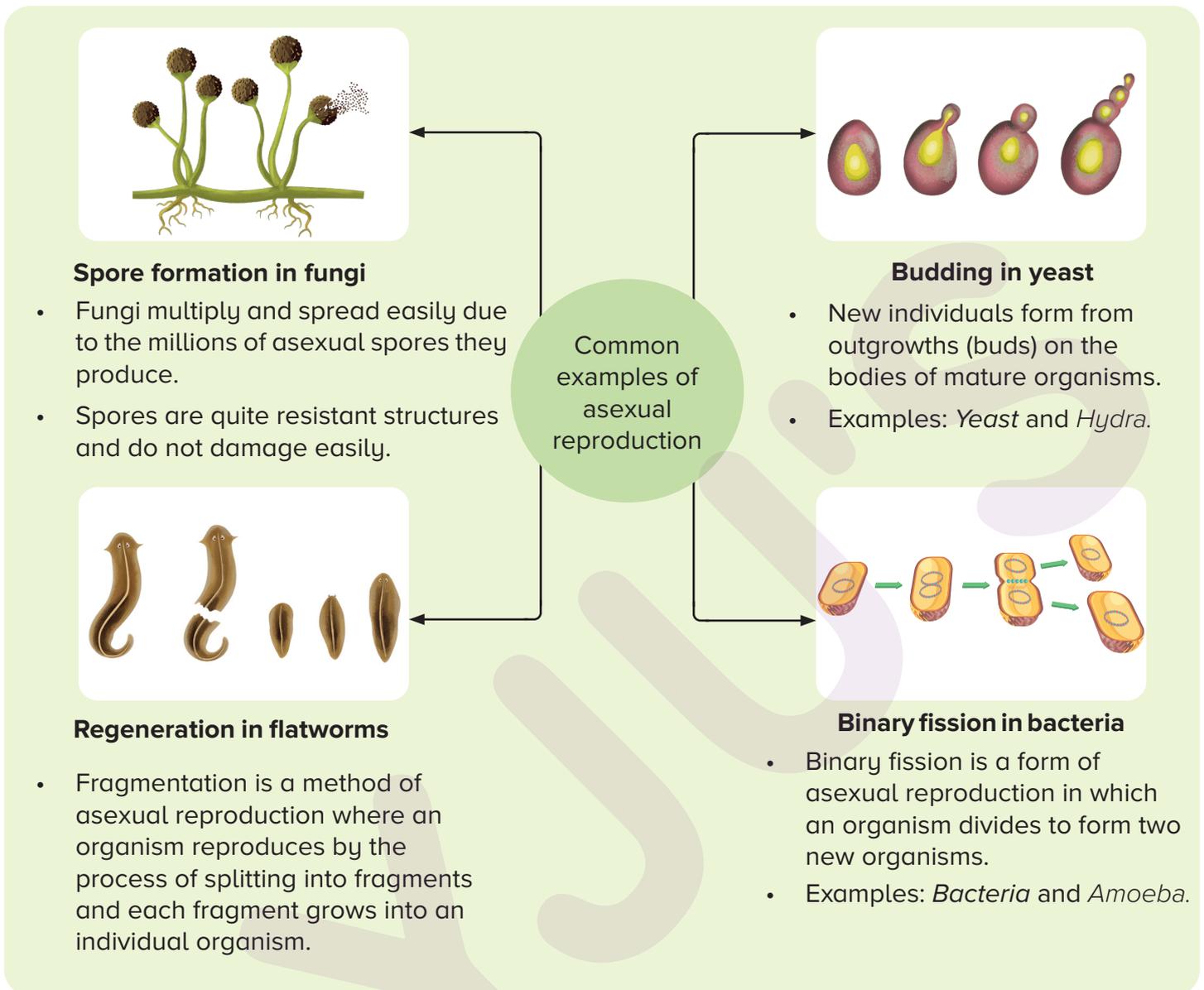
- **Growth is a property of living beings but it cannot be considered as a defining characteristic.**

## Reproduction

- It can be defined as the production of new individual organisms or offspring.
- It is not essential for an individual for survival. However, it is essential for the propagation of a population.
- **Thus, reproduction is not a defining characteristic of living organisms.**



<b>Asexual Reproduction</b>	<b>Sexual Reproduction</b>
Does not involve the fusion of gametes	Involves the fusion of gametes
Offspring is identical to the parent	Offspring varies genetically from the parents
It is uniparental	It is generally biparental



### Not all living beings can reproduce

#### Infertile couple



It is the inability of a couple to bear offspring.

#### Worker bee



Amongst a swarm of bees, the worker bees are sterile, while the queen and drones are fertile.

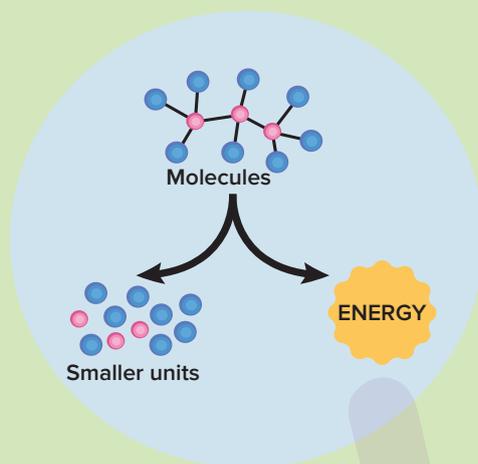
#### Mule



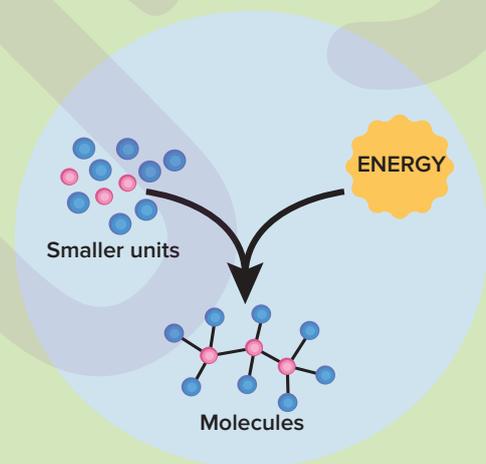
It is the cross between a male donkey and a female horse. It does not produce gametes.

## Metabolism

- It is the sum total of all the chemical reactions occurring in a coordinated manner to support life.
- It occurs in both unicellular and multicellular organisms.
- Non-living objects do not perform metabolic processes.
- **Thus, metabolism is a defining property of living beings without exception.**
- Metabolism comprises catabolism and anabolism.



**Catabolic reactions are those in which the molecules are broken down and energy is released. (Example: The breakdown of food during digestion).**

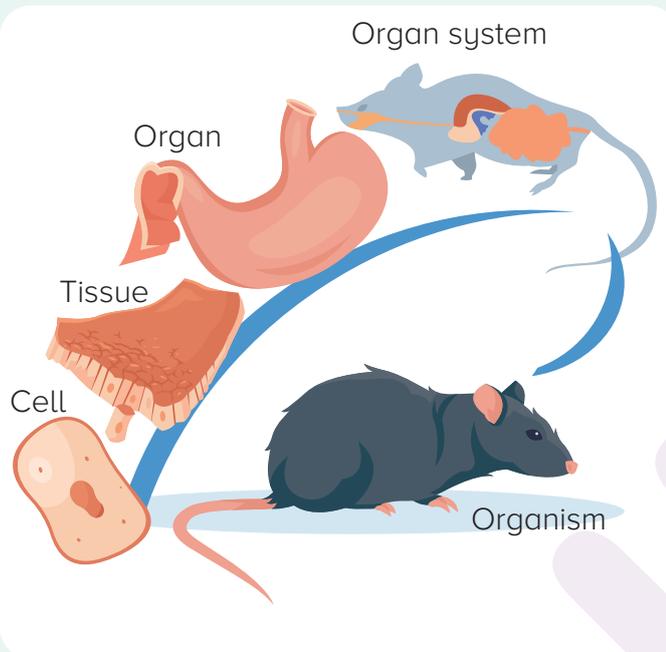


**Anabolic reactions are those in which energy is utilised to combine smaller molecules to yield larger and more complex molecules. (Example: Photosynthesis)**

- The food that we eat is digested or broken down into simpler substances. These substances reach the cells and release energy. The unused waste materials are excreted. It is a very organised phenomenon that happens in organisms.

## Cellular organisation

It is the differentiation of a body into smaller units and subunits that are arranged in an orderly manner.



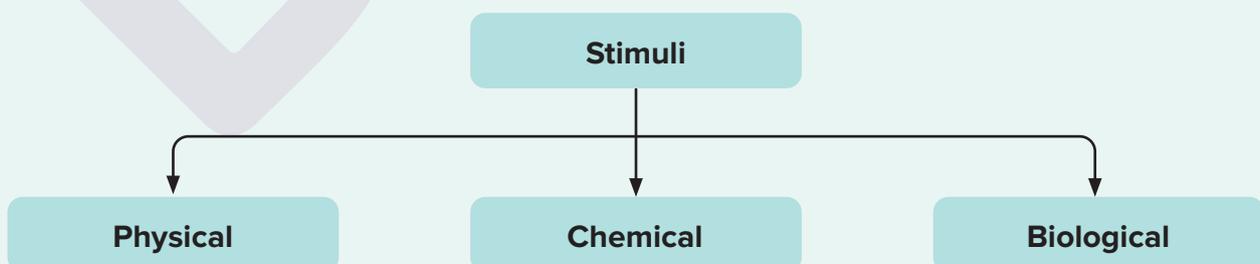
- All living beings are made up of cells. Cell is the basic functional unit of life containing organelles.
- Organelles interact with each other for the proper functioning of the cell. It is an organised process.
- Each organelle might be involved in individual functions. The functions performed by cells are a result of the cumulative activities of all the organelles.
- Cells aggregate to form tissues that in turn aggregate to form organs.
- **Thus, cellular organisation is a defining property of living beings.**

## Homeostasis

- It is the maintenance of **constant** and **favourable internal** environmental **conditions** suitable for functioning of body organs.

## Consciousness

- It is the state of awareness of the surroundings and the response to external stimuli.
- Stimuli can be of three types.



- Stimuli are perceived by sense organs.
- The visible change or reaction that an organism produces as a result of the applied stimulus is known as **response**.

- Examples:

### Sense organs



### Response to external factors



- **Consciousness is a defining property of living organisms.**



### Did you know?

Human beings in coma have no self-consciousness. They are supported by machines. Some return back to normal life, whereas some do not.

### Adaptation

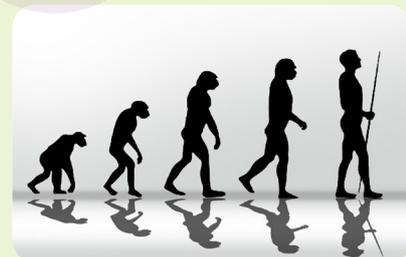
- They are **useful, inheritable changes** in form, function, and behaviour that enable an organism to **adjust well and successfully** in its environment.
- An organism is considered best adapted to an environment when it possesses inherited traits that enhance its survival and breeding in that environment.
- There are two types of adaptations.

Short Term	Long Term
Develop in response to a particular season or to <b>overcome a specific stress</b>	Develop in response to <b>struggle for existence</b> in order to survive
Appear for a <b>short duration</b> and disappear when the stress period is over	<b>Life-long</b> and remain present all the time
Might be <b>heritable</b> or <b>acquired</b>	Always <b>heritable</b>

Play <b>very little</b> role in evolution	Play a <b>major</b> role in evolution
<p>Examples:</p> <ul style="list-style-type: none"> <li>• Most amphibians, reptiles, and some mammals hibernate during unfavourable conditions.</li> <li>• Their metabolism is slowed down and they utilise the stored nutrients to obtain energy.</li> </ul> 	<p>Examples:</p> <ul style="list-style-type: none"> <li>• Claws of different birds are well-adapted to suit their perching habits.</li> <li>• Clinging and climbing: Woodpecker</li> <li>• Striking and catching: Hawk</li> <li>• Perching: Pigeon    • Running: Ostrich</li> <li>• Swimming: Duck</li> </ul>   <p>Claws of eagle                      Claws of ostrich</p>

### Evolution

- It means to unroll, unfold, or reveal hidden potential.
- **Darwin** defined evolution as **descent with modification**.



### Repair and regeneration

- It is the ability to **repair** or **renew** damaged/lost body parts in the **post-embryonic life** of an organism.
- All living organisms heal their wounds or repair the damaged parts.

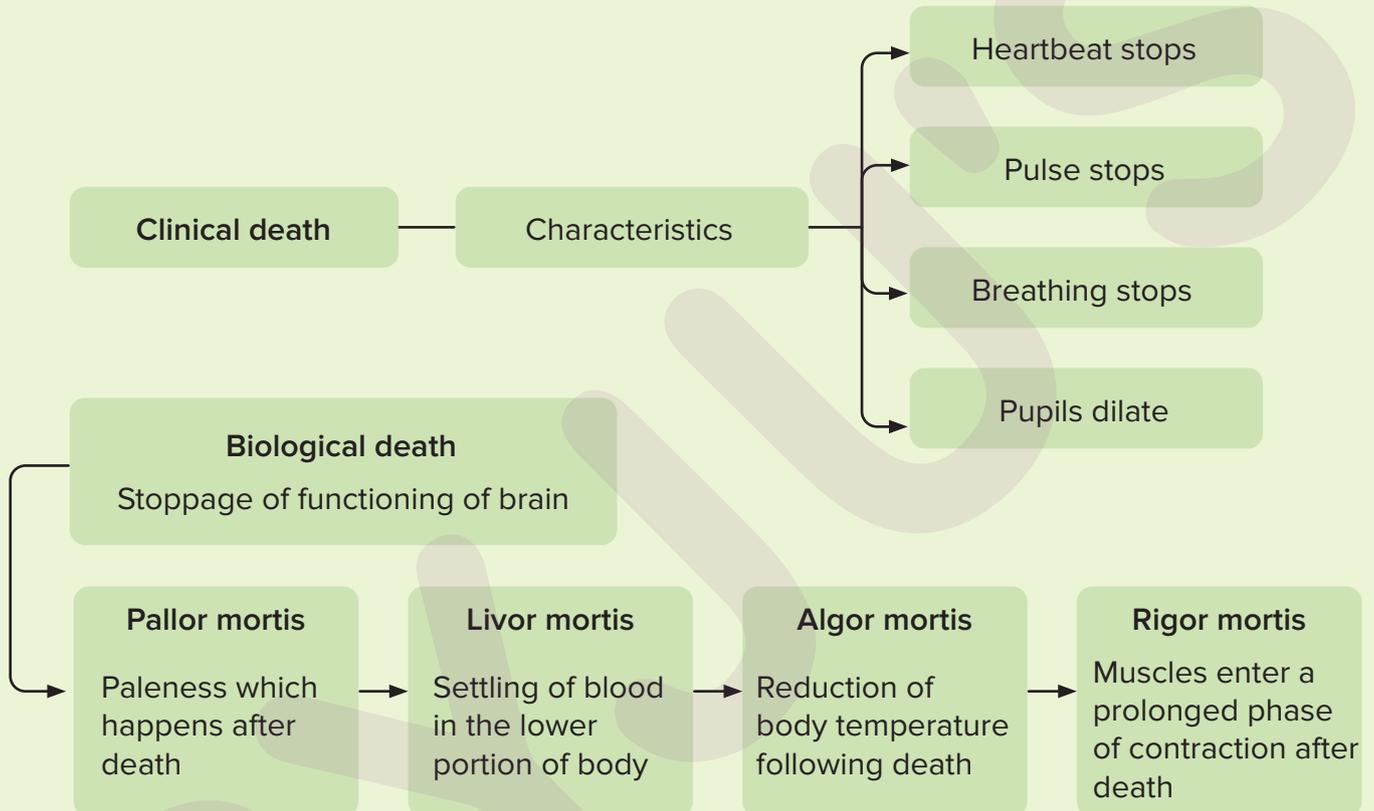
### Ageing

- It is the **progressive decline/deterioration** in **structure** and **function** of an organism.
- Study of ageing is known as **gerontology**.
- Ageing starts before birth (biological ageing).

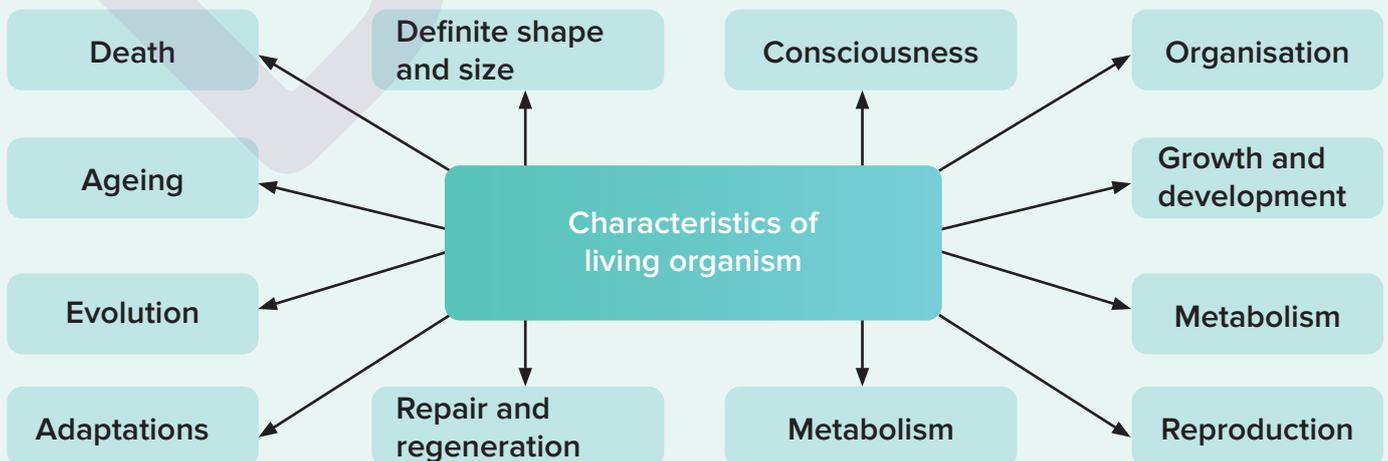


## Death

- It is the **ultimate termination** of functional life.
- Study of death is known as **thanatology**.
- It is an important **regulatory process** that **prevents overcrowding** and helps in **recycling of materials**.
- There are two stages of death.



- Within this duration of clinical and biological death, **internal organs can be transplanted** (liver, kidneys, etc).





## Summary Sheet

