

## *1.2.3. Characteristics of Life*

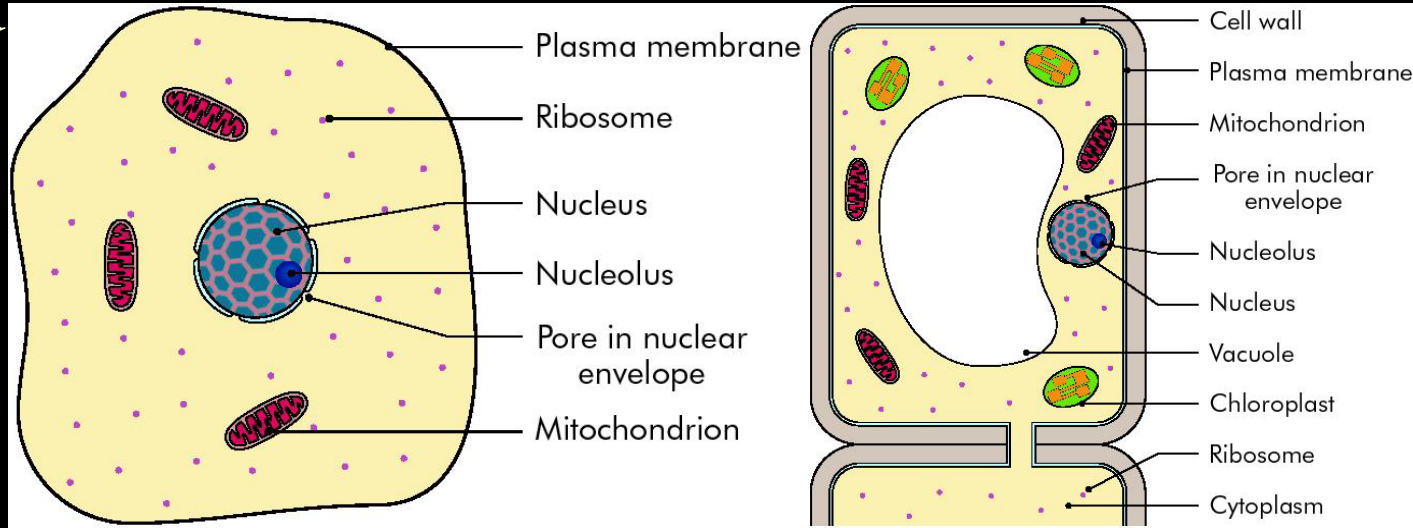


# *How do we know if something is alive?*

- It has organization – cells, tissues, organs, etc.
- It uses energy
- Grows and develops
- Excretes
- Reproduces
- Responds to the environment
- Adapts to the environment

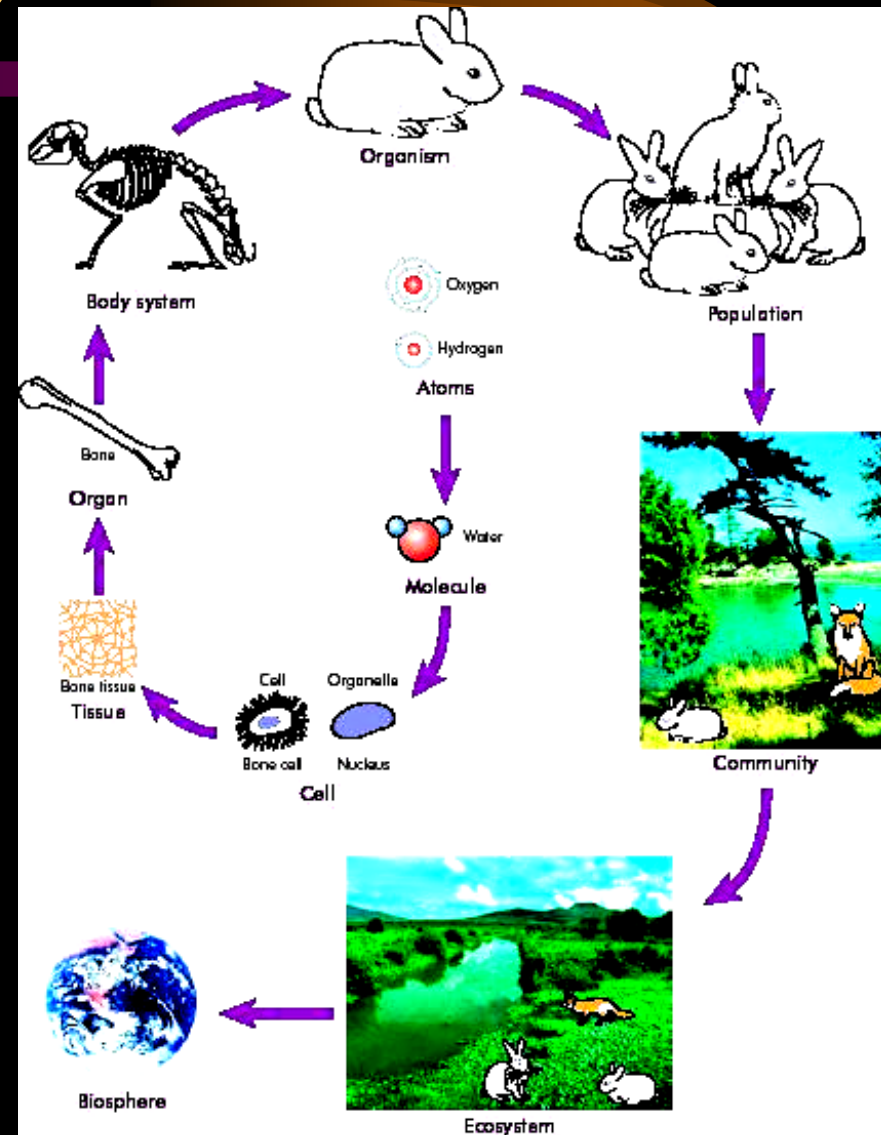
# Organisation

- Unicellular or multicellular
- Specialized structures
- Cell is the basic unit of structure and function
- If cell structure is damaged its function is also affected



# Levels of organisation

- Cell
- Tissue
- Organ
- Organ system
- Organism
- Population
- Community
- Ecosystem
- Biosphere



# *Energy*



- All energy for living things can be traced back to the sun (primary source of energy)
- Organisms use light energy to see (vision), to make food (photosynthesis), for warmth (respiration)
- Plants use sunlight to make food (producers)
- Other organisms eat the plants to get energy (consumers)

# *Learning check*

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# *Growth and Development*

- Growth – increase in size
- Development – change in form or shape
- Amount of growth varies in different organisms
- Nutrition maintains the organisation and growth of living organisms

# *Nutrition*



This is the process involved in the making and receiving or the absorption and utilisation of food (energy and materials) from the environment



# *Sources of Nutrition*



In Animals: feed on other organisms

In Plants: make food by photosynthesis and absorbing chemicals from the environment

Energy flow:

Sun → Plants → Animals

# *Excretion*

- Excretion - is the elimination of the waste products of metabolism from a cell, tissue or organ
- All living things must get rid of waste material – if it was allowed to accumulate it would become toxic to the organism
- A balance must be maintained between their internal and external environments

# *Methods of excretion*

Various organised structures involved

In Animals: the urinary system, skin, lungs

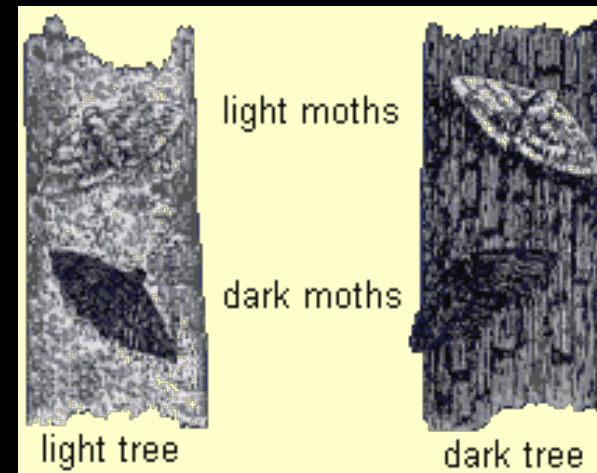
In Plants: the stomata

# *Learning check*

- What is meant by nutrition?
- This is the process involved in the making and receiving or the absorption and utilisation of food (energy and materials) from the environment

# *Response and Adaptation*

- Response = reaction to a stimulus in environment
- Adaptation – plants and animals change in response to long-term changes in the environment; these may be passed on to future generations (Charles Darwin)



# *Methods of response*

- In Animals: organised structures respond to light, sound, touch, etc.
- In Plants: growth towards or away from a stimulus e.g. light, water, fertilisers, etc.

## *Learning check*



What is Excretion?

- It is the elimination of the waste products of metabolism from a cell, tissue or organ

# *Reproduction*



- Life comes from life.
- Reproduction is the ability of an organism to produce new individuals of its own kind and pass on genetic information to the next generation.
- Necessary for the survival of the species
- Offspring can be the same as or different from parent(s)



# *Methods of reproduction*

- Asexual: e.g. in bacteria and protista – binary fission (simple division in two) – mitosis
- Sexual: e.g. in plants and animals – involves two parents and the production of male and female gametes

# *Learning check*

- What is the purpose of reproduction?
- To produce new individuals of its own kind and pass on genetic information to the next generation.
- Reproduction is necessary for the survival of a species.

# *Interactions between organisms*

- There are relationships between organisms living in same habitat
- Predator-prey
- Symbiosis (Mutualism & Commensalism)
- Parasitism
- A change in one type of organism can cause other organisms to change
  - Organisms that can't adapt fast enough might become extinct

# Summary



- One characteristic is not enough to qualify something as being alive.
- Life involves an interaction between metabolism and continuity
- Metabolism requires an interaction of organisation, nutrition, excretion and behaviour
- Continuity requires organisation, nutrition, behaviour and reproduction

## *Need to know*

Definition and identification of the "characteristics of life", through fundamental principles and interactions of organisation nutrition, excretion, response and reproduction.



*END*