Chapter – 9: Living Organisms and Their Surroundings

- Different surroundings – different parts of our country
    - Mountains –
        - Cold places
        - Types of trees – oaks, pines, *deodar*
        - Unique animals – yak, mountain goats
    - Deserts –
        - Very hot and dry
        - Special type of plants – cactus
        - Special type of animals – camels

    - Coastal areas –
        - Very humid
        - Special kind of trees – palm trees
        - Another kind of animals – fish, crabs, etc

- Living things – found everywhere – even in the volcanoes

Living Things Around Us

- Variety of things around us
- Some things – need water, food, air – living things
    - Birds and animals (including humans) – boy, girl, cat, dog, peacock, crow, etc
- Other things – do not need water, food, air – non-living things
    - Table, chair, car, sand, rock, paper, cloud, moon, etc
- Living things – called organisms
- Study of organisms – biology

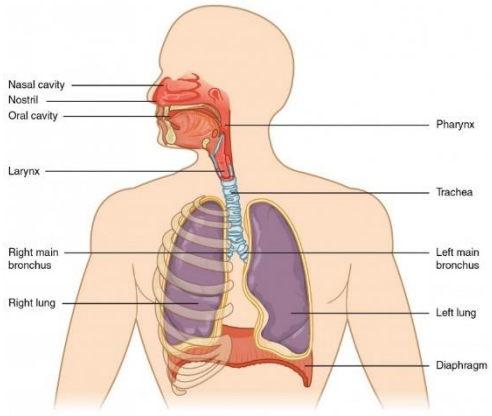
Characteristics of Living Things

- Food –
    - All living things – need food, air, water
    - Plants – make their own food
    - Animals (including humans) – obtain food from plants and other animals
    - Food – provides energy
    - Non-living things – do not require food
- Growth –
    - All living things – grow
    - Young ones – grow and become bigger in size
    - Seed – grows to become a plant
    - Baby – grows to become adult

    - All living things – grow from a single cell – divides to form lots of cells
    - This growth – happens from inside
    - Non-living things – do not grow
    - Some cases – cloud – appears to grow – still – non-living thing
    - This growth – happens from outside – accumulation (gathering) of water vapours

- Movement –
  - Most imp. sign of life
  - All living things – move by themselves – different ways
  - Movement – caused by internal factors – muscles, hormones (chemicals)
  - Animals – move from one place to another – move their body parts
    - Frog – jumps
    - Bird – flies
    - Humans – visit places
  - Animals move – for food, protection from enemies, natural disasters
  - Plants – cannot move from one place to another – BUT – can move their body parts
    - Sunflower – moves in the direction of sun
    - Some flowers – open and close their petals
  - Non-living things – cannot move by themselves
  - Movement – caused by external forces
    - Rock – thrown by someone else
    - Cloud – moved by air
- Response to stimuli –
  - All living things – respond to changes around them – stimuli – smell, touch, taste, heat, light, etc
    - Touch a hot pan – remove the hand quickly
    - Step on a nail (sharp object) – remove the foot quickly
    - Move from darkness to sunlight – shut our eyes quickly
    - Move towards a bird – bird flies away
    - Some animals – attracted to light – moths, beetles
    - Some animals – move away from light – cockroach, earthworm
    - Mimosa plant – touch-me-not – touch the leaves – leaves fold up
    - Potted plant – in the garden – sunlight from all sides – grows in all directions
    - Same plant – inside dark room – sunlight from a window – grows in that direction
    - Some flowers – open up in sunlight
    - Some flowers – open up in darkness

  - Non-living things – do not respond to stimuli
- Respiration –
  - All living things – require energy – perform daily functions
  - This energy – obtained through respiration
  - Respiration – chemical process – food combines with oxygen – release energy
  - Other products – carbon dioxide and water
    - Our body – takes in oxygen – releases carbon dioxide
    - This exchange – takes place inside lungs
    - This process – breathing
  - Breathe in – oxygen in air – used for respiration – carbon dioxide – waste product – breathe out
  - Breathing – easily observed – movement of ribs
  - Some animals – do not have lungs – BUT – different mechanism
  - Earthworm –
    - Breathes through skin



        - Thin and moist skin – absorbs oxygen directly – releases carbon dioxide directly
    - Fish –
        - Special organs – gills
        - Takes water through mouth – send it to gills
        - Oxygen – absorbed by the gills – carbon dioxide – released into water
    - Plants –
        - Day time –
            - Carbon dioxide – absorbed through stomata – used in photosynthesis – oxygen – released through stomata
        - Night time –
            - Oxygen – absorbed through stomata – used in respiration – carbon dioxide – released through stomata
    - Non-living things – do not respire
- Excretion –
    - All living things – take food – obtain energy – respiration
    - Respiration – waste product – carbon dioxide
    - Also – some part of food – remains unused – waste material
    - These waste materials – poisonous – removed from body – excretion
    - Animals (including humans) – excrete –
        - Carbon dioxide – released during breathing
        - Urea, unwanted water, salts – in the form of urine
        - Faeces – solid waste
    - Plants –
        - Carbon dioxide (respiration), oxygen (photosynthesis)
            - Day time – carbon dioxide – reused in photosynthesis
            - Night time – oxygen – reused in respiration
        - Some plants – store waste products – body parts
            - These waste product – do not harm plant
            - Remove them – shedding leaves, peeling of bark, felling of fruits
        - Some plants – remove waste products – secretions
            - Gum, resin, latex (rubber) – useful to humans
    - Non-living things – do not excrete any waste products
- Reproduction –
    - Living things – produce – new members
    - Different animals – different methods of reproduction
        - Some animals – give birth to young ones
            - Humans, dogs, cats, cows, etc
        - Other animals – lay eggs
            - Birds, fishes, etc

    - Plants – also reproduce – different methods
        - Through seeds –
            - Seeds – sown in moist soil – germinate and grows into new plant
            - Wheat, paddy, corn, Bengal gram (*chana*)
        - Through tubers –
            - Tuber – thickened, underground stem
            - Potato – stem tuber – many buds

                - Potato – sown in soil – each bud – grows into a new plant
                - Even cut the potato into pieces – each piece grows into plant – if it contains a bud
            - Through cuttings –
                - Small part – cut with a sharp knife
                - Cutting can be a stem, root, leaf – contain some buds at least
                - Cutting – buried in moist soil – grows into a new plant
        - Living things – limited life span – reproduction – essential
        - Non-living things – cannot reproduce
- Definite life span –
    - Living things – start their lives – born as babies, hatched from eggs, grown from seeds – become adults – after some time – they all die
    - Different organisms – different life-span – BUT – life-span – limited
        - Humans – 60-70 years
        - Some insects – few hours
        - Tortoise – 100 years
    - Different plants – different life-span
        - Most trees – longer life than some animals
    - Non-living things – do not die ever – live forever

The case of a seed

- Some cases – living things – do not show all characteristics
- Take some seeds (wheat) –
    - Do not require food
    - Do not grow – remain as it is in a shop
    - Cannot move on their own
    - Do not excrete
    - Do not reproduce
    - ONLY – respire
- Put your hand inside a gunny bag – full of wheat – feels warm
- This heat – produced during respiration

Habitat

- All living things – live in places – suitable for them – habitat
- Provides – food, water, air, light, shelter (protection), place for breeding (reproduction)
- Deserts, mountains, forests, grasslands, soil, homes, trees, etc
- Divided in 2 main groups –
    - Terrestrial –
        - Land based habitat
        - Plants and animals – live on land
        - Desert, mountain region, forest, grassland, field, soil, homes, etc
    - Aquatic –
        - Water based habitat
        - Plants and animals – live inside water
        - Pond, lake, river, swamps, oceans, etc

- Type of habitat – vary from organism to organism
- Different plants and animals – have same habitat
    - Pond – algae, hydrilla, water-lily, some weeds, etc – fish, frogs, turtles, snails, kingfishers, ducks, etc
- Lots of living organisms – same habitat – BUT – different food habits
- Other than animals – many components – physical environment

Biotic components

- Biotic – living
- All living things – any habitat – biotic components
- Plants, animals, micro-organisms, etc

Abiotic components

- Abiotic – non-living
- All non-living things – any habitat – abiotic components
- Soil, rocks, air, water, sunlight, temperature, etc
- These components – required for biotic components
    - Soil – provides nutrients
    - Water – required by plants and animals
    - Sunlight – provides energy
    - Air – provides carbon dioxide and oxygen

Adaptations

- Different habitats – entirely different conditions
- Plants and animals – living in a habitat – adapted to the habitat
    - Desert –
        - Very little water – plants and animals – developed specific features for it
        - Camels, cactus, etc
    - Ocean –
        - Saline water – plants and animals – developed specific features for it
        - Marine fish, other such animals
- Living thing – survive in a habitat – its body – adapted (suited) for the conditions – for survival
- Adaptation – presence of specific body features – helps in survival

Adaptation in Camel

- Long legs – keeps him far away from the hot sand
- Drink large amounts of water – store it in body
- Saves water – less amount of urine, sweat – dry dung – live for longer times – without drinking water
- Camel's hump – fat stored in it – on requirement – breaks down to produce water
- Large and flat feet – helps in walking on soft sand

Adaptation in Fish

- Head, trunk, tail – streamline body – helps in moving through water easily
- Special organs – gills – helps in breathing – cannot breathe on land

- Slippery scales – protects the fish from other animals
- Strong tail – helps in swimming
- Flat fins – change direction and maintain balance

- Adaptation – does not happen instantly – BUT – happened over 1000s of years
- Animals – who adapted – lived on – who didn't adapt – died
- This adaptation – results in variety of organisms

Deserts

- Terrestrial habitat
- Waterless area – covered with sand – little to no vegetation
- Dominant features –
    - Scarcity (shortage) of water
    - High temperatures
- Plants and animals – developed special features – survive for long

Adaptation in desert animals

- Live in burrows –
    - Desert rats, snakes – dig deep burrows – stay inside – day time
    - These burrows – stay cool during day time
    - Night time – come out from burrows – search for food
- Conserve water –
    - Excrete less amounts of waste materials
    - Cope up (adapt) with lack of water

Adaptation in desert plants

- Leaves –
    - Either absent or present in very small amounts
    - Sometimes in the form of thorns
    - Helps in reducing loss of water through transpiration
    - Survive on stored water – longer times
- Photosynthesis –
    - No leaves – BUT – stem – modified – performs functions of leaves
    - Photosynthesis – carried out by green stems
- Storing water –
    - Stems – modified – store water
    - Stems – covered with thick, waxy layer – prevents loss of water
- Roots –
    - Long, deep roots – absorb water easily

- Cactus –
    - Modified leaves – thorns – reduce transpiration
    - Green leaf-like structure – its stem – carries out photosynthesis
    - Store water inside stems – covered with thick, waxy layer – prevents evaporation
    - Long roots – absorb water – deep inside soil

Mountain regions

- Terrestrial habitat
- Very high hill – mountain
- Usually – very cold and windy
- Many areas – snowfall can be observed

Adaptation in plants

- Lots of rain, cold weather, snowfall
- Low temperatures – soil water freezes – unavailable for roots
- High mountains – windier – more evaporation
- Adaptations –
    - Cone-shaped –
        - Sloping branches
        - Rain water and snow – slides off easily – without damaging branches and leaves
    - Leaves –
        - Small, needle-like leaves – lose very little water
        - Survive in winters – soil water freezes
        - Thick, waxy layer – reduces transpiration – protects them from damage
    - Broad-leaved trees –
        - Shed leaves – before winters
        - Helps in survival – no water available

Adaptation in animals

- Thick skin or fur – protects them from cold
- Adaptations –
    - Yak –
        - Large ox – covered with long hairs
        - Long hairs – protects from cold – keeps them warm
    - Mountain goat –
        - Long hairs – protects from extreme cold
        - String hooves (feet) – helps in running on steep slopes – grazing
    - Snow leopard –
        - Thick fur – body, feet, toes – protects form cold
        - Thick layer of fat – beneath (inside) the skin – insulation
        - Rounded body, small ears – reduces heat loss
        - Big feet – helps in walking on snow

Forests (or Grasslands)

- Terrestrial habitat
- Large area – covered with trees and plants – forests
- Large area – covered with grass – used for grazing – grassland
- Speed – imp. features – few places to hide

Adaptations in lion

- Carnivorous animal – eats only meat
- Strong, fast and agile – hunt and kill its prey – deer
- Long, strong, sharp claws – front legs – can be pulled inside the toes – more comfortable while walking
- Eyes – in front of its head – helps in focusing on the prey
- Light brown colour – helps in hiding while hunting

Adaptations in deer

- Herbivorous animal – eats only the plants
- Eyes – on the side of its head – enables to see in all direction
- Big ears – helps in hearing predators (lion) easily
- Fast and agile – speed helps in running away
- Brown colour – helps in hiding – protection against predators
- Strong teeth – chewing hard plant stems

Oceans

- Salt water aquatic habitat
- Very large sea – ocean
- Sea creatures – adapted to survive under water
- Adaptations –
    - Streamline bodies –
        - Helps in movement inside water
        - Fishes, dolphins, whales – streamline bodies
        - Octopus, squids – no streamline body – BUT – bodies become streamline while moving
        - These animals – stay near sea-bed – less movements
    - Gills –
        - Helps in breathing under water
        - Gills – absorb oxygen from water
        - Dolphins, whales – no gills – breathe through nostrils – upper parts of their heads
        - Swim near surface – breathes in air – covers the nostrils with flaps – dive back in – can stay under water for longer durations

Ponds, Lakes and Rivers

- Fresh water aquatic habitat
- 3 kinds of aquatic plants –
    - Some – float on the surface –
        - Water lettuce, water hyacinth
    - Some – partly submerged –
        - Roots – fixed in soil – bottom of pond, lake, river
        - Stems – grow up to the surface
        - Leaves, flowers – float on the surface

        - Lily, lotus
    - Some – fully submerged –
        - Roots – fixed in soil – bottom of pond, lake, river
        - All the parts – grow under water
        - Hydrilla, Vallisneria

Adaptation in aquatic plants

- Short and small roots –
    - Main function – keep the plant in place
    - All parts – surrounded by water – absorb water and minerals directly
    - Do not depend on roots to absorb water and minerals
- Soft and hollow stems –
    - Do not require strong stem
    - Stems – soft, hollow, light
- Leaves –
    - Narrow and thin leaves
    - Bend in the flowing water
    - Highly divided – water flows through them – without damaging

Animals adapted to live in water and on land

- Some animals – live inside water as well as on land
- Frogs – spend life on land – lays egg in water
- Adaptations –
    - Webbed feet –
        - Helps in swimming – living in water
    - Strong back –
        - Helps in jumping (hopping) – catching their prey – living on land

Acclimatisation

- Adaptations – very slow adjustments – 1000s of years
- Some changes – short period of time – adjust to sudden changes – acclimatisation
- Visit a mountain region – trouble in breathing – after some time – our body adjusts to the changes
- These changes – temporary – can be reversed