

## Science form 2

### Chapter 8 Support and Movement

#### Support system in Animals

1. to help raise their body above the ground so that their movement becomes easier.
2. to maintains the shape of the body.

#### Skeleton

- The rigid or elastic structures in the body forming the framework of the animal body.
- Three types of skeleton
  - o Hydrostatic skeleton
  - o Exoskeleton
  - o Endoskeleton

#### Hydrostatic skeleton

- Animals are supported by pressure from a fluid filled in their body cells or in spaces between the body organs
- Usually in soft-bodied invertebrates
- Eg sea anemones, earthworms
- Function: provide movement and support

#### Exoskeleton

- Is an external skeleton which lies outside the soft part of body
- Is hard and rigid shell
- Usually in invertebrates
- Insects like ant and beetles have exoskeleton made from substances known chitin
- Moulting: insects must remove their exoskeleton in order to grow because they cannot change size once their exoskeleton have hardened

#### Endoskeleton

- Have a rigid internal skeleton

- Made up of bone and cartilage
  - o Bone: provide the strength
  - o Cartilage: at joints lets bones slide each other so that body can move
- Usually in vertebrates
- Gives shape and support the body, provide movement
- Grows as the body grows

### **Support systems in land and aquatic vertebrates**

- The support system of vertebrates consists of the internal skeleton
- The skeletons vary according to the habitat of the vertebrates

### **Land vertebrates**

- Require a strong and rigid skeleton to support their bodies
- The weight of land vertebrates mainly supported by pectoral and pelvic girdles
- Eg elephant need strong and big pectoral and pelvic girdles ,both girdles are joined to the limbs beneath the body
- Eg birds,the endoskeleton is made up of hollow bones, hollow bones are stronger and lighter, forelimbs are modified to form wings

### **Aquatic vertebrates**

- The body weight of aquatic vertebrates is supported by the water buoyancy
- Aquatic vertebrates have smaller endoskeleton, the pectoral and pelvic girdles are small and weak for their bodies
- Eg shark and rays have endoskeletons made up entire of cartilage, therefore the endoskeletons are light and flexible
- Endoskeletons of aquatic vertebrates have streamlined shapes which help them to speed up the movement in water

### **Support systems in land and aquatic invertebrates**

#### **Land invertebrates**

- Land invertebrates with joined legs such as insects, centipedes, scorpions and spiders have hard exoskeleton

- Snails are land invertebrates without joined legs, their exoskeletons are hard shells
- Other land invertebrates without legs such as earthworm, caterpillar, leeches and slugs have a hydrostatic skeleton to support their bodies

### **Aquatic invertebrates**

- Have hard and rigid exoskeleton such as lobsters, crabs and mussels
- Jellyfish have hydrostatic skeletons to maintain their shapes and support part of their weight

### **Support systems in plants**

- Stem : is the main support in plant, support its own weight, leaves, flower and fruits
- Roots: support the plant by anchoring the plants in the soil, some roots above the ground provide support for entire plants

### **Woody and non woody plant**

i. woody plant: usually either trees or shrubs, hard and rigid, the outer layer of woody stems called bark

- Trees: plants with a single stem eg durian tree
- Shrubs: woody plants that develop branches close to the ground eg hibiscus

ii. non-woody plant: depend on the water stored in the cells of their stem for support eg balsams

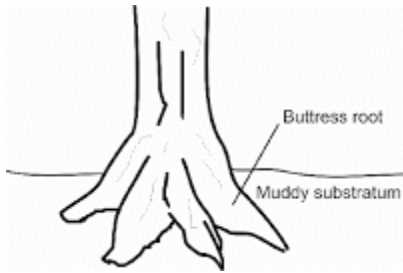
- Non woody plant are soft, when there is not enough water, the non-woody plant will wilt

### **Additional features of support**

I. Buttress roots

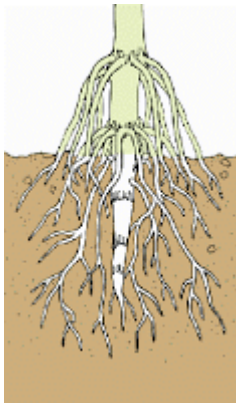
- Common in large tropical trees
- These roots occur at the base of trunk where the main roots branch off at the ground surface and enter the soil

- They have wall-like structures at the interface between the trunk and at the ground
- Function is to provide additional support to the stem



## II. Prop roots

- Formed from the nodes on the main stem or branches of plant
- Provide additional support for the plants
- Eg. Prop roots of a maize plant grow from the nodes of the stem close to the soil surface
- Eg. Woody prop roots of the banyan trees grow out the branches and dangle vertically downward, eventually penetrating the soil and providing support to the massive branches
- Prop roots are similar to buttress roots except that they originate further up the stem rather than at the base of the plant



## III. Clasping roots

- Are aerial roots that develop from the nodes of a stem
- These roots enable a plant to climb by growing around and clasping its support
- Have many small disks that emit a glue-like substance to hold onto the support
- Eg. Money plant, pepper plant, orchids



#### IV. Tendrils

- Are slender, coiled structures which twine around a support to help the plant support its weight and climb easily
- Tendrils are thigmotropic, which means that they are sensitive to touch, this enable them to form coils around the support
- Eg . in gourds and pumpkin plants , the tendrils are modified branches



#### V. Thorns

- Thorns are modified branches and are usually found where a leaf joins a stem
- A bougainvillea plant has thorns which are used as organs of support for climbing



#### VI. Stilt roots

- Mangrove trees grow along the muddy shores of tropical countries

- Some mangrove trees have stilt roots which grow from the stems to provide additional support



### Aquatic plants

- Need supportive tissues such as water lilies and water hyacinths
- Have a lot of air spaces in their stems, leaves and roots, air spaces provide buoyancy to help them stay afloat or upright in water

### Appreciating the support system in living things

- Dolphins and whales get beached or stranded in shallow water when they are unable to support themselves and will die because their weight will crush their internal organs
- Reason why some whales get beached
  - o Suffering from infections of the inner ear which may affect their ability to navigate using echoes
  - o Topographical features lead to stranding
  - o Reflection of solar pulses
  - o Have panicked
- Ways to help beached whale
  - o Inform to marine department about the details on exact location of the stranded whales
  - o Turn the whales so that face the shore, prevent sand and water enter blowhole
  - o Allow time to feel a wave coming with their tails and close their blowhole
  - o Prevent overheating, water flippers and tails assist cooling
  - o Cover the body of the whale with wet towel to reduce burning and drying effect from sun and wind

## The crippled

- Cripple is a person who is partly or wholly unable to use one or more of his limbs
- Due to injury or disease to his muscular, skeletal or nervous system
- The person may need a cane, crutches or walking frame to provide additional support



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