Living Things Plants

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Content

ADAPTATION IN PLANTS

- Plants grow all over the world. They are of different sizes. Some grow in hot deserts, while some in cold regions.

- Plants grow not only on land but also in water. Thus, we find different kinds of plants in different natural surroundings.

- Let us study in detail about them.

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At first, we need to familiarize ourselves with two terms which we will come across often.

ADAPTATION- Plants and animals are able to change themselves slowly in order to live in their environment. This change is called **adaptation.** They modify their parts over time, so that they can live better and longer in their environment.

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Here is the second term to remember:

HABITAT- The natural home or environment of an animal, plant or other organism is called its habitat.

The habitat of a plant or an animal depends on several factors:

- climate and soil (in case of plants)
- availability of food and water
- presence of enemies, if any

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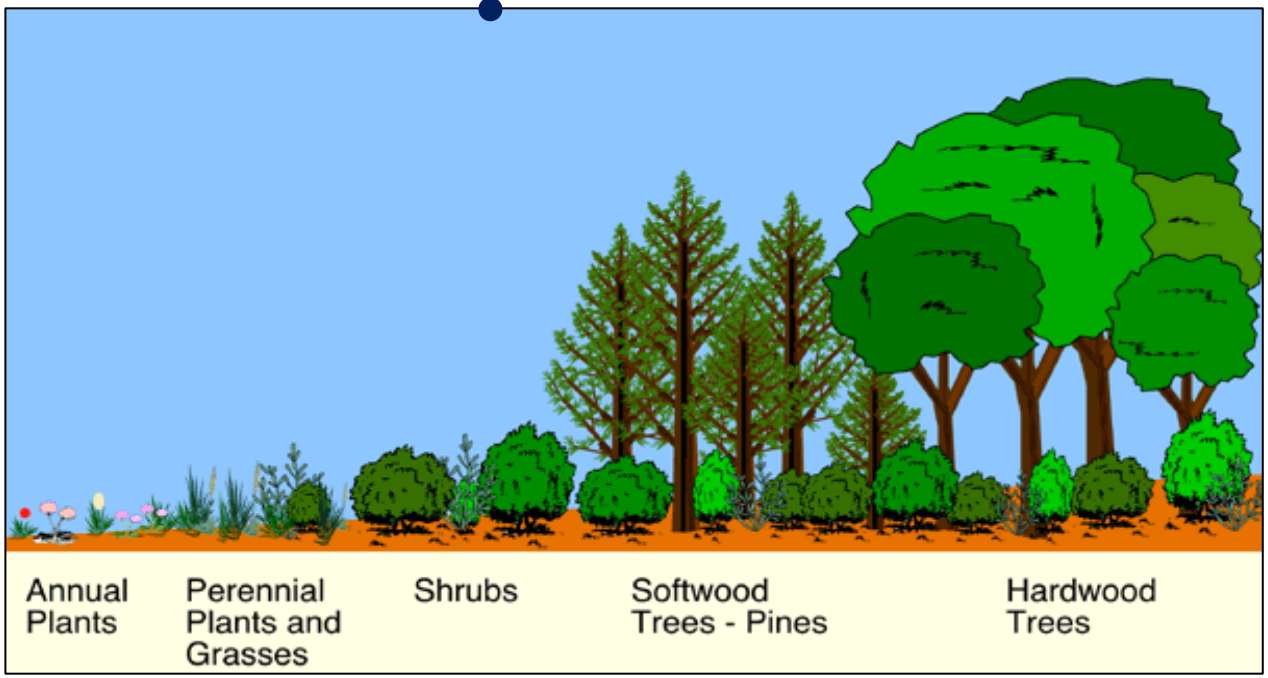
Plants grow in different places. Some grow on land and some in water.

Plants that grow on land are called **Terrestrial Plants**.

Plants that grow in water are called **Aquatic Plants.**



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AQUATIC PLANTS

Plants that grow in water are called **aquatic plants** (Aqua: water). On the basis of their features, they are classified into following the categories:

They are:
1. Floating Plants
2. Fixed Aquatic Plants
3. Under Water Plants

1. Floating plants: Some plants are seen floating on the surface of water in ponds and lakes.

How do these plants adapt themselves to float?

- Wolffia, Pistia and Duckweed Plants float due to their small size and light body.
- Water Hyacinth has swellings in its leaf stalk which help it to float.

Duckweed Plants

Water Hyacinth

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2. Fixed Aquatic Plants

How do these plants adapt to the aquatic environment?

- Some plants have roots fixed to the soil under water.
- Lotus and Water Lilies have long stems which are hollow and light that keep the leaves and flowers afloat.
- Broad leaves help in capturing the sunlight for making food.
- Wax coated leaves prevent water from entering the leaves.
- They have stomata only on the upper surface. Can you explain why?

Water Lily

Lotus

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3. Under Water Plants

Some plants grow and remain under the water.

Example: Hydrilla, Vallisneria and Pond Weed remain underwater.

- These plants have long, ribbon-like, narrow leaves.
- These leaves arise in clusters from the roots and do not have any stomata at all.
- They breathe through the body surface. They use carbon dioxide from water for photosynthesis and give out oxygen.
- These plants are introduced in aquariums. Can you guess why?

Hydrilla

Pond Weed

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TERRESTRIAL PLANTS

Some plants grow on land. They are called terrestrial plants (terrestrial : of the earth) A big country like ours has different types of climate. So, we find different types of plants growing in different places.

They have different shapes, sizes, and structures, according to their habitat.

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1. Plants of the Desert

Deserts are hot and dry places with sandy soil and very little rainfall. Hot winds blow during the day and the nights are cold. Desert plants are also called **Xerophytes**. A xerophyte is a species of plant that is adapted to survive in an environment with little water, such as a desert or an ice/snow-covered region in the Alps or the Arctic.

1. The roots are spread close to the surface of the ground and are able to absorb even the first few drops of rain.
2. The cactus plant absorbs plenty of water when it rains and stores it in the stem. The plant survives on this water for the rest of the year.
3. The stem of a cactus is green. The green stem makes food for the plant. Most cactus plants have thick and fleshy stems to store food and water.
4. Most cactus flower at night. If they were to bloom during the day, the flowers would not survive the heat of the desert.
5. Plants lose water through their leaves. A desert plant cannot afford to lose water. Thus, in cactus plants, the leaves are reduced to sharp and pointed spines to prevent loss of water. These spines also protect the plant from grazing animals.

Barrel Cactus Small

Star Cactus

Saguaro Cactus

Finger Cactus

Barrel Cactus Large

Jade Cactus

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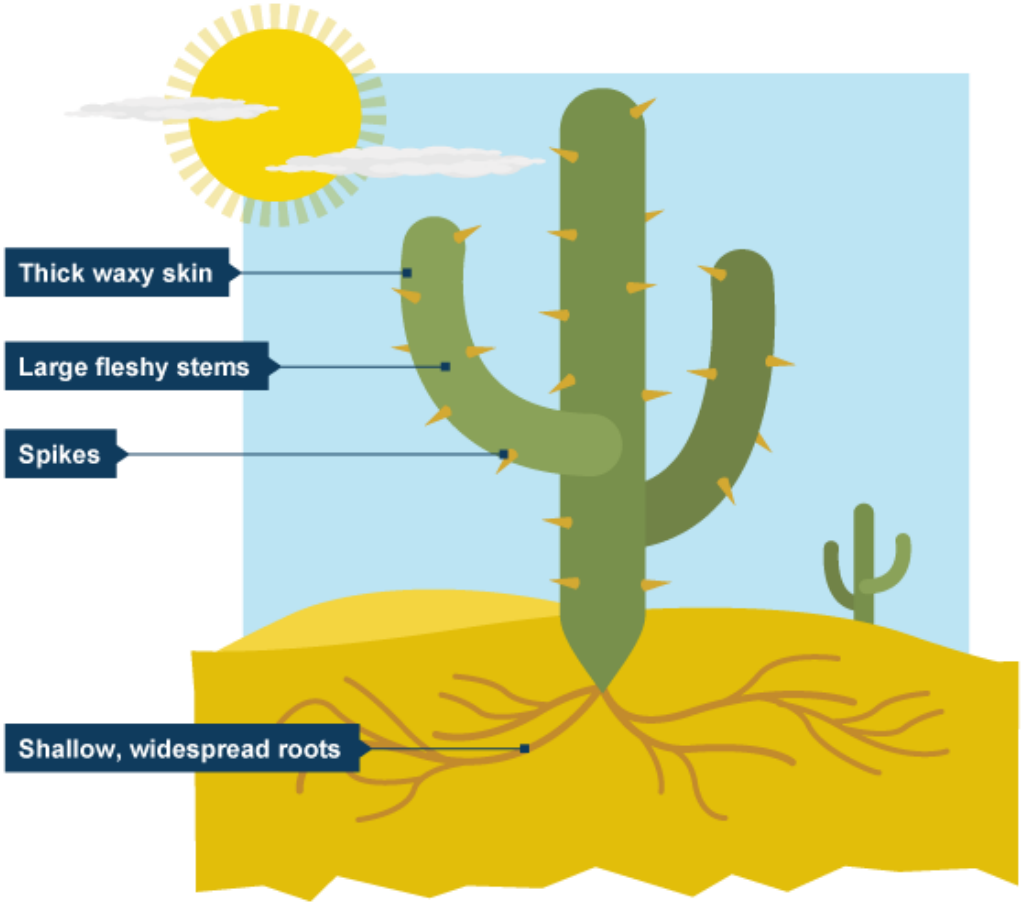
Cactus Adaptations



- Thick, waxy skin to reduce loss of water and to reflect heat
- Large, fleshy stems to store water
- thorns and thin, spiky or glossy leaves to reduce water loss
- Spikes protect cacti from animals wishing to use stored water
- Deep roots to tap groundwater
- long shallow roots which spread
- over a wide area
- Plants lie dormant for years until rain falls

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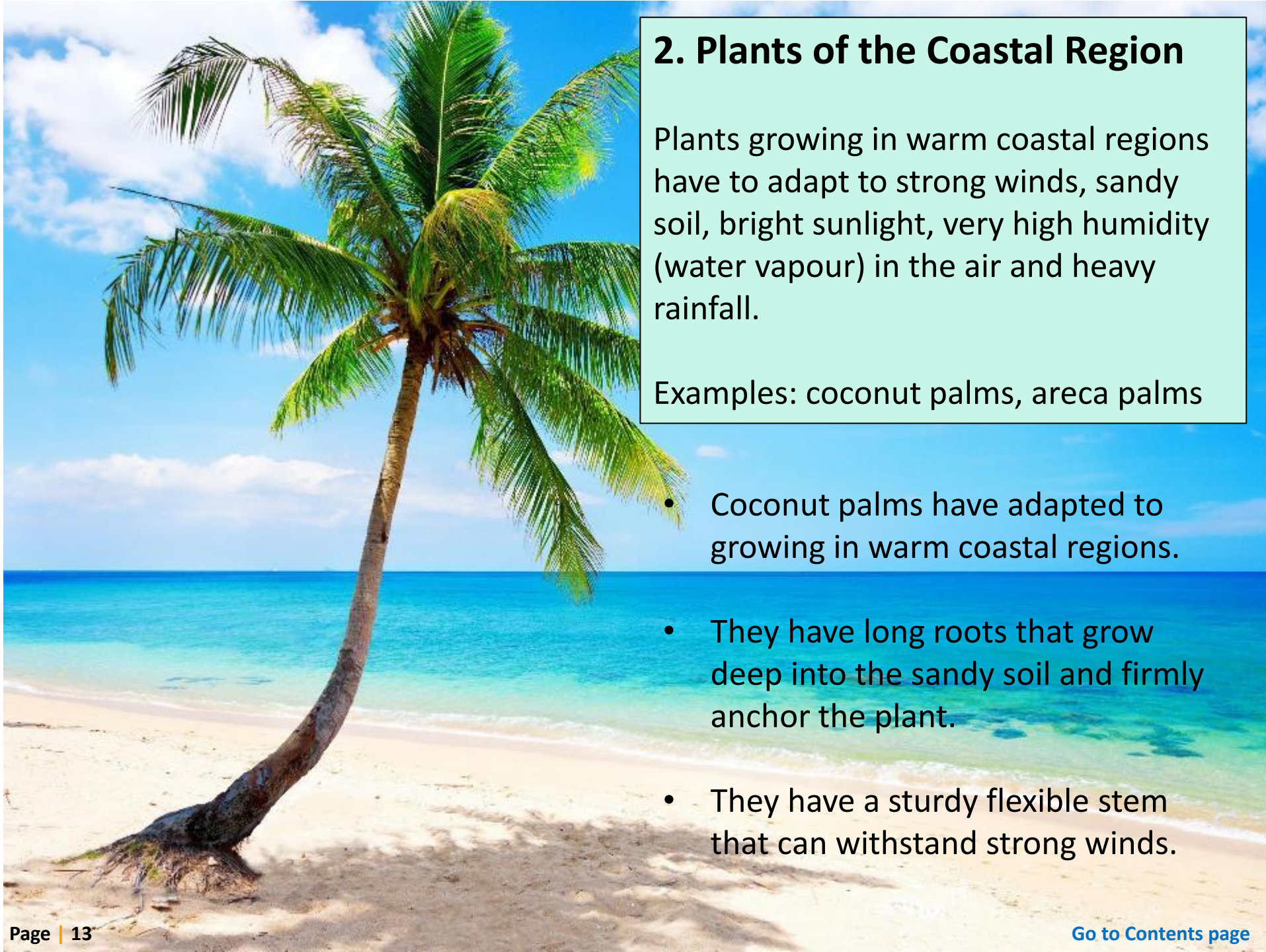

2. Plants of the Coastal Region

Plants growing in warm coastal regions have to adapt to strong winds, sandy soil, bright sunlight, very high humidity (water vapour) in the air and heavy rainfall.

Examples: coconut palms, areca palms

- Coconut palms have adapted to growing in warm coastal regions.
- They have long roots that grow deep into the sandy soil and firmly anchor the plant.
- They have a sturdy flexible stem that can withstand strong winds.

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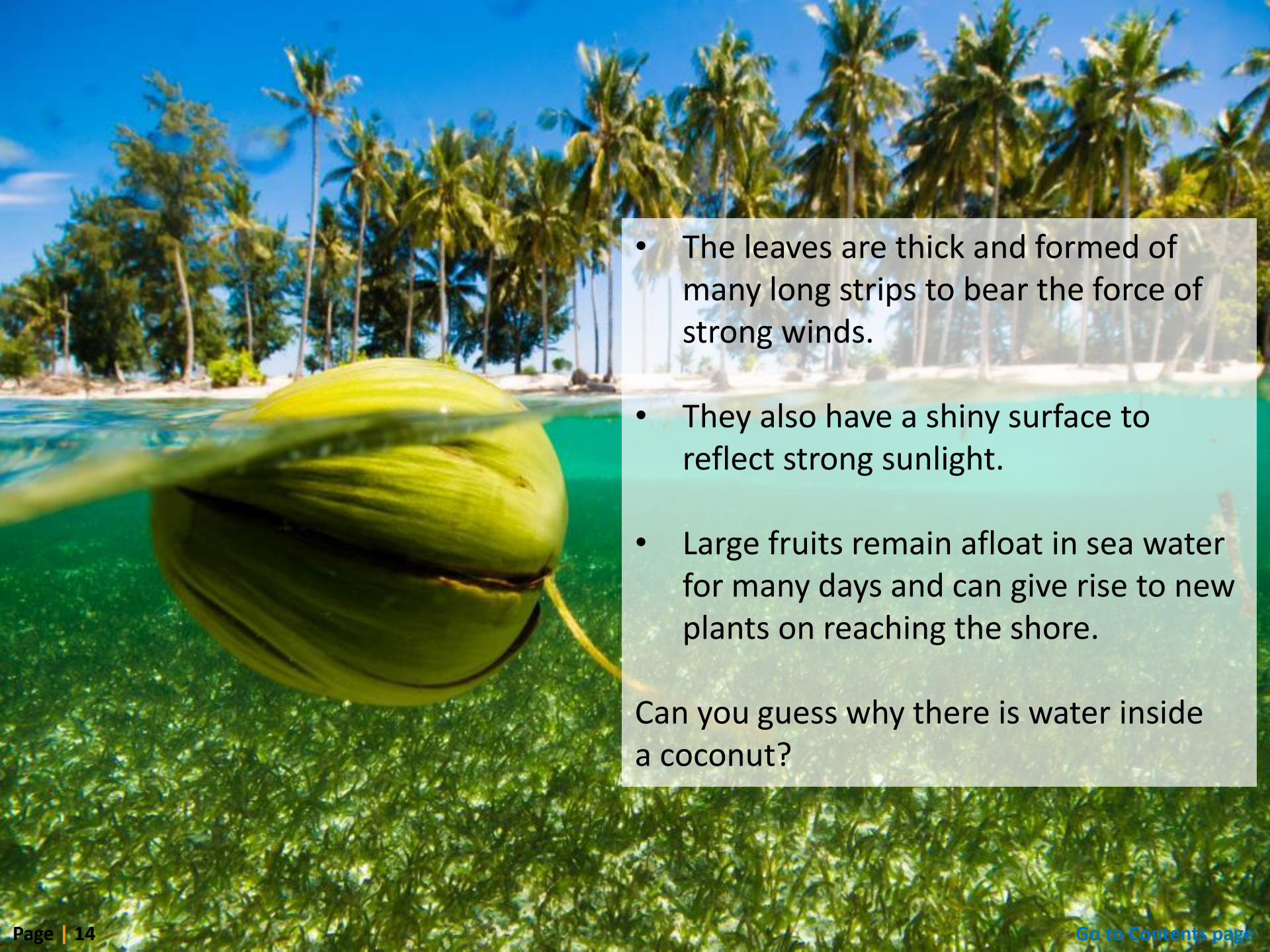

- The leaves are thick and formed of many long strips to bear the force of strong winds.
- They also have a shiny surface to reflect strong sunlight.
- Large fruits remain afloat in sea water for many days and can give rise to new plants on reaching the shore.

Can you guess why there is water inside a coconut?

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3. Plants of the Mountainous Region

In cold hilly regions, the temperature is cold and sometimes, there is snowfall.

Examples: pine, fir, deodar and spruce.

A different way of describing the Plants of the Mountainous Region.

like in Desert Plants and Aquatic Plants

Trees are tall and straight.

- Leaves are needle-like so that if there is snowfall it slides off easily.
- Instead of flowers, these trees bear cones.
- Seeds develop in these cones.
- The trees are evergreen. They do lose leaves, but each tree loses its leaves gradually and not all at once.

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ADAPTATIONS

- To withstand the cold winter conditions the trees, have a trunk with a thick bark.
- The leaves are thin and broad and are able to capture lots of sunlight.
- The leaves change colour during autumn because they stop producing chlorophyll.
- During winter, the trees shed leaves. New leaves grow again in the spring, which marks the onset of summer.

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5. Plants of the Rainforest

HABITAT

- Rainforests are forests located around the tropics, which is a zone around the equator.

- Rainforests are found in warm regions that get heavy rains throughout the year.

- Plants growing in rainforests are adapted to flooding.

- The growth of trees in a rainforest is so dense that very little sunlight reaches the forest floor.

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Rainforests produce 20% of the oxygen that all of us in the world need to breathe.

Examples: Orchids, Figs, Ebony, Mahogany, Rubber Tree, Amazon Water Lily

ADAPTATIONS

- The trees have a thin smooth bark which allows water to quickly flow towards the ground.
- The leaves have a waxy surface and drip tips. Such leaves do not hold water but make raindrops run off quickly.
- To get enough sunlight, trees in a rainforest grow very tall. Some plants climb on trees to reach the sunlight available at the top.
- A variety of shade-loving plants grow below the trees.

Why is the Amazon rainforest called the pharmacy of the world ?

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6. Plants of the Mangrove

Mangroves grow in soil that is sticky and clayey, and in areas where soil is low on oxygen and the water is salty and brackish. Example: Sundari tree found in Sunderbans in West Bengal.

ADAPTATIONS

- The trees have breathing roots also called knee roots to absorb oxygen directly from the air.
- The mangrove trees have stilt roots and prop roots that provide extra support to the trees. This feature helps the mangroves to grow well at the edge of the ocean and get a grip on the slippery soil.
- The leaves are 5 cm to 15 cm long, oval or elliptic in shape. They have smooth edges, thick leathery surfaces.
- As fresh water is limited, mangrove plants limit the amount of water they lose through their leaves by restricting the opening of the stomata.
- They also vary the orientation of the leaves to avoid the midday sun and to reduce evaporation from leaves.
- To counteract the salinity of the water salt glands are also present in the leaves.
- The flowers are pale yellow or white, inconspicuous and fragrant.
- The mangrove plant seeds are buoyant and suitable for water dispersal.

Why are the mangroves important to the coastline?

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Mangroves reduce the impact of severe weather conditions and control the flow of water

NUTRITION IN PLANTS

Have you ever looked at parks, gardens and forests carefully? They are green and beautiful. They contain plants, trees, bushes, shrubs and herbs growing around.

Why do plants have green leaves? The leaves are green in colour due to the presence of green substances called **chlorophyll**.

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Chlorophyll helps to make food for the plants. On our Earth, only plants can make their own food. So, they are known as autotrophs (Auto: self, trophs: plants). As food is made only in the green leaves, the green leaf is known as “the food factory of the plant” or “the kitchen of the plant “

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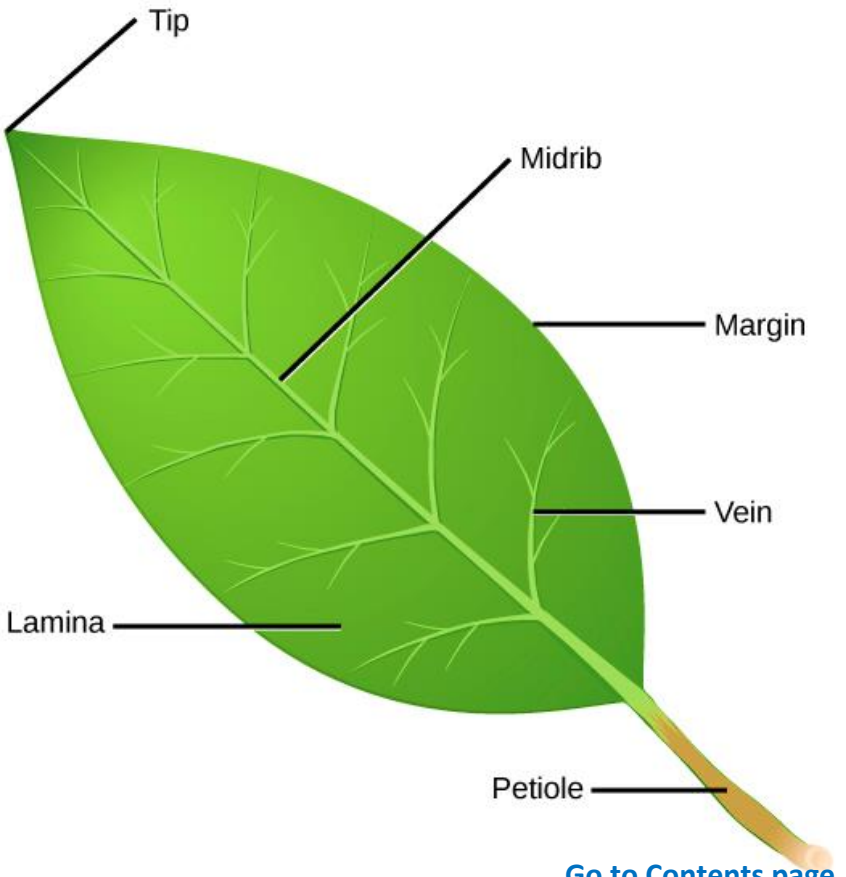
Take a leaf and look at it against the light?

What do you observe? You see a main vein running through the middle of the leaf. This is called as the Midrib. The **petiole** is a stalk that attaches a leaf to the plant stem.

There are also small veins branching out of the Midrib. These are called side-veins. Several smaller veins branch out from the side veins to form a network of veins.

The veins have two pipelines -

- One pipeline is used to bring water and minerals to the leaf from the stem.
- The other pipeline takes the prepared food from the leaf to the other parts of the plant.



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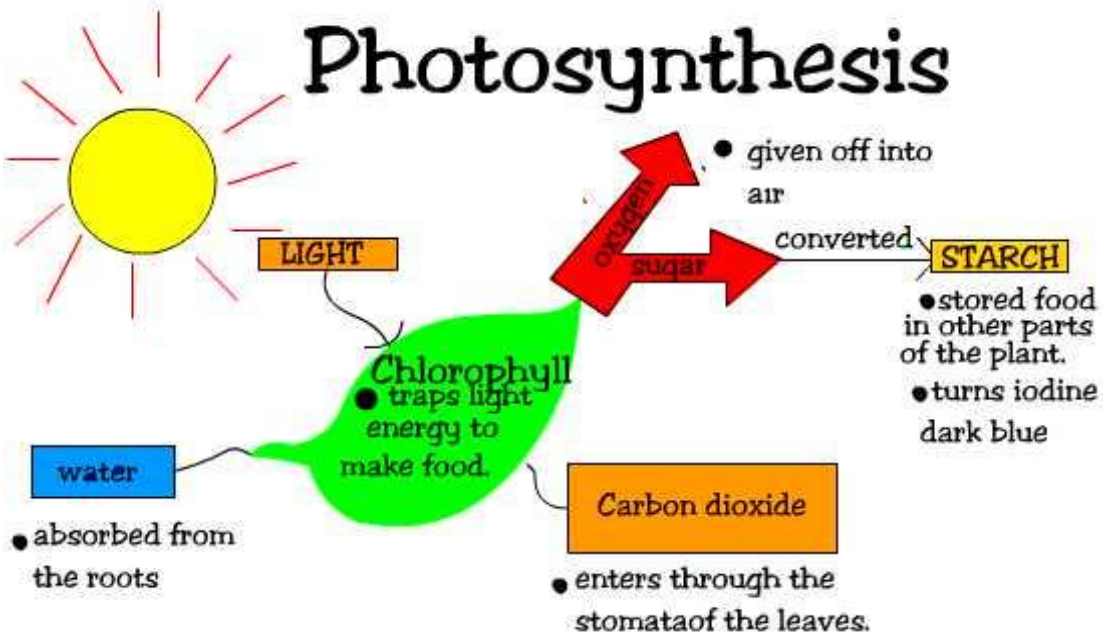
HOW DO LEAVES MAKE FOOD?

For making food, a plant gets water and minerals from the earth, and carbon dioxide from the air. The energy needed to make food is taken from sunlight. It is the chlorophyll that traps sunlight for this purpose. Leaves make food by a process called **photosynthesis**. **Photo** means **light** and **synthesis** means **putting together.**



In the presence of sunlight, green leaves mix water, minerals and carbon dioxide together to make food. This plant–food is a kind of sugar called **glucose.** When leaves make food, they give off oxygen. This process of making food by green plants is called **photosynthesis.**

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WHAT MAKES LEAVES GREEN?

Leaves have a green-coloured pigment called chlorophyll. Even leaves of plants such as crotons have chlorophyll, but it is hidden by red or yellow pigments.

Plants make food in their leaves with the help of chlorophyll.

green leaves of plants

Crotons

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How do leaves get sunlight, water and air to make food?

Sunlight

Leaves absorb the sunlight that falls on them. That is why leaves are flat. The leaves are arranged on a plant in such a way they receive enough sunlight.

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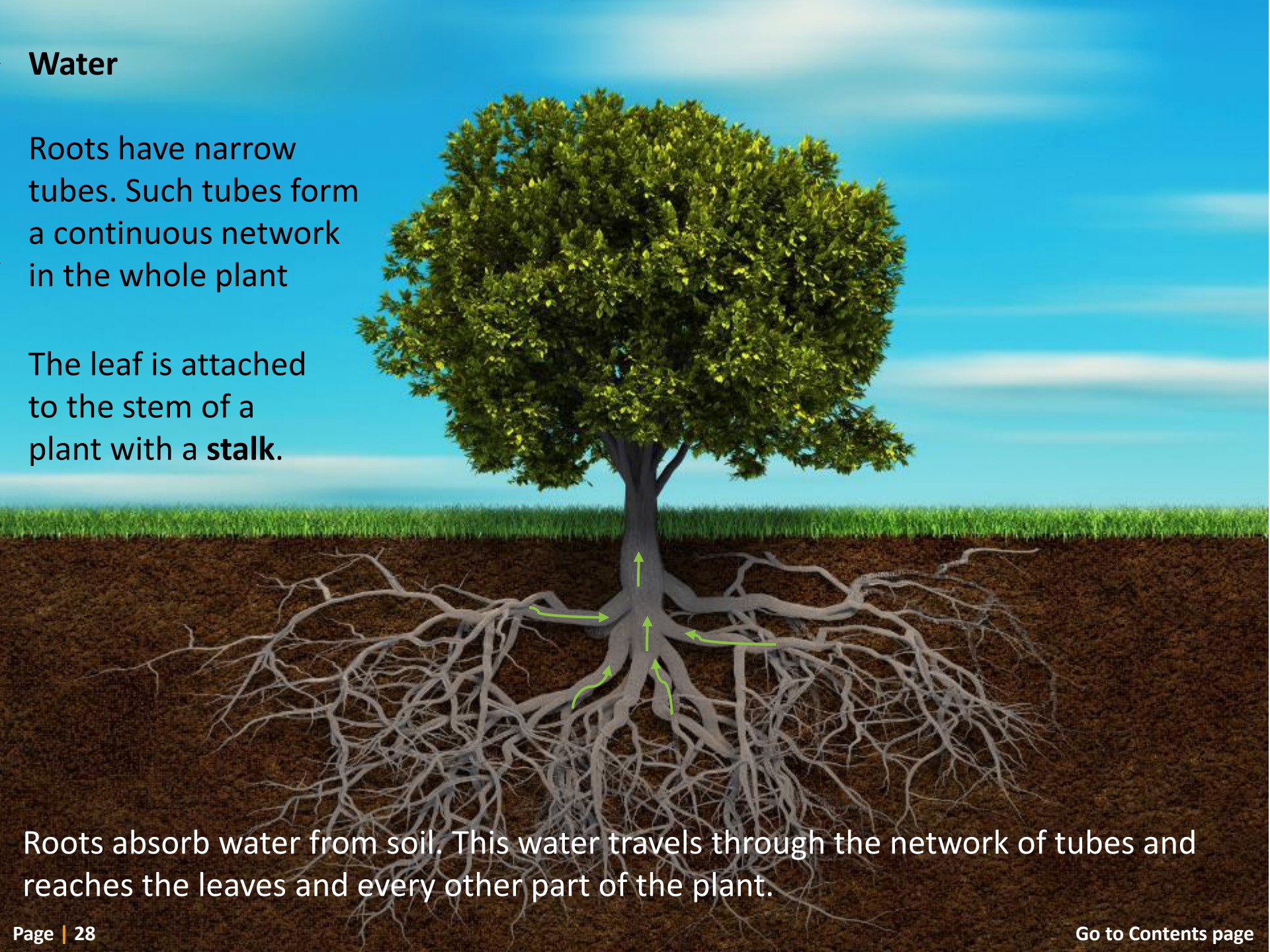
Water

Roots have narrow tubes. Such tubes form a continuous network in the whole plant

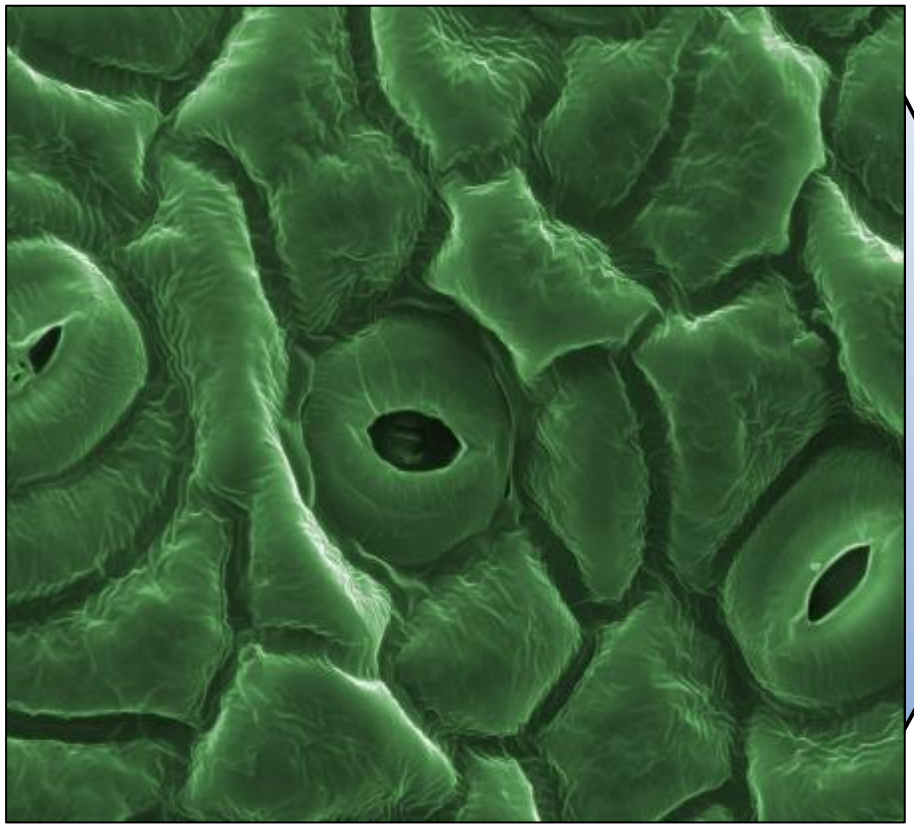
The leaf is attached to the stem of a plant with a **stalk**.

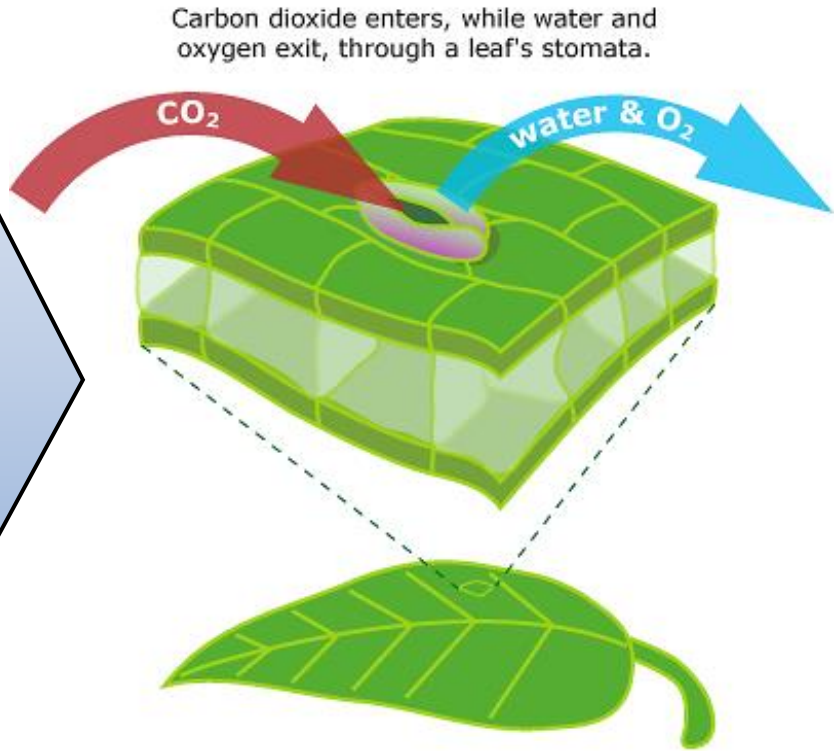


Roots absorb water from soil. This water travels through the network of tubes and reaches the leaves and every other part of the plant.

Air

You may remember from what you have learnt in grade 3 that there are tiny holes called stomata mostly found on the lower surface of the leaf. Air enters the leaf through the stomata. Leaves absorb the carbon dioxide gas present in the air to make food.





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HOW DO THE PLANTS USE THEIR FOOD?

During the process of **photosynthesis**, the food that the leaf prepares is a kind of sugar called glucose.

What happens to the food made by plants?

After using the food prepared for its own growth and repair of damaged tissues, plants store the excess food as starch in the leaves, roots, flowers, fruits and seeds.

These parts are consumed by us for their nutritive value.

For example, we eat the following parts of the plants:

roots

flowers

stems

fruits

leaves

seeds

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SOME UNUSUAL PLANTS AND THEIR FEEDING HABITS

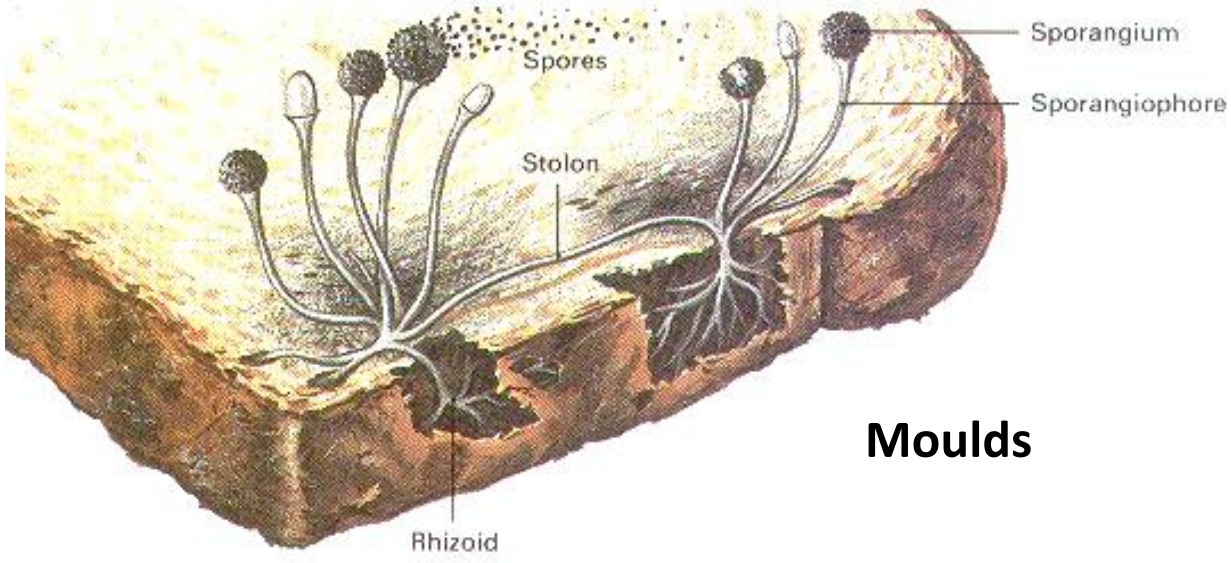
Moulds and **Mushrooms**

Moulds and **Mushrooms** are non-green plants. They do not have chlorophyll.

They cannot make their food.

They get their food from dead and decaying plants and animals.

Mushrooms



Moulds

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Crotons

The leaves of some plants like **crotons**, have **chlorophyll**, but they appear dark red in colour.

This is because the red pigment present in the leaves hides the presence of green colour of the chlorophyll.

So, such leaves can make food by the usual process of **photosynthesis.**

Dodder – a total parasite

Plants that do not make food.

Some plants like dodder, do not have chlorophyll. So, they cannot make their own food.

They depend totally on other plants for food and water. They grow on other plants and use their food and water.

Such plants are called **total parasites**. They kill the plants on which they grow.

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Mistletoe – a partial parasite

Mistletoe is a parasitic plant that grows on trees such as mango and chickoo.

It is a **partial parasite**. It has chlorophyll and makes its food but depends on other plants for water and certain nutrients.

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Plants that feed on animals

Some plants like the Pitcher plant and Venus Flytrap feed on insects. They are called insectivorous or carnivorous plants.

The Pitcher plant has a pitcher (pot-like structure) with nectar in it. The nectar attracts insects.

When an insect enters the pitcher, it touches the hair-like structures present inside the pitcher, and on being disturbed, close the opening of the pitcher by lowering the flap. The insect then gets trapped inside it. The plant secretes juices to digest the insect.

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The leaves of the Venus Flytrap looks like a flower.

They have spine-like structures around them.

When an insect enters the Venus Flytrap, it closes, and the insect is trapped inside.

Although the Pitcher plant and the Venus Flytrap feed on insects, these plants also make their own food with the help of chlorophyll in their leaves.

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MOVEMENT IN PLANTS

Different parts of the plant show movement in response to various external stimuli.

Touch, light, gravity, wind and water are the various stimuli that trigger plant movements.

Plant movements are categorized into two types.

- Tropic movements or Tropism
- Nastic movements

Tropic movement (Tropism) - It is the movement of a plant towards stimulus.

If the growth is towards the direction of the stimulus, the tropism is called positive.

If it is against the direction of the stimulus, it is referred to as negative.

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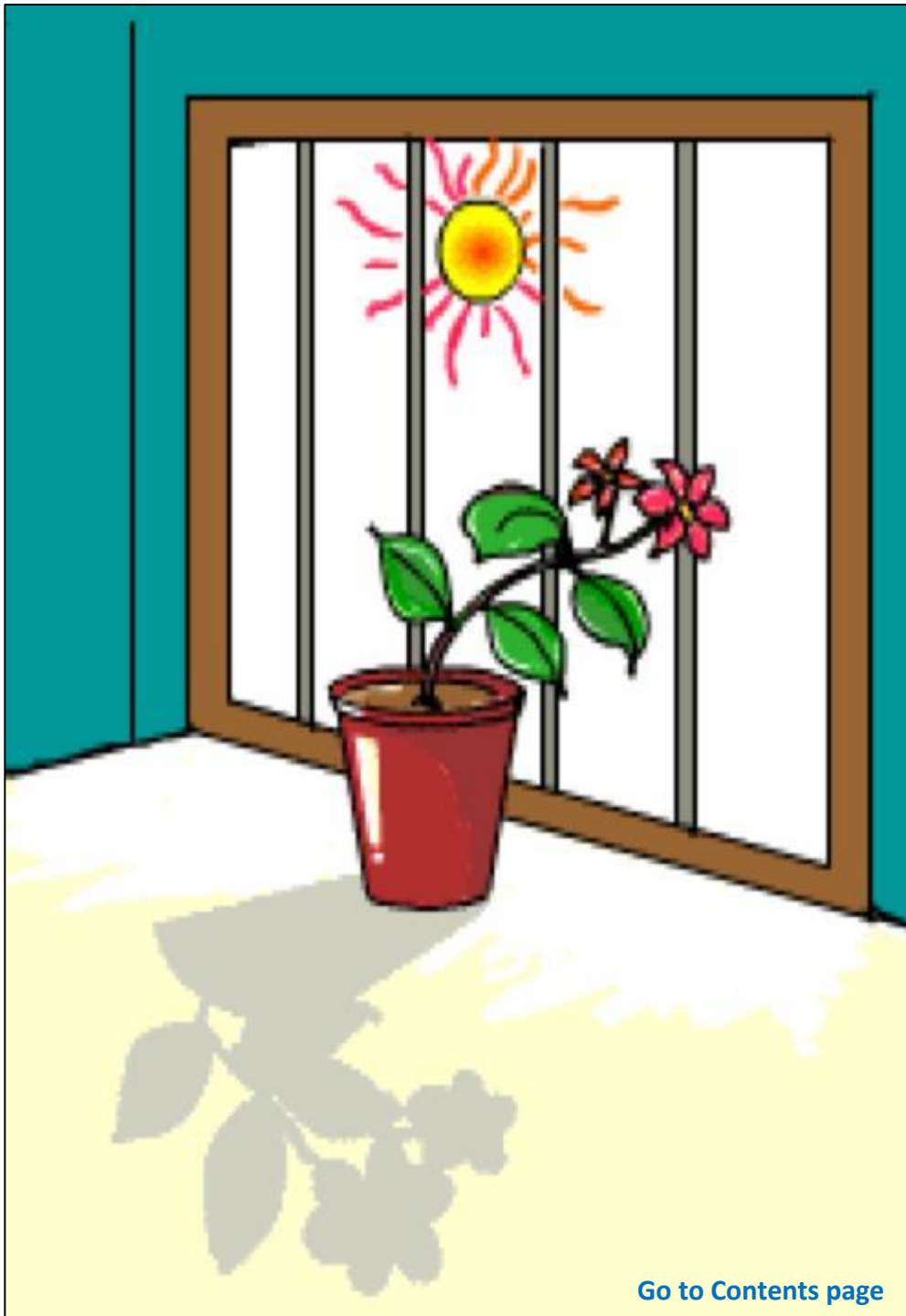
Phototropism

Plants are very sensitive to light, and the shoots tend to grow towards the light.

This type of movement in response to light is known as phototropism.

In phototropism, shoots are positively phototropic. They grow towards the light. Roots, however, are negatively phototropic. They grow away from the light.



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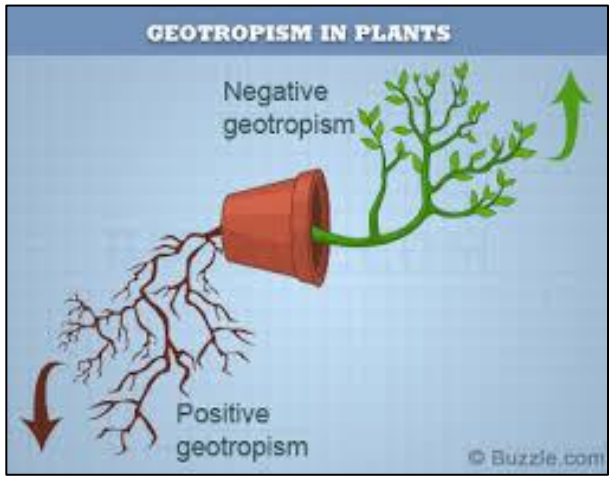
Geotropism

The roots of plants grow downward while their shoots grow upwards against gravity.

This type of plant movement in response to gravity is known as geotropism.

In geotropism, the shoot is negatively geotropic, and the root is positively geotropic. Roots display positive geotropism when they grow downwards, while shoots display negative geotropism when they grow upwards.



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Nastic movement

This kind of movement has no relation to the direction of stimulus.

Examples:

- The folding of the leaflets of sensitive plants like Touch–Me-Not.

- The closing of pitcher of insectivorous plants.

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Activities

Activity 1

1. Take a white carnation flower with a stem.
2. Make a fresh slanting cut at the end of the stem.
3. Take a vase with lukewarm water and add a little food colour to it.
4. Now place the flower in the vase.

- Observe the flower after a few hours.
- Observe the petals with a magnifying lens.
- Has the coloured water reached the petals?

Activity 2

Test for Starch

Dissolve a pinch of starch in hot water. Cool the solution. Take a few drops of this solution in a dish. Add one drop of iodine solution to it. The solution turns blue-black. It is because iodine gives a blue-black colour with starch. No other substance gives this result. We can do the iodine test on different food items to test for the presence of starch.

Vocabulary

- **Adaptations** - body features and habits that help a living thing live in its surroundings
- **Chlorophyll** - green pigment present in plants
- **Humidity** - the amount of water vapour in the air
- **Insectivorous plants** - plants that also feed on insects
- **Midrib** - the vein in the centre of a leaf
- **Nastic movement** - movement of a plant part in response to an external stimulus
- **Negative tropism** - movement of a plant away from an external stimulus

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- **Partial parasite** - plants that prepare their food but depend on other plants for water and certain nutrients
- **Positive tropism** - movement of a plant towards an external stimulus
- **Phototropism** - movement of a plant in response to light
- **Stilt roots** - roots that grow above the ground to support the plant and help it to take air
- **Te//**
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- - tiny opening or pores found on the under-surface of plant leaves that aid exchange of gases
- **Total parasite** - plants that depend on other plants for food and water

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