

4

The Living Organisms - Characteristics and Habitats



"Millions of species of plants, insects, and microorganisms are still undiscovered by humans".

Introduction

There is a large variety of things around us. Some of these are living things whereas others are non-living things.

Those things which need food, water and air for their survival are called living things. All the animals need food, water and air to survive or live, so all the animals (including human beings) are living things.

Those things which do not need food, water and air for their survival are called non-living things. For example, a table or chair do not need food, water or air to survive, so a table and a chair are non-living things.

The living things are called organisms. Thus, all the plants and animals are organisms.

Characteristics of living things

The characteristics of living things are given below:

- (i) Living things need food, air and water.
- (ii) Living things can grow.
- (iii) Living things can move by themselves.
- (iv) Living things can respond to stimuli (or changes around them). They are sensitive.
- (v) Living things respire (release energy from food).
- (vi) Living things excrete (get rid of waste materials from their body).

The study of living things (or organisms) is called biology.

SPOT LIGHT

All the living things have some common characteristics (or features) which make them different from non-living things.

SPOT LIGHT

- (vii) Living things can reproduce. They can have young ones.
 (viii) Living things have a definite life-span (after which they die).

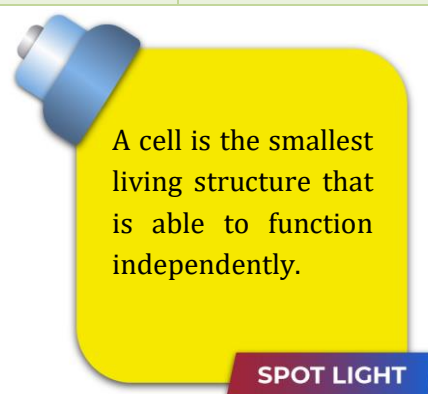


List out some animals, plants and other objects found in different habitat.

In the forest	On mountains	In the desert	In the sea	Any other?

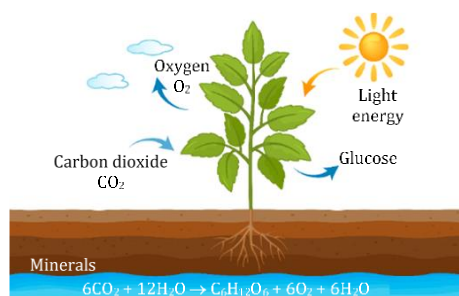
Suggested Answers

In the forest	On mountains	In the desert	In the sea	Any other?
Lion	Yak	Camel	Fishes	
Tiger	Brown Bear	Snake	Sharks	
Deer	Chiru	Spiders	Octopus	
Rabbit		Lizards	Crab	



Food

All the living things (plants and animals) need food to stay alive. They also need air and water. The plants make their own food by the process of photosynthesis. But animals obtain their food from plants or other animals. Food gives the material for growth and energy to carry out various life processes taking place inside the living things.



Photosynthesis



Food

Growth

Growth means increase in size. All the living things can grow. The young ones of all living things (plants and animals) grow and become bigger in size with the passing of time.



A seed grows to become a plant.



Animals cannot manufacture their own food. So, they are called heterotrophs (hetero-different; trophe-food).

SPOT LIGHT



A baby grows to become an adult.

All the living things grow from a 'single cell'. The growth in living things is from within the living thing (or living organism). As a living thing grows the number of cells in its body go on increasing. Non-living things do not grow.



Aim

To demonstrate growth in plants

Procedure

Sow some wheat seeds in moist soil. Keep watering them daily.

Observation

In a few days, tiny seedlings emerge from these seeds. Observe them daily. In few weeks, the seedlings become much bigger.



True or False

1. Cell is the basic unit of life.
2. All the living things need food to stay alive.
3. Green plants are called autotrophs.

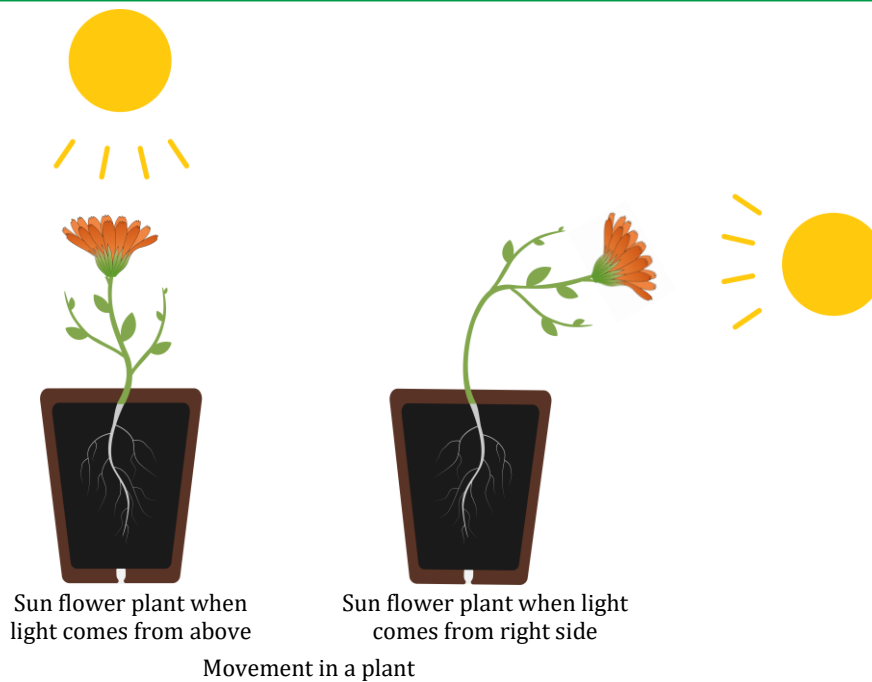
Movement

All the living things move by themselves (without any external help). Animals can move from one place to another or they can move their body parts. For example, a frog moves when it jumps into a pond.



Green plants manufacture their own food in their green leaves by photosynthesis. So, they are called autotrophs (auto-self; trophe-food).

SPOT LIGHT



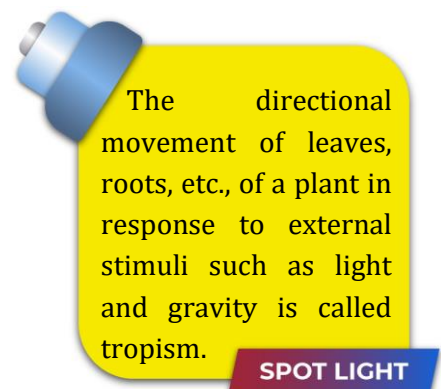
The plants are fixed in the soil at a place, so they cannot move like animals from place to place. The plants can move only parts of their body such as leaves, flowers, shoots and roots. The plant parts move towards a stimulus such as sunlight, water or gravity. Non-living things cannot move by themselves. For example, a rock is a non-living thing which cannot move by itself from one place to another.

Response to Stimuli

All the living things respond to changes around them. The changes in surrounding to which living things respond are called stimuli ('stimuli' is the plural of stimulus). The living things show response to external stimuli such as heat, light, touch, sound, smell, taste, water and chemicals. For example, if a man touches a very hot object accidentally, he quickly pulls his hand away from the hot object. In this case, the stimulus is heat and the man responds by moving his hand away from the hot object.



Movement in an animal (Frog Jumps)



	Stimuli	Phenomenon of response
(1)	Water	Hydrotropism
(2)	Temperature	Thermotropism
(3)	Light	Phototropism
(4)	Gravity	Geotropism
(5)	Touch	Thigmotropism



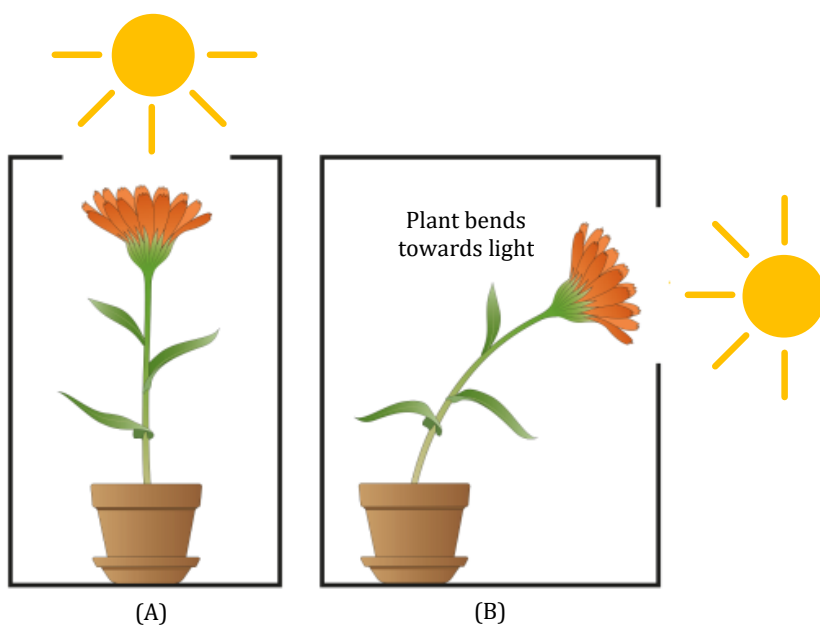
Aim

Place a potted plant in a room a little away from a window through which sunlight enters some time during the day. Continue watering the plant for a few days. Does the plant grow upright, like plants out in the open? Note the direction in which it bends, if it is not growing upright. Do you think, this may be in response to some stimulus?

All living things respond to changes around them.

Plants respond to light. If a potted plant is kept in the open space, the stem of plant grows straight up towards the source of light "sun".

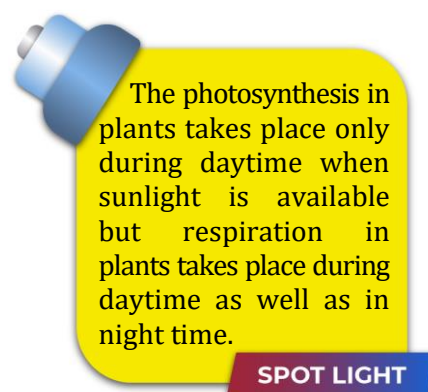
Non-living things do not respond to changes in their surroundings. For example, a rock is a non-living thing which does not respond to stimuli like heat, light, touch, sound and smell etc.



(A)

(B)

Plant responds to stimuli (Light)



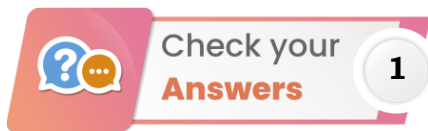
SPOT LIGHT



What happens if we move from a dark room into bright sunshine suddenly?

Explanation

While coming out from a dark room to bright sunshine suddenly, our eyes feel a glaring effect. This is due to the reason that in dark room the pupil is dilated, so when we come out in bright light, a large amount of light enters our eyes, and we feel glare. But after sometime, the pupil responds by contracting and we are able to see clearly as less light enters our eyes now.

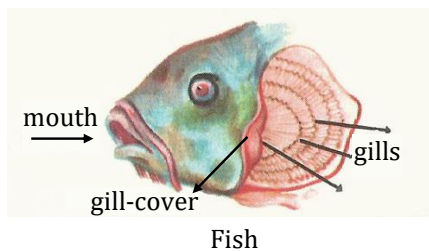
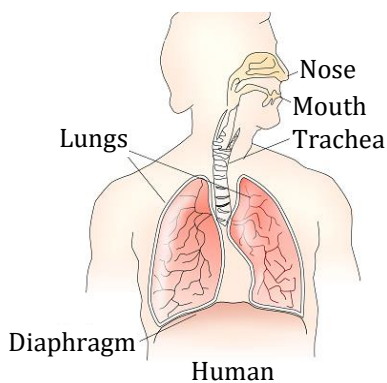


1. True 2. True 3. True

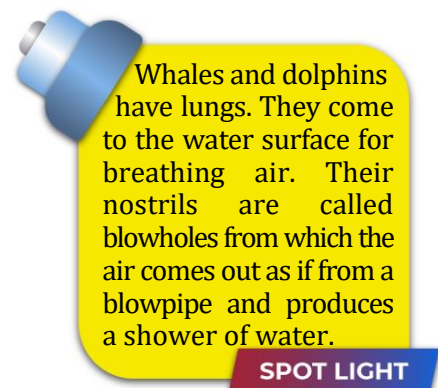
Respiration

All the living things need energy to grow, move and stay alive. They get this energy from food through respiration. Respiration is the chemical process in which food taken by an organism combines with oxygen to release energy. This energy is used by the organism to carry out its various life processes. All the living things (plants and animals) undergo respiration to obtain energy from food.

In humans, the process of taking air into the lungs through nose and then expel it through nose is called breathing. The purpose of breathing in air is to provide oxygen to our body for carrying out respiration.



Breathing organs in different



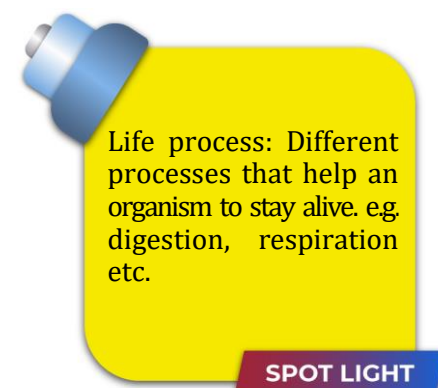
The earthworm breathes through its skin. So, the earthworm absorb oxygen (or air) needed for respiration through its thin and moist skin having good blood supply.

The fish has special organs of breathing called gills. The fish breathes by taking in water through its mouth and sending it over the gills. When water passes over the gills, the gills extract dissolved oxygen from this water. The carbon dioxide produced during respiration is also expelled by the gills into the surrounding water.

The exchange of gases (oxygen and carbon dioxide) in plants during respiration takes place through the tiny pores in their leaves called "stomata".

Plants use oxygen for respiration and release carbon dioxide.

The oxygen (of air) enters the plant leaves through stomata and utilized in respiration. The carbon dioxide produced during respiration inside the plant is also expelled from the leaves through stomata. Non-living things do not respire. For example, a rock is a non-living thing which does not undergo respiration.



Excretion

The living things produce some waste materials in their bodies during the various life processes. Many of these waste materials are poisonous to the living things so they have to be removed. The removal of waste substances from the body of a living organism is called excretion. All the living things get rid of wastes from inside themselves.

Some harmful or poisonous waste materials are also produced in plants. Some plants remove their waste products as secretions.

Non-living things do not excrete.

Reproduction



Human beings and some other animals reproduce by giving birth to babies.

The process by which living organisms produce new members of their species is called reproduction.

Some animals reproduce by giving birth to their young ones whereas some animals reproduce their young ones through eggs. For example, human beings reproduce by giving birth to babies. The animals such as dogs, cats, cow, horse, deer, lion and tiger etc., also reproduce by giving birth to their young ones. The animals like birds and fish reproduce through eggs. Birds lay eggs which on hatching produce young ones. When these eggs are hatched, young ones (baby birds) come out of these eggs.

Some plants reproduce through cutting : A small part of a plant which is removed by making a cut with a sharp knife is called a cutting. A cutting may be a piece of stem, root or even a leaf. The cutting should be made in such a way that there are some buds (growing points) on it. In this method, a cutting of the existing plant (say, of stem or shoot) having some buds on it is taken and its lower part is buried in the moist soil.

After a few days, the cutting develops roots and grows into a new plant. The plants such as rose, henna (mehndi), grapes, sugarcane and cactus, etc. can be grown by the cutting method.

All living things remove metabolic waste products. In animals, it is called excretion and in plants it is secretion.

SPOT LIGHT

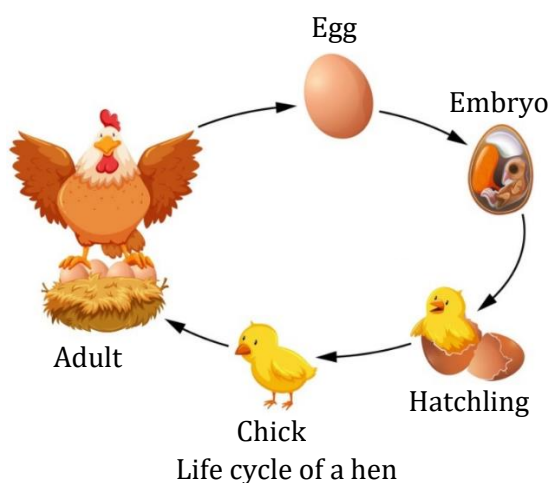
Egg-laying animals are called oviparous and animals which give birth to young ones are called viviparous.

SPOT LIGHT

What is life ?

Push your hand deep inside a sack of wheat. Do you find it is warm inside? There is some heat being produced inside the sack of wheat. The seeds respire and in that process give out some heat. We see that respiration is a process that takes place in seeds even when some of the other life processes may not be very active. It may not be very easy to answer our question – "what then is life"? However, looking at all the diversity of living beings around us, we can conclude that "life is beautiful"!

All living things follow a cycle of growth & development by which an organism takes birth, grows into an adult, gets old and dies. This is known as the life cycle of organism.

SPOT LIGHT

Life cycle of a hen



A new plant grows from a bud of potato

**What are the differences between living and non-living things?****Explanation****Differences between Living and Non-Living Things**

Living things		Non-living things	
1	Living things need food, air and water.	1	Non-living things do not need food, air and water.
2	Living things grow.	2	Non-living things do not grow.
3	Living things can move on their own.	3	Non-living things cannot move on their own.
4	Living things respond to stimuli (changes around them). They are sensitive.	4	Non-living things do not respond to stimuli. They are not sensitive.
5	Living things reproduce.	5	Non-living things do not reproduce.
6	Living things respire. They release energy from food.	6	Non-living things do not respire.
7	Living things excrete. They get rid of waste materials from their body.	7	Non-living things do not excrete.
8	Living things have a definite life-span after which they die.	8	Non-living things exist forever.



Check your
Concepts

2

1. Do all the living organisms show all the characteristics of life all the time?



Check your
Answers

2

1. No, it is not necessary. For example, seeds are living and are stored for months. But neither they grow nor reproduce, nor move nor feed. When these seeds are sown in the soil, they germinate and grow into whole plants. Also, when they are stored, they respire without air (anaerobically).



All that surrounds living things & affects their growth & development is called their environment (environ - to surround).

SPOT LIGHT

Differences between plants and animals

Plants		Animals	
1	Green plants make their own food by the process of photosynthesis. (Autotrophic nutrition)	1	Animals get their food from plants or other animals. (Heterotrophic nutrition)
2	Plants do not move from place to place since they lack organs for locomotion.	2	Animals move from place to place since they have organs for locomotion.
3	Plants grow throughout their life. (Unlimited growth)	3	Growth in animals is limited up to a certain period.
4	Plants show growth at the tips of shoots and roots. (Localised growth)	4	Animals show uniform growth in their body. (Diffused growth)
5	Plants lack sense organs and they show slow response to external stimuli.	5	Animal have sense organs and show quick response to external stimuli.
6	Plant cells have cell wall and chloroplasts.	6	Animal cells do not have cell wall and chloroplasts.

Habitat

All the living organisms (plants and animals) prefer to live in those places which are best suited to their needs. The place (or surroundings) where a plant or animal lives is called its habitat. A habitat provides food, water, air, light, shelter (protection) and a place for breeding to the plants and animals living in it. All the habitats can divided into two main groups :
Terrestrial habitats and Aquatic habitats.

Terrestrial habitats

A land based habitat is called a terrestrial habitat. Some of the examples of terrestrial habitats are: Desert, Mountains (or Hills), Forest, Grassland, Garden, Field, Soil and Homes.



Water dissolves vital gases like oxygen and Carbon dioxide and allows sun light to penetrate water bodies. This enables living beings to survive in water.

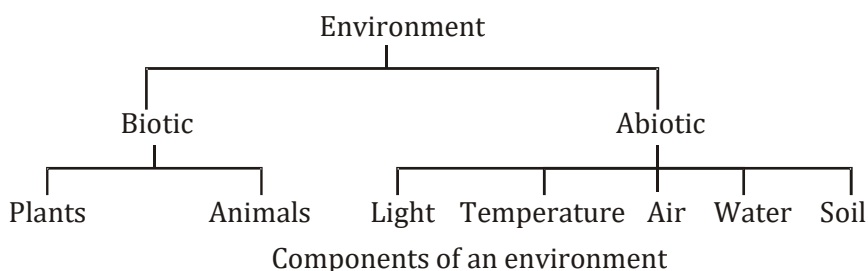
SPOT LIGHT

Aquatic habitats

A water based habitat is called an aquatic habitat. Thus, the plants and animals which live in water are said to live in an aquatic habitat. Some of the examples of aquatic habitats are Pond, Lake, River, Swamps (an area with water logged ground) and Oceans (or Sea).

Components of a habitat

A habitat does not consist of only living organisms. In a habitat, soil, water, air, light, temperature and many other components of physical environment are also present. Thus, a habitat includes both biotic and abiotic components of the environment.



In nature biotic and abiotic components are closely interrelated.

SPOT LIGHT

Biotic components

The term "biotic" means "living". So, the living things in a habitat are its biotic components. The living things in a habitat are plants, animals and micro organisms.

Abiotic components

The term "abiotic" means "non-living". So, the non-living things in a habitat are its abiotic components. The various non-living things in a habitat are soil, rocks, air, water, sunlight and temperature etc.



Aim

To show the effect of some abiotic factors on the germination of seeds to form young plants.

Procedure

Take a small heap of moong seed.

- (i) Keep some dry moong seeds in a sunny room (where sunlight is available).
- (ii) Keep some moong seeds completely submerged in water for a few days.
- (iii) Soak some moong seeds in water for a day, then drain out water.
 - (a) Keep some soaked and wet moong seeds in sunlight for a few days.
 - (b) Keep some soaked and wet moong seeds in a completely dark place for a few days.
 - (c) Keep some soaked and wet moong seeds in a very cold place like a refrigerator (or with ice around them) for a few days.

Many plants and animals develop special body parts that help them to survive in their habitat. Such changes are termed modification.

SPOT LIGHT

Observation

- (i) After a few days we will observe that the dry moong seeds do not germinate at all showing that water (or moisture) necessary for the germination of seeds to grow into plants.
- (ii) The moong seeds kept completely submerged also do not germinate showing that air is also necessary for the growth of plants.
- (iii)
 - (a) The wet moong seeds kept in sunlight germinate and grow maximum.
 - (b) Those kept in dark do not grow much showing that sunlight is necessary for the growth of plants.
 - (c) The wet moong seeds kept in a very cold place (like a refrigerator) grow very, very slowly showing that temperature (heat or warmth) is necessary for the growth of plants.

Conclusion

Abiotic factors such as water, air, sunlight and temperature (or heat) are very important for the growth of plants. In fact, these abiotic factors are very important for the existence of all living organisms, plants as well as animals.

Adaptations

A living thing can survive in a particular habitat, if its body is suited (or adapted) to the conditions or environment of that habitat. Plants and animals develop special characteristics or features in their body in order to survive in their habitat (or surroundings). The presence of specific body features (or certain habits) which enable a plant or an animal to live in a particular habitat is called adaptation.

There are some changes that can happen in an organism over a short period of time to help them adjust to some changes in their surroundings. For instance, if we live in the plains and suddenly go to high mountain regions, we may experience difficulty in breathing and doing physical exercise for some days. We need to breathe faster when we are on high mountains as there is lower levels of oxygen in air. After some days, our body adjusts to the changed conditions on the high mountain. Such small changes that take place in the body of a single organism over short periods, to overcome small problems due to changes in the surroundings, are called acclimatisation. These changes are different from the adaptations that take place over thousands of years.

Some terrestrial habitats and their adaptations

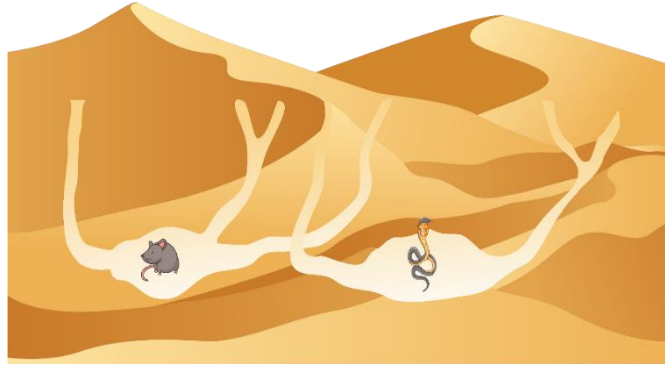
Some of the important terrestrial habitats are

1. Deserts
2. Mountain regions and
3. Forests (or Grasslands)

1. Deserts**Adaptation in desert animals**

The animals like desert rats and desert snakes survive in the hot desert having lack of water due to the following adaptations :-

- (i) They live in burrows. During the daytime, the desert rats and snakes dig deep burrows in the sand and stay in them when it is very hot. The burrows stay cool during the day and hence protect these animals from the sun's heat as well as loss of water from their body. The desert rats and desert snakes come out of the burrows only during cool night in search of food.



Desert rats and desert snakes live in burrows during hot day time



Camel



How the camel is adapted to survive in the desert environment?

Explanation

Camel lives in hot desert where water is scarce. The body structure of a camel helps it to survive in desert conditions. Camel is adapted to live in a desert because of its following special features -

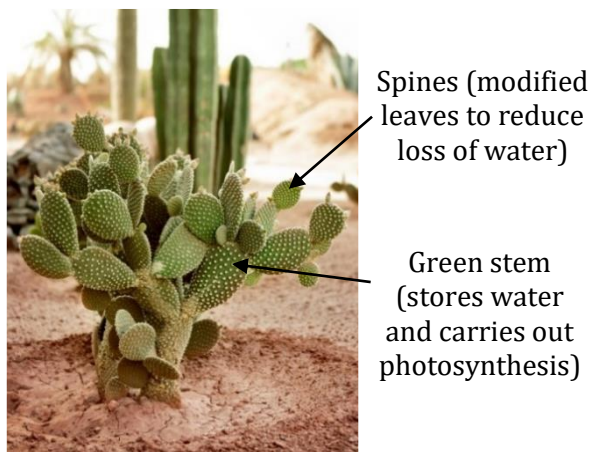
1. The camel has long legs which help to keep its body away from the hot sand in the desert.
2. A camel can drink large amount of water (when it is available) and store it in the body.
3. A camel's body is adapted to save water in the dry desert as follows : A camel passes small amount of urine ; its dung is dry and it does not sweat.
4. A camel's hump has 'fat' stored in it. In case of emergency, a camel can break down stored fat to obtain water.
5. A camel has large and flat feet which help it to walk easily on soft sand (by preventing it from sinking into soft sand).

Adaptations in desert plants

Some of the adaptations which help the desert plants to survive in hot and dry environment of a desert are as follows :

- (i) The leaves in desert plants are either absent, very small or present in the form of spines (thorns). This helps in reducing the loss of water from the leaves through transpiration.

- (ii) Since the leaves of desert plants are either absent, very small or form spines the stems of desert plants are modified to perform the function of leaves. Thus, in desert plants photosynthesis is usually carried out by their green stem.
- (iii) The stems of desert plants are modified for storing water. The stems of desert plants are also covered with a thick waxy layer (called cuticle) which prevents the loss of water from it.
- (iv) Most of the desert plants have long roots which go deep into the soil for absorbing water.



Spines (modified leaves to reduce loss of water)

Green stem (stores water and carries out photosynthesis)

Cactus

Adaptations in mountain regions

The mountain habitats are usually very cold and windy.

Adaptation in mountainous plants

There is lot of rain in mountain regions. It is very cold during winter and snowfall may also occur. The rain and snow may damage the mountain trees and plants.

The trees can survive in extremely cold and windy mountain habitats due to the following adaptations :

- (i) The trees in mountain are usually cone-shaped having sloping branches. This shape of the mountain trees make the rain-water and snow to slide off easily without damaging the branches and leaves.
- (ii) Many mountain trees have small, needle-like leaves due to which these leaves lose very little water in windy conditions. The needle like leaves have a thick waxy layer to reduce the loss of water through transpiration and to protect them from damage by rain and snow.



Mountain trees

Adaptation in mountainous animals

The animals living in mountain habitats are also adapted to the extremely cold environment present there.

Adaptation in yak :

Yaks have long hair on their body to protect them from cold by keeping them warm.



Yak

Adaptation in mountain goat:

- (i) The mountain goat has long hair to protect it from cold and keep it warm.
- (ii) The mountain goat has strong hooves for running up the rocky slopes of mountain for grazing (The hard and rough feet of an animals are called hooves).



Mountain goat

Adaptation in snow leopard :

Snow leopard lives in mountains where snow is present. The snow leopard is adapted to live in extremely cold places having snow as follows:

The snow leopard has thick fur on its body. This fur protects the snow leopard from cold and keeps it warm. The snow leopard has also fur on its feet and toes. This protects its feet from cold when it walks on the snow.



Snow leopard

Adaptations in forests and grass land

The adaptations in lion and deer to the forest habitat are described below:

Adaptation in Lion

- (i) The lion has long, strong and sharp claws in its front legs to catch its prey. The lion can withdraw the claws inside the toes so that they do not become worn out and blunt when it walks.
- (ii) The lion has eyes in front of its head which enable it to have a correct idea of the location of its prey. This helps it in catching the prey.



Lion

- (iii) The lion is light brown in colour. The light brown colour helps the lion to hide in dry grassland (without being noticed) when it hunts for prey.

Adaptation in Deer

The deer is a herbivorous animal which eats only the plant material as food. The deer is adapted to the forest habitat in the following ways :



Deer

- (i) The deer has eyes on the sides of its head which enables it to see in all directions at the same time. The all round vision of deer helps it to see its predator animals like lion (which kill it), in all the area around it.
- (ii) The deer has big ears. The big ears help the deer to hear the movements of predators very easily.
- (iii) The speed of deer helps it to run away from the predators (like lion) which try to catch it.
- (iv) The deer has brown colour. The brown colour of deer helps it to hide in dry grasslands without being noticed by lion etc.
- (v) The deer has strong teeth for chewing hard plant stems of the forest.

Adaptations in aquatic habitats

Some aquatic habitats

The important aquatic habitats are

1. Oceans

Many sea-animals have streamlined bodies to help them move in sea water easily.

2. Ponds, lakes and rivers

Ponds, lakes and rivers are "fresh-water" aquatic habitats. The plants which grow in water are called aquatic plants.



How many types of aquatic plants are there? Explain.

Explanation

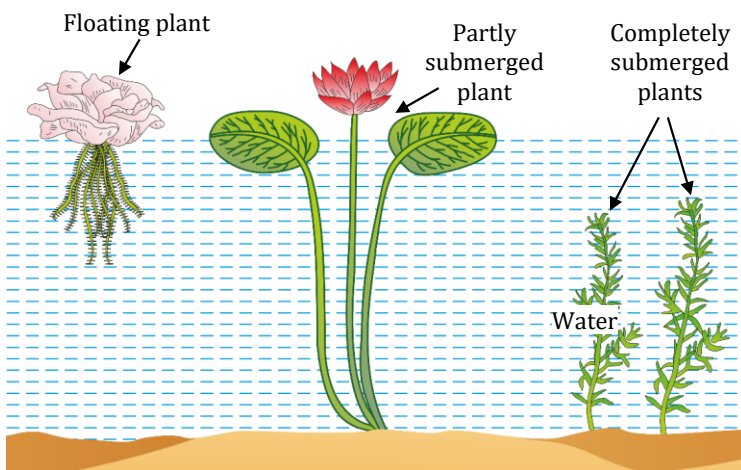
There are three types of aquatic plants (or water plants). These are described below :

- (a) Some aquatic plants float on the surface of water. e.g. water-lettuce and water hyacinth.
- (b) Some aquatic plants are partly submerged in water. The roots are fixed in the soil below water at the bottom of pond, lake or river. The stems of such plants grow up to the surface of water while the leaves and flowers float on the surface of water. e.g. water lily and lotus.
- (c) Some aquatic plants are completely submerged in water. The roots of submerged plants are also fixed in the soil below water at the bottom of pond, lake or river. All the parts of such plants (including stem, branches and leaves) grow under water. e.g. Hydrilla and Vallisneria.

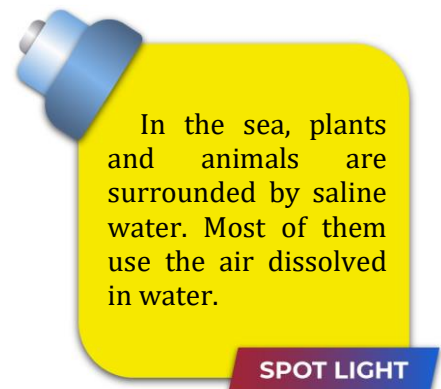
Adaptations in aquatic plants (or water plants)

The aquatic plants show a number of adaptations. Some of the adaptations are as follows :

- The aquatic plants have very short and small roots whose main function is to hold the plant in place. All the parts of an aquatic plant are surrounded by water, so an aquatic plant can absorb water and dissolved minerals directly from the surface of their stems, branches and leaves.
- The stems of aquatic plants are soft, hollow and light, having large spaces filled with air. The aquatic plants do not need strong stems because the surrounding water of a pond, lake or river keeps them up.
- The submerged aquatic plants have narrow and thin ribbon-like leaves which can bend in the flowing water of rivers and streams and hence do not obstruct the flow of water.



Types of Aquatic plants



SPOT LIGHT



**Building
Concepts**

5

How the frog is adapted to live in water and on land?

Explanation

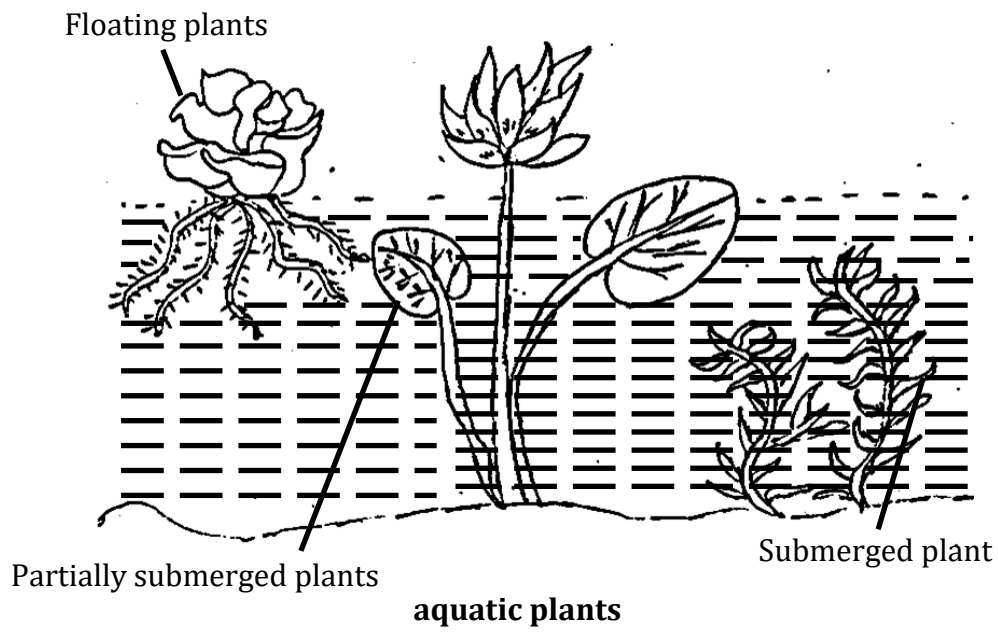
The animal like frog have ponds as their habitat. Frogs can live inside water as well as on land near the pond.

- Frogs have webbed back feet which help them to swim in water. This adaptation helps the frogs to live life in water.
 - Frogs have strong back legs for leaping (jumping) and catching their prey. This adaptation helps the frogs to live life on land.
- Some sea-animals like squids and octopus do not have streamlined body shape. But when squids and octopus move in sea-water, they make their body shape streamlined. Such animals stay deeper in the ocean near the sea-bed and catch any prey that moves towards them.

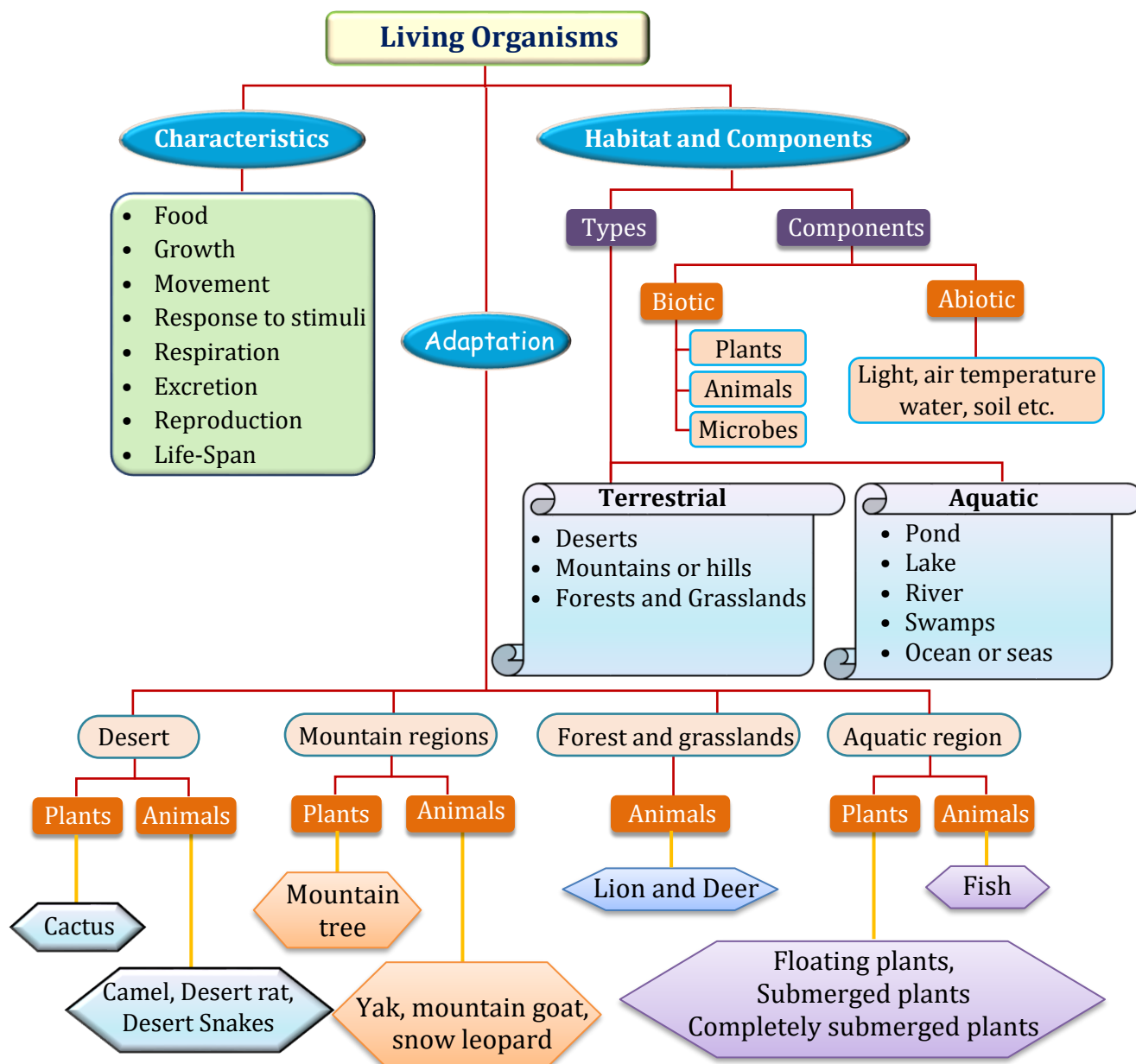


Frog

Biology Diagrams made Easy



Chapter At a Glance



SOME BASIC TERMS

1. **Adaptation** : The ability of living organisms to adjust themselves to their surroundings
2. **Aquatic habitat** : Habitat with water.
3. **Biotic component** : Living things in an surrounding .
4. **Excretion** : removal of metabolic waste.
5. **Growth** : Increase in mass and size of a body.
6. **Habitat** : Natural environment where an organism lives.
7. **Living** : Being alive.
8. **Reproduction** : Giving birth to young ones.
9. **Respiration** : Burning of food.
10. **Stimulus** : Any change in environment.