Unit 8

Adaptation

Go out of your classroom and note down the names of living organisms found around you.

Now, note down the names of those organisms which are not found around you but you known know them. Like crocodile, tiger etc....

Now, classify those both types of organisms in the following table :

Flying live elements in the sky	Live elements swimming in the water	Live elements living on land

- Bony animals, which can fly in the air are known as avions.
- Animals living in the water are known as aquatic animals.
- Animals living on land are known as terrestrial animals.

- Animals whose forelimbs are converted into wings and those who have bones are known as avains. Bee - mosquito are classified as insect.
- Bat has wings. It can fly in the air. It possesses bones. It gives birth to young ones (not laying eggs). Hence it is classified as mammal.

Frog can live on land as well as in water. How shall we classify them ?

Animals which can live on land as well as in water are known as amphibians. Give some names of other amphibians you have seen.

Gather some more information from the book 'Animal World' bringing it from your school library.

Do you ever think about that, why did the nature do so ?

Nature has kept some animals on land and kept some flying in the air.

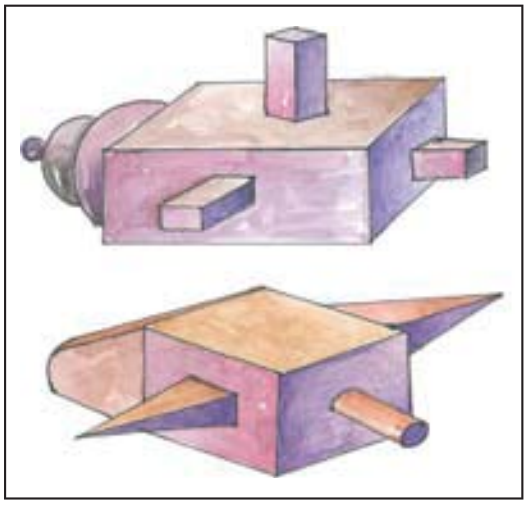
Can we live with the fish in water ?

Can we fly in the air like bird ?

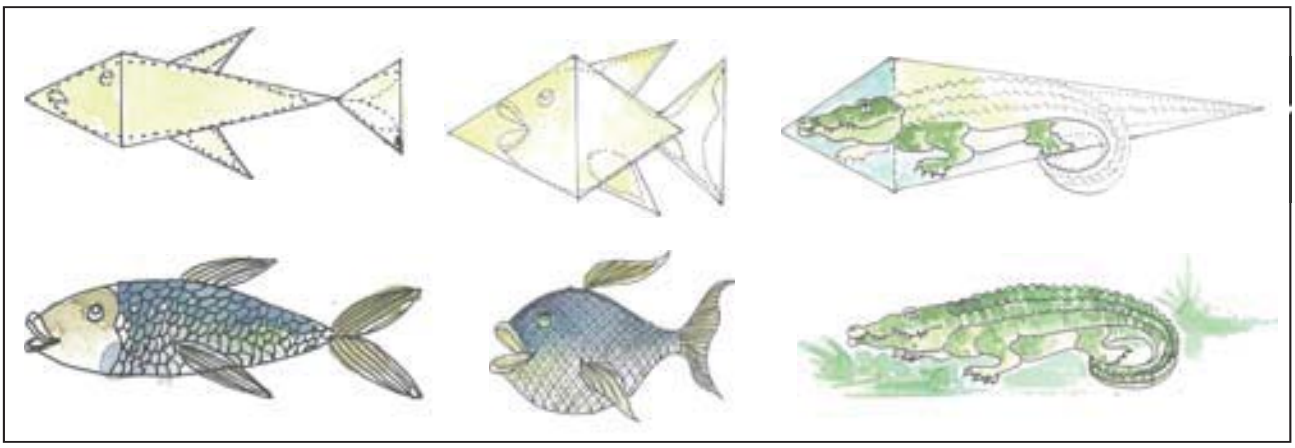
Every organism changes its structure according to its environment and its requirements.

Changes occuring in the structure of organism to cop up successfully with the changing environment are called adaptions.

Look at the picture. Have you seen any fish like this ? What happens if any fish have this type of shape ? Note down.



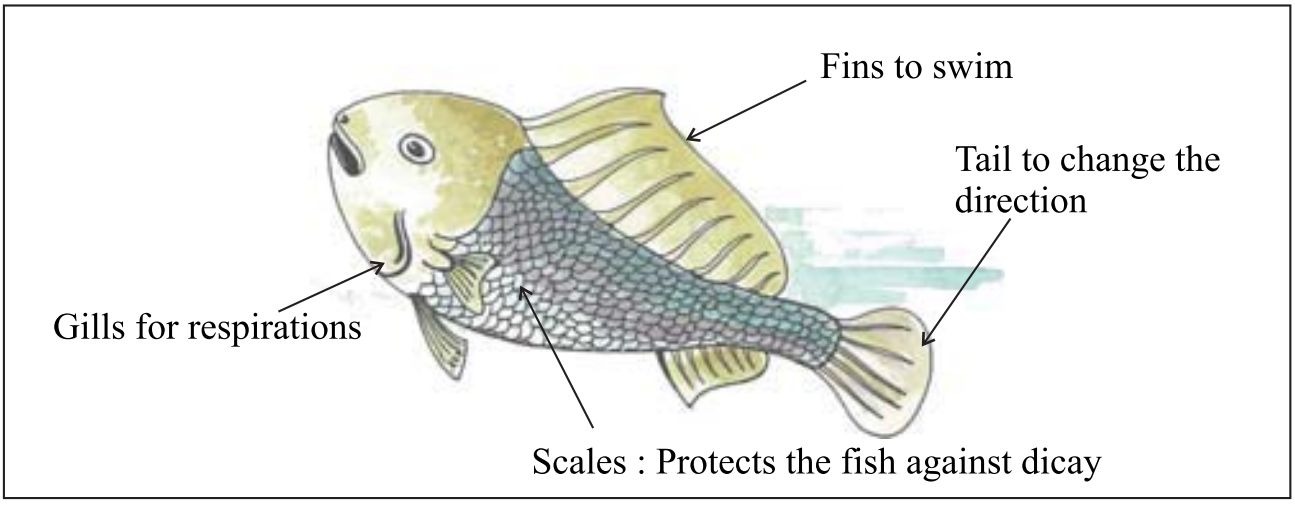
Link up the dotted line in the following pictures and which type of shape is formed. See that.



All fishes or aquatic animals have the such type of shape. They are narrow at its anterior and posterior ends and swollen in the middle region. This type of shape is called aerodynamic shape, which helps the animals to swim by reducing the resistance of water and thus they can swim very swiftly in the water.

You may have seen the shape of a boat and a steamer. What are the similarities between the shapes of a boat and a fish ? Why ? Discuss it and note down.

Thus, shape of a fish is its adaptation to live in water. The body of the fish is covered by smooth and sticky scales made up of wax, hence the body of fish never becomes wet or decay even if it lives in water. Thus, one cannot live in water if only he knows swimming. There are certain other adaptions found in the fish, we shall understand them with the help of following picture.

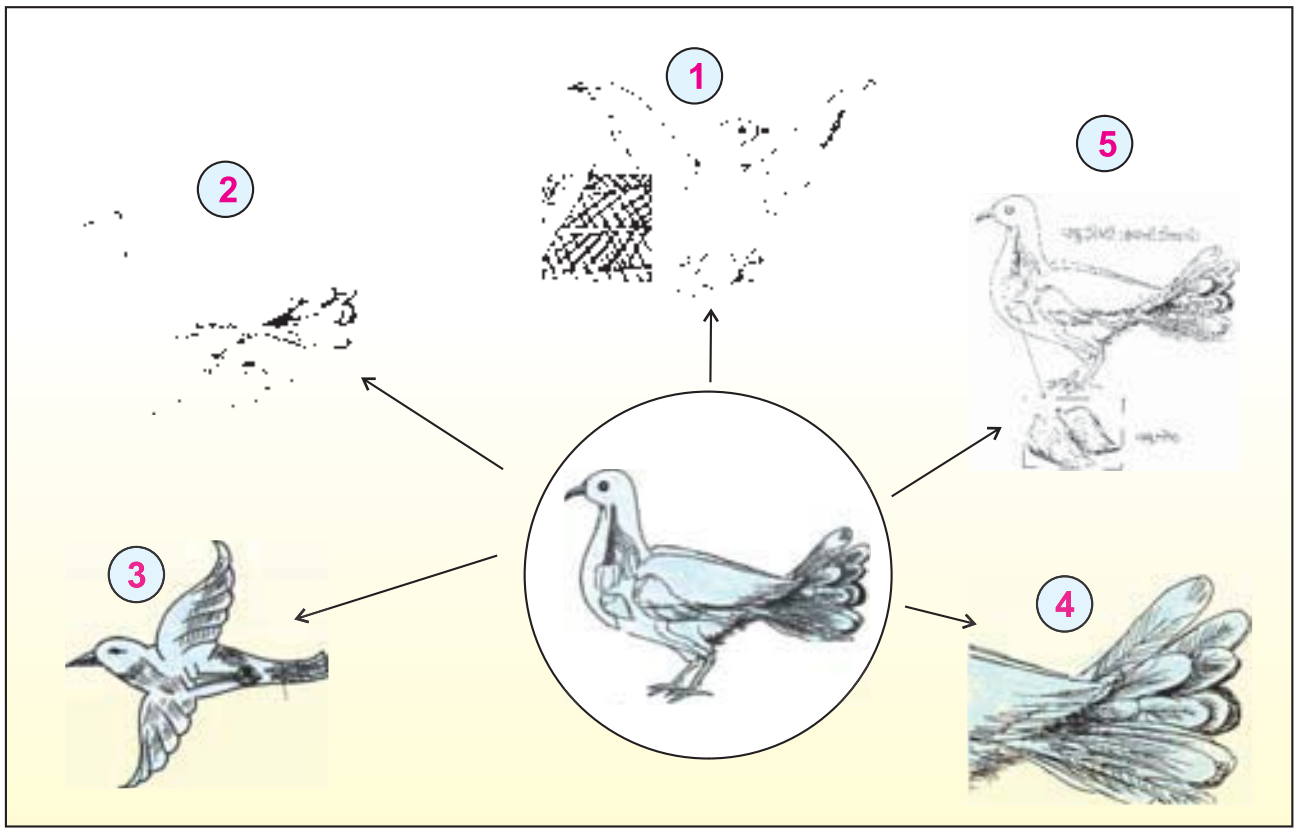


Now, tell that fish posses which organ in place of nose ?

Select any two aquatic animals from your list and discuss about their adaptations and note them here.

We always wish to fly while we see a flying bird. Can we fly if we are provided with wings ? Birds also have some adaptations for flying in the air. Discuss about the differences between humanbody and the body of birds.

	Human	**Bird**
Size of the body		
Shape of the body		
Weight of the body		
Comparison between their hands, legs, nose, eyes etc.		



1. The forelimbs of birds are modified into wings for flying.

2. The bones, forming the skeleton, are spongy and light in weight to reduce the body weight.

3. They can fly easily in the air due to their special type of shape.

4. Tail is useful to balance the body.

5. They fill their air sacs with the air before flying, which help them in their flight. Birds possess such nine air-sacs.

Man has developed the shape of an Aeroplane inspiring from birds shape, hence it also can fly easily in the air. Moreover birds show variations in their beaks on the basis of their habitat and food. This is also one type of adaptions.

A	B	Identify the name of the bird on the basis of its beak and tell something about their food habit		
		**Description**	**A**	**B**
		Name of the bird		
		Food		

We have understood the adaptions of aquatic animals and avions, but if you look at the animals surrounding you than you will find many variations amongst them.

Make a list of the terrestrial animals and write down in the following table :

Name of animal	Living on tree	Living in burrow (Hole)	Living on land	Domestic animals

Animals live on trees :

Animals living on the trees are known as arboreal. E.g. Squirrel, garden lizard and monkey.

These animals have a long, thin, whip, like tail. Their tail is useful to twine around the twing of tree while their tongue is useful to catch insects. They have two independent eyes on both the sides Some animals change their colour according to the colour of the leaves of the tree. This type of animals is found just in your surroundings. Find it and note down here.

Burrowing animals :

Observe the similarities between the burrowing animals and write down them in the following table :

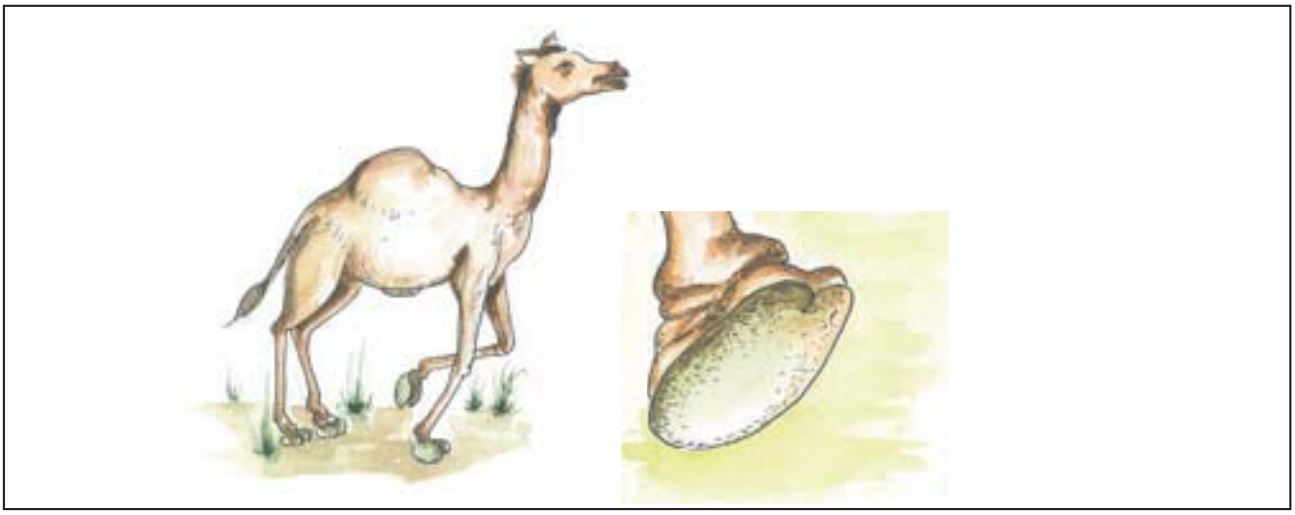
Rat	Snake	Screw (Chhachhunder)

Desert animals :

Water scarcity, less number of trees and sandy soil are the characteristics of a desert. Climate is very hot there. Animals live there show many adaptations due to these reasons.

Snake, rat and scorpion living in the desert show many specific characteristics in their structure.

Animals like horse can't walk in the sand of desert. People use only camel to travel in the desert.

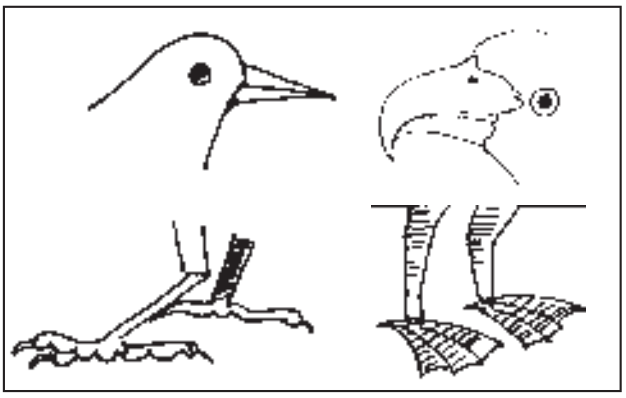


You may have seen and you must have an idea that camel has a hoof. It stores fat in this hoof. When food is not available in the desert at that time camel gets energy from this fat.

- It can be alive for a long time without water.
- Colour of its body matches with the colour of desert.

Thus, animals show adaptation according to their habitat, food, environment etc and thus diversity is found in animal kingdom.

Identify the animals in the following picture and give reasons for having such organs.



Movement of a cut tail is also an adaptation. What can be the reason behind this ?

Lizard can developed a new tail in place of cut tail.

Not only animals but plants also show adaptation. Plant show their adaptation generally on the basis of availability of water and proportion of salinity.

What is required ? Water, three bottles, money plants (pothos), *Calotropis/Zizyphus, Vinca* (Barmasi) ?

What to do ?

- Take plants having roots of *Vinca*, money plant and *Calotropis/Zizyphus*.
- Keep the plants in different bottles filled with water in such a way that they get enough sunlight. Observe them after 5-6 days.

- Condition of money plant _____
- Condition of *Calotropis/Zizyphus*. _____
- Condition of *Vinca* _____

Do you know why does this occur ? Requirement of water is different for each

- Some plants can survive in very less availability of water. These plants are called xerophytes. E.g. *Zizyphus, Calotropis, Acacia* (Babul).
- Some plants grow only under the water. They require no land to germinate. These plants are called hydrophytes. E.g. Lotus, *Typha*, Water chesnut *(Trapa)*, Money plant.
- Some plants require adequate amount of water. These types of palnts are known as mesophyte. E.g. Neem, *Vinca*, Mango-tree.

Bring the book 'Plant kingdom' from your school library and collect more information.

Xerophytes grow in the desert where water is available in least amount and climate is very hot.

Root system of this type of plant is well developed and reaches to deep layers of soil. They can absorb water from the deep soil. Leaves are few and small, to reduce the rate of transpiration.

- Some plants convert their leaves into spines.
- Stem becomes green and fleshy in such plants, which can store water and food. E.g. *Opuntia.*
- Some plants grow in pond or ocean. They show characteristics to grow under water.

Like.....

- ⇨ Their leaves never decay even though remain in water.
- ⇨ Water is available in sufficient quantity hence they have poorly developed root system.
- ⇨ Their stems are hollow, thin and weak so that they can move with the water current.
- ⇨ Leaves of some hydrophyte are big and broad so that they can float on water and perform photosynthesis E.g. Lotus, Water chestnut *(Trapa)*.
- ⇨ Some of them show their roots touching ground while some of them have roots free from soil.
- Compare the plants of *Zizyphus* and Money plant and note down in the following table :

Observed organ	**A plant of *Zizypus/Acacia/* Date palm**	**A plant of money plant/ Water chest nut *(Trapa)*/Lotus**
Root system		
Stem		
Leaf		
Other		

Plants with moderate requirement of water are known as mesophytes. There are many mesophytes found around you.

If more amount of water is available then the plants die due to decaying and if they get less amount of water they burn due to heat. E.g. *Vinca*, Rose, *Ficus*

- Roots of such plant are well developed.
- Stems are branched and strong.
- Stomata are found on both the surface of leaf for means of transpiration.

We can estimate the quantity of water in the soil by observing the plants grown there.

- An Indian scientist **'Varah Mihir'** had a capacity to tell that in which soil you will get water and in which soil you will get (natural oil) crude oil by observing the vegetation of a particular area.

Observe the leave of *Ficus*, lotus and *Acacia* and note down the differences among them. Thus, every organisms show adaptation to survive and to live successfully.

- Frog is a cold blooded animal (body temperature do not remain constant = poikilothermic). It show no metabolic activity except breathing. Hence, during winter it digs down into the damp earth. This is called winter sleep (hibernation). Similarly during summer it goes underground. This is called summer sleep (estivation). During these sleeps lung breathing is stopped, while skin respiration continues. Respiration is the only process shown by frog during these stages.

Q.1 Why does the upper surface of leaf is smooth and the lower surface of the leaf is rough ?

Q.2 Why do different birds show different shapes of beak ?

Q.3 Hairs are found in more number on the skin of animals living in cold regions ? Why?

Do it yourself :

Make a list of plants, animals and insects found in your area. Note down the specialty of each organism. Try to collect information of more and more organisms. Prepare your own book **'Organism surrounds me'**.