CLASSIFICATION OF ANIMALS 3

SYLLABUS

A. Animals : Vertebrates and invertebrates

Fish, amphibians, reptiles, birds, mammals

Molluscs, worms (without legs)

Arthropods (with jointed legs and bodies) — insects, arachnids, crustaceans, millipedes/centipedes.

Common examples of these categories.

B. Classification and the need for it — a few examples of scientific names.

Classification may be based on several criteria; a group of items may be classified in many different ways — what are other possible ways of classifying animals ?

Open-ended practical exercises based on actual observations of students.

* Practical observation of live/preserved specimens of animals (E).
(*Caution :* Students should be instructed not to pick up or handle any unknown animals. Many invertebrates can sting; others are poisonous.)
* Drawing simple animals from specimens — live and preserved (E).
(Drawing from specimens is an essential skill in which students need practice).
* Groups of students may create bulletin board displays on common Indian animals : endangered species; unusual animals - modifications and adaptation to their life-style/environment (E).

There are thousands and thousands of different kinds of animals found on earth. These animals are of various shapes and sizes. Their sizes range from the tiny *Amoeba* (which we cannot see through our naked eyes) to giant-sized elephants, whales and sharks. Despite vast differences in their sizes, they all are animals.

Though there are many different features among animals, they show certain common features. For example, animals cannot prepare their food by themselves, they feed either on plants or on other animals. They are **heterotrophic**.

Most animals move from one place to another mainly in search of food or for shelter. Such a movement is called **locomotion**.

CLASSIFICATION OF ANIMALS

Depending on the presence and absence of backbone, animals are classified into two categories (A) vertebrates and (B) invertebrates.

A. VERTEBRATES

Animals with a backbone (vertebral column) are called vertebrates. They are classified into five groups (classes) :

(i) Class PISCES (Fishes)

The main features/characteristics of pisces are as follows :

- Aquatic animals with a streamlined body (narrowed at both ends).
- Swim with the help of fins.
- Body covered with scales.
- Breathe through gills.

Common examples : Almost all fishes (Fig. 3.1) and to name a few Rohu, Catla, Mahasheer, Electric ray fish, Dogfish.

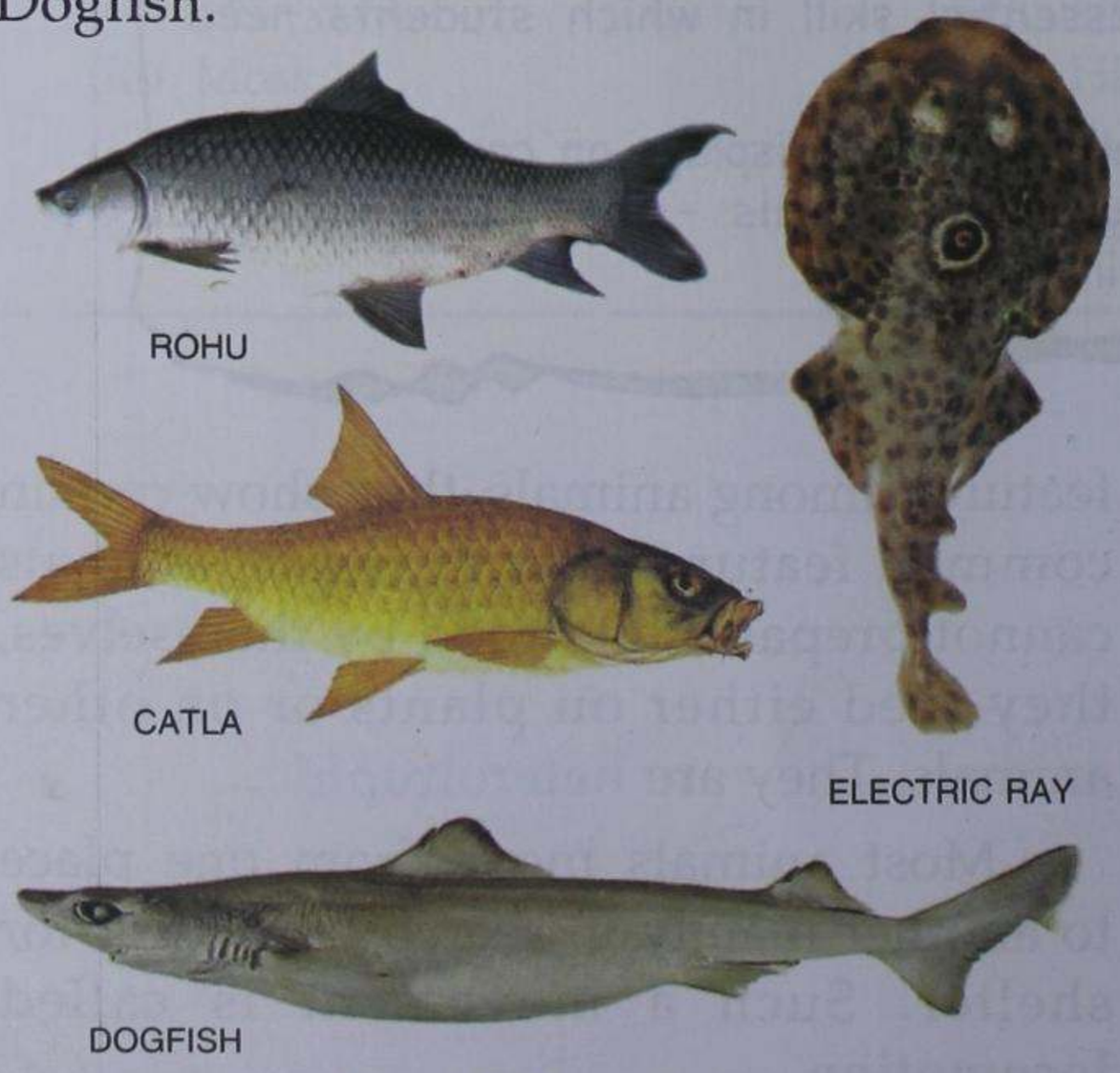


Fig. 3.1 Some fishes

(ii) Class AMPHIBIA (Frogs)

The main characteristics of amphibians are as follows :

- They live in water as well as on land.
- They lay their eggs in water.
- Their body is covered by a slimy and slippery skin.
- They breathe through lungs and skin.

Common examples : Frog and toad.

See figures 3.14 and 3.15 on page 29.

(iii) Class REPTILIA (Lizards and Snakes)

The main characteristics of reptiles are as follows :

- Mostly land vertebrates.
- Skin is dry and scaly.
- Breathe through lungs.
- Females lay soft shelled eggs on land.

Common examples : Lizards, snakes, tortoise, crocodiles, etc. (Fig. 3.2).

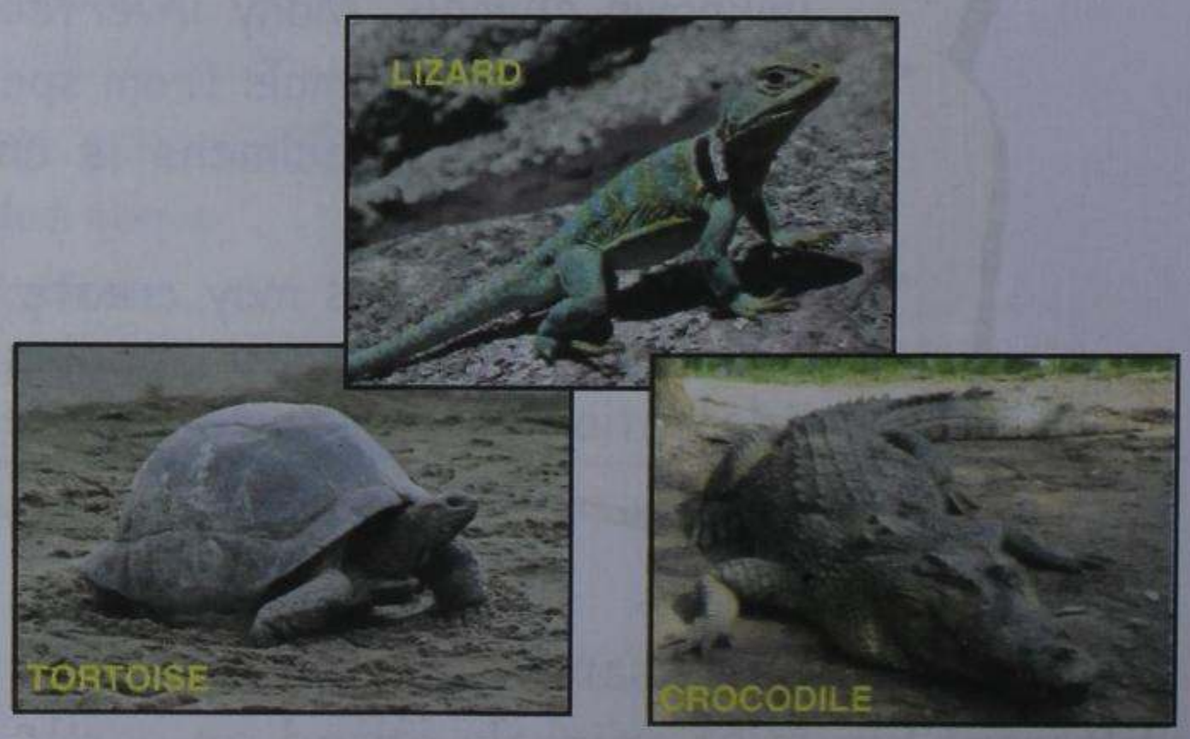


Fig. 3.2 Some reptiles

(iv) Class AVES (Birds)

The main characteristics of aves are as follows :

- Body covered with feathers.
- Have wings to fly.
- Scales only on legs.

BULBUL

SPARROW

Fig. 3.3 Two common birds

- Jaws provided with horny beak and have no teeth.
- Females lay hard shelled eggs.

Common examples : Peacock, ostrich, parrot, pigeon, bulbul, sparrow, etc. (Fig. 3.3).

(v) Class MAMMALIA (Milk-nourishing animals)

The main characteristics of mammals are as follows :

- Body covered with hair.
- Possess projecting external ears.
- Give birth to young ones (babies).
- Mothers suckle their young ones with their own milk.
- Usually, have a tail and four limbs.

Common examples : Cow, dog, dear, camel, lion, tiger, elephant, rat, and humans (Fig. 3.4).

COW

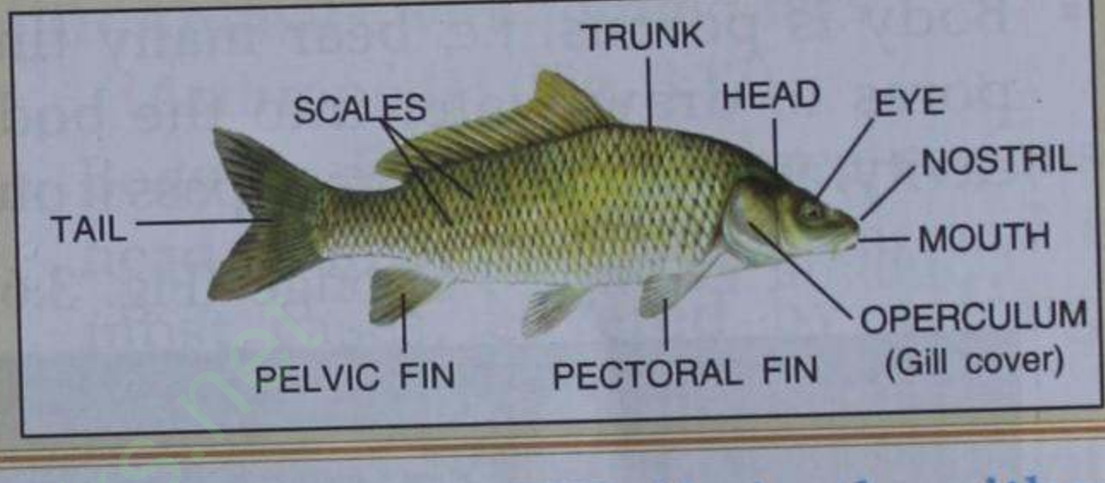
RAT

DEER

Fig. 3.4 Some mammals

ACTIVITY 1

Ask your teacher to place before you a preserved specimen of a fish. Observe the fish and note its important features. Draw the diagram of the fish in your Practical Note Book, and label its various parts. While labelling the parts, you can take the help of the figure given below.

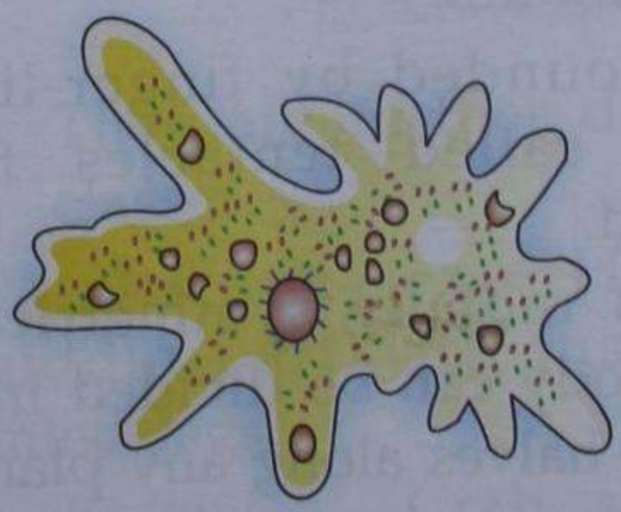


B. INVERTEBRATES (Animals without backbone)

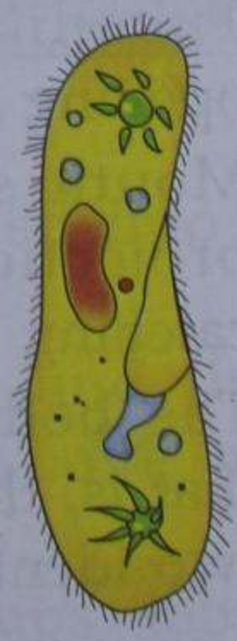
The animals that do not have a back bone are called invertebrates. Based on their different characteristics, the invertebrates are further divided into nine groups.

(i) Single-celled animals (Protozoans)

- Small, microscopic, single-celled.
- Occur everywhere — in soil, in water and even inside the bodies of other animals including humans.
- Some may cause diseases like malaria, dysentery, etc.



AMOEBA



PARAMECIUM

Fig. 3.5 Two protozoans found in water

Common examples : Amoeba Paramecium, Plasmodium (malarial parasite) (Fig. 3.5).

(ii) Pore bearing animals (Poriferans)- Sponges

- Mostly found in sea, very few occur in fresh water.
- Fixed to some object or to the bottom of the pond or ocean.
- Body is porous, *i.e.* bear many tiny pores to draw water into the body cavity, and one large pore to pass it out.

Common example : Sponge (Fig. 3.6).

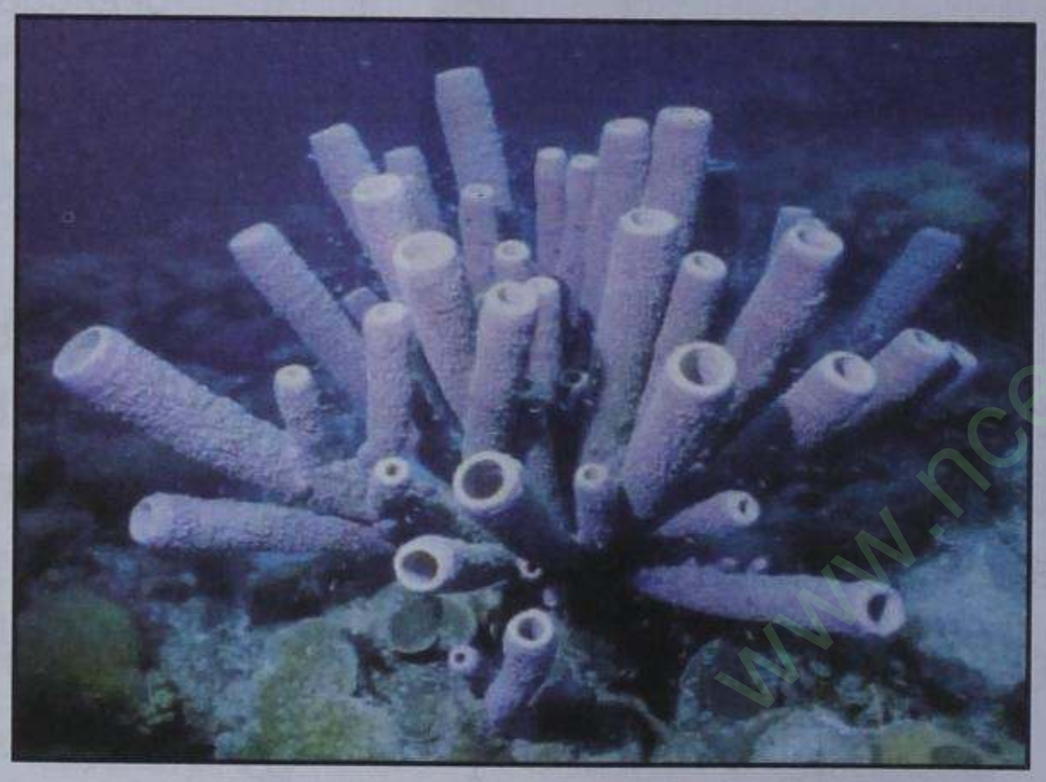


Fig. 3.6 Sponge

(iii) Hollow sac-like animals (Coelenterates, now called Cnidarians)

- Aquatic animals.
- Tube-like body with only one opening *i.e.* mouth.
- Mouth surrounded by finger-like projections called tentacles for catching food.
- The body is radially symmetrical, that is, the body can be divided into two identical halves along any plane.

Common examples : Jellyfish, hydra, sea-anemone (Fig. 3.7).

HYDRA SEA ANEMONE

Fig. 3.7 Two coelenterates

(iv) Flatworms (Platyhelminths)

- Body thin and flattened.
- Mostly live as parasites in the bodies of other animals (hosts).

Common example : Tapeworm (Fig. 3.8).

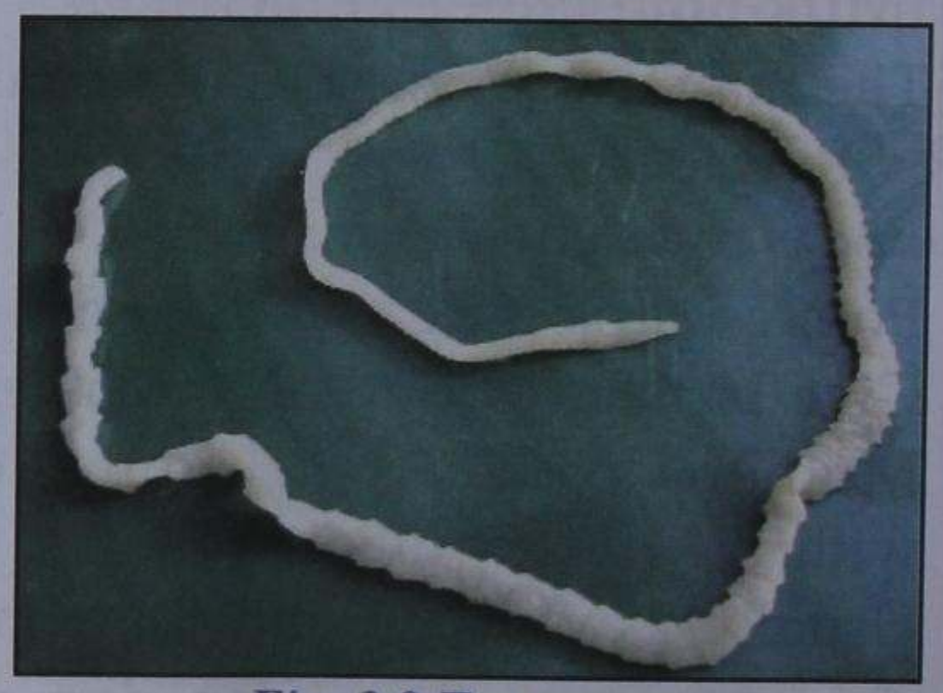


Fig. 3.8 Tapeworm

The human tapeworm occurs in the intestine and may gain a length of about six metres. It looks like a long ribbon with a small head-like part at the front end. It absorbs the already digested food from the human intestine. People who eat pork or beef may get infected by this worm.

(v) Roundworms (Nemathelminths)

- Body elongated and unsegmented.
- Some are thread-like.
- Mostly live as parasites in the body of animals including humans.

Common example : The human roundworm (*Ascaris*) (Fig. 3.9) lives in the small intestine of humans, commonly in children who eat with unwashed hands.

Fig. 3.9 Ascaris (Human roundworm)

(vi) Segmented worms (Annelids)

- Body composed of rings or segments.
- They have a body cavity.
- They have special organs for excretion called **nephridia**.

Common examples : Earthworm, leech (Fig. 3.10).

Fig. 3.10 Leech

(vii) Soft bodied shelled animals (Molluscs)

- Soft body which is not segmented.
- Body enclosed in a hard shell.

Common examples : Snail, slug, pearl oyster, octopus (Fig. 3.11).

Fig. 3.11 Octopus

(viii) Animals with jointed legs (Arthropods) (Fig. 3.12)

- Body is divided into three regions– head, thorax and abdomen; and in most cases, covered by a tough covering.
- Body has paired appendages with many joints.

Fig. 3.12 Arthropods

They are further divided into four classes.

(a) Crustacea – Head and thorax (middle part) are fused, have many jointed legs.

Examples – Crab, shrimps, lobsters, prawn, etc.

(b) Myriapoda – Body is divided into many segments, one or two pairs of legs on each segment.

Common examples – Centipede, millipede.

(c) Insecta – Body is divided into three regions – head, thorax and abdomen.

- Have three pairs of legs.
- Usually, have two pairs of wings.

Common examples – Ant, housefly, butterfly.

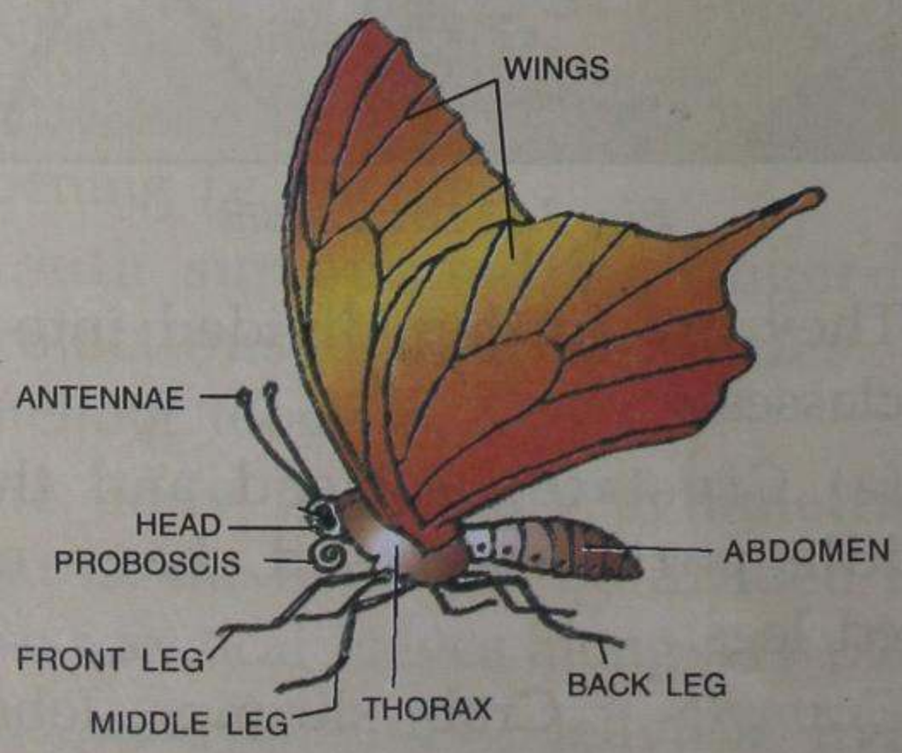
(d) Arachnida – Head and thorax fused.

- Have four pairs of legs.
- Have no wings.

Common examples – Spider, ticks, scorpion.

ACTIVITY 2

Ask your teacher to place before you the preserved specimens of some common animals. Observe these animals and identify them. Note their important features and draw them in your Practical Note Book. A diagram of a butterfly is given here for guidance. Draw, identify and label the body parts of other animals in the same manner.



Butterfly

(ix) Spiny-skinned Animals (Echinoderms)

- Body is rough and spiny, and is star-like or ball-like.
- No head or tail, no left or right side.

Common examples : Starfish, sea urchin (Fig. 3.13).

Fig. 3.13 Sea urchin

ACTIVITY 3

Collect pictures of some common animals and plants from various sources. Display them on the "Display Board" of your school. Write the name of each animal and plant below it. Similarly, paste pictures of different plants and animals in your note book and write not only the names of each below them, but also their characteristics alongwith other examples of the same kind.

SPECIES

A species is a group of organisms having common characteristics, and which come together to produce young ones.

Look at the *two* animals ahead :

Are they both frogs ? No. One is a **frog** and the other is a **toad**.

Fig. 3.14 Frog

Fig. 3.15 Toad

Fig. 3.17 Tiger

ACTIVITY 4

Read the newspapers and magazines regularly. Spot the news about nearly vanishing species of animals and plants or unusual animals and plants. Take note of modifications and adaptations in them according to their environment. Cut out these news items and paste them in your "Scrap Book". Discuss these informations with your classmates. Also try to bring awareness among your classmates to save such animals and plants as they are an essential part of our living world.

Similarly, lion (Fig. 3.16) and tiger (Fig. 3.17) are close relatives. You can easily distinguish the spotless lion from the striped tiger. Is there any difference in their tails too ?

Fig. 3.16 Lion

Look at the following three human pictures.

Fig. 3.18 Three examples of the human races

Are the three humans shown above similar ? No, not exactly, yet they are all humans. A human being from any part of the world can marry another woman from any other part and they can have a normal child. So, all present-day humans belong to one single species called *Homo sapiens*.

Two frogs can produce their young ones, two toads can produce their young ones. Can a frog and a toad reproduce between them? No ! Two rats can produce baby rats, two squirrels can produce baby squirrels. But, a rat and a squirrel cannot reproduce among themselves.

Thus, frog is one species, toad is another species, and similarly rat and squirrel are separate species.

Similarly, among plants, grass is one

species, sugarcane is another species, rose is yet another species, and so on. These plants cannot interbreed because they belong to different species.

NAMING THE ORGANISMS

Your parents have given you a name. Do you know why? Because you get recognised everywhere by your name, whether in Delhi, in Mumbai or overseas.

In other words, when a person recalls your name, your image immediately comes to his mind. As human beings all over the world belong to one species – *Homo sapiens*, similarly all house flies belong to the species *Musca domestica*, parrots belong to *Psittacula krameri* and the edible pea to *Pisum sativum*. Thus, animals and plants are differentiated from each other by their species' names.

Two part scientific names

In science, people from different countries with different languages have to read about each other's research work. So, it was found necessary to eliminate any possible confusion in using local names by substituting them with names specially given in scientific language. The present practice is to use a two-part name for each species. For example, our hill crow (black) is *Corvus macrorhynchos* and the house crow (grey and black) is *Corvus splendens*. The first part in these names is the genus which in this case is the same for both, that is "*Corvus*" and the second part is the particular species of the genus. This method of naming an organism by giving two names is called the **binomial nomenclature** (*bi* : two, *nomen*: name). For example, *Rana tigrina*, *Homo sapiens*. This method was introduced by the biologist Carolus Linnaeus.

You need to write scientific names in many places. Scientific names of plants and animals are always underlined whenever you write them. For example, Frog — Rana tigrina when hand written but when printed it is in italics *Rana tigrina*.

A few scientific names (consisting of two part names) are as follows :

Toad — *Bufo melanostictus*
Lion — *Panthera leo*
Tiger — *Panthera tigris*
Wheat — *Triticum vulgare*
Mango — *Mangifera indica*

In the previous chapter, you have seen that plants are classified on the basis of various features. For example, flowering and non-flowering plants; herbs, shrubs and trees; annual, biennial and perennial plants. Similarly, animals can also be classified depending on their different characteristics.

OTHER CRITERIA FOR CLASSIFICATION

On the Basis of Their Mode of Life

- **Terrestrial (Land) animals** such as camel, horse, cow, deer, zebra, etc. (Fig. 3.19) These animals live on land. Human beings are also terrestrial.

DEER ZEBRA

Fig. 3.19 Two terrestrial animals

- **Aquatic animals** such as fishes, whales, etc. (Fig. 3.20), live in water.

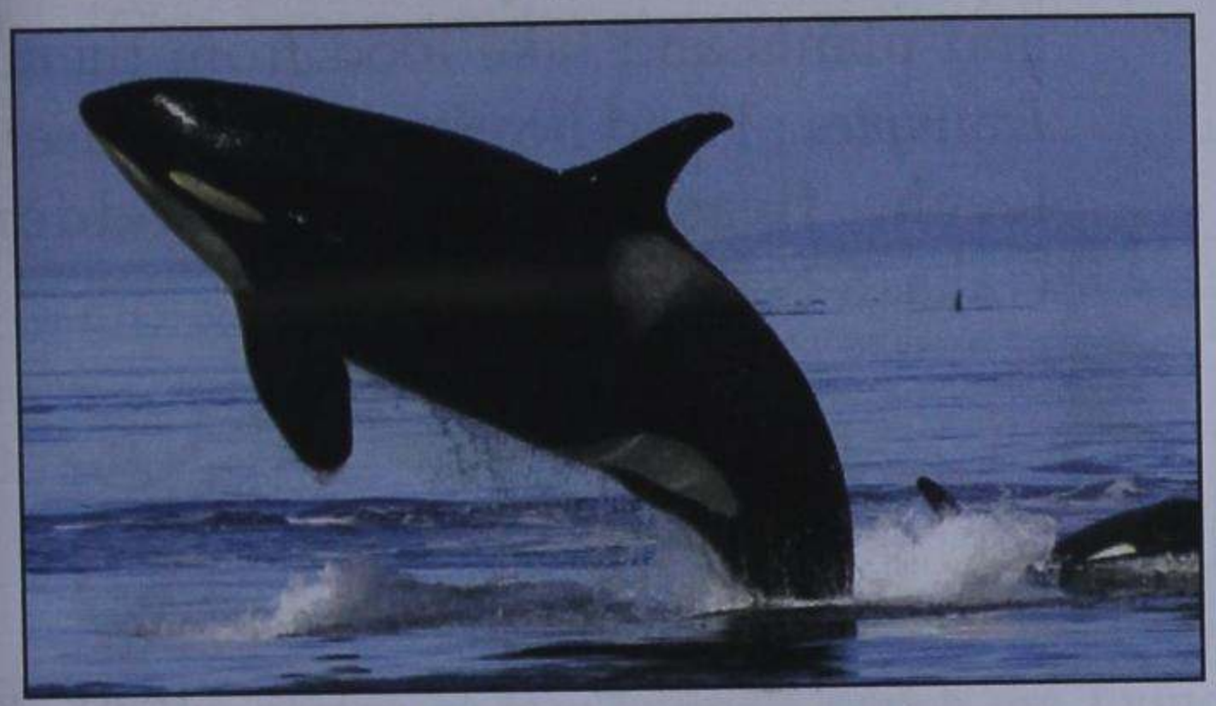


Fig. 3.20 An aquatic animal

- **Burrowing animals** such as earthworm, rat, snake, etc., make burrows in the soil and live there.
- **Arboreal animals** such as squirrel, monkey, etc. (Fig. 3.21), live on trees.

Fig. 3.21 Two arboreal animals

- **Aerial animals** such as insects, birds, bats, etc. (Fig. 3.22), fly in air.

Fig. 3.22 Bat — a flying animal

Note that though the birds live on trees, they are not called arboreal because they can fly, whereas arboreals cannot fly.

By such classification, we can look to the body modification of animals adapted for a particular type of life. For example, all aerial animals must have wings. Bat's arms have modified into wings, and whales arms and legs have modified into paddles.

On the Basis of Their Food Habits

- **Herbivorous animals** (*herb* : plant, *vore* : eating) feed on plants. *Examples* : cow, elephant, giraffe, etc. (Fig. 3.23)

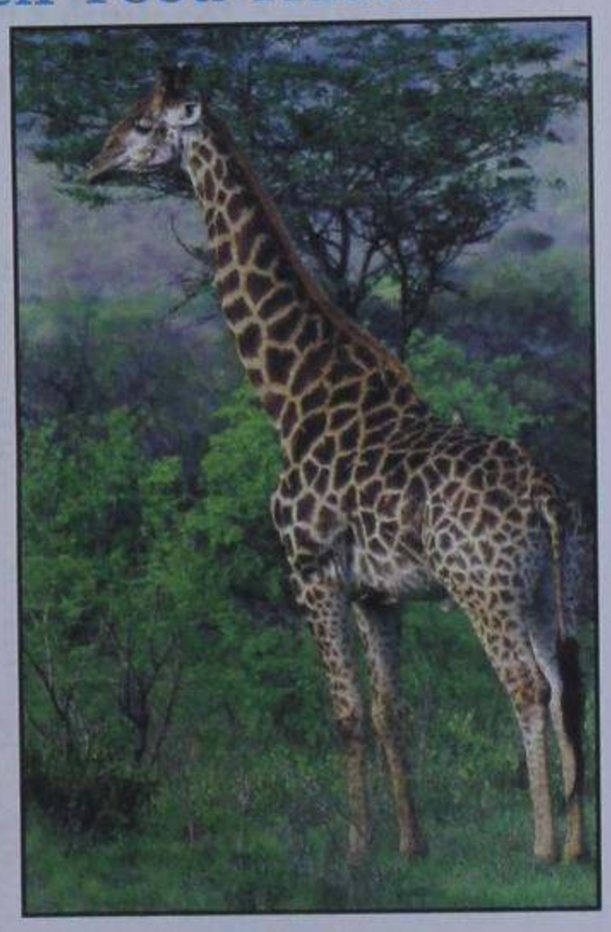


Fig. 3.23 Giraffe — a herbivore

- **Carnivorous animals** (*carni* : flesh) feed on the flesh of other animals. For example, lion, tiger, etc. (Fig. 3.24).

Fig. 3.24 Lion — a carnivore

- **Omnivorous animals** (*omni* : all) feed on both plants as well as flesh of other animals. *Example* : crow, man, cockroach, bear, etc. (Fig. 3.25).

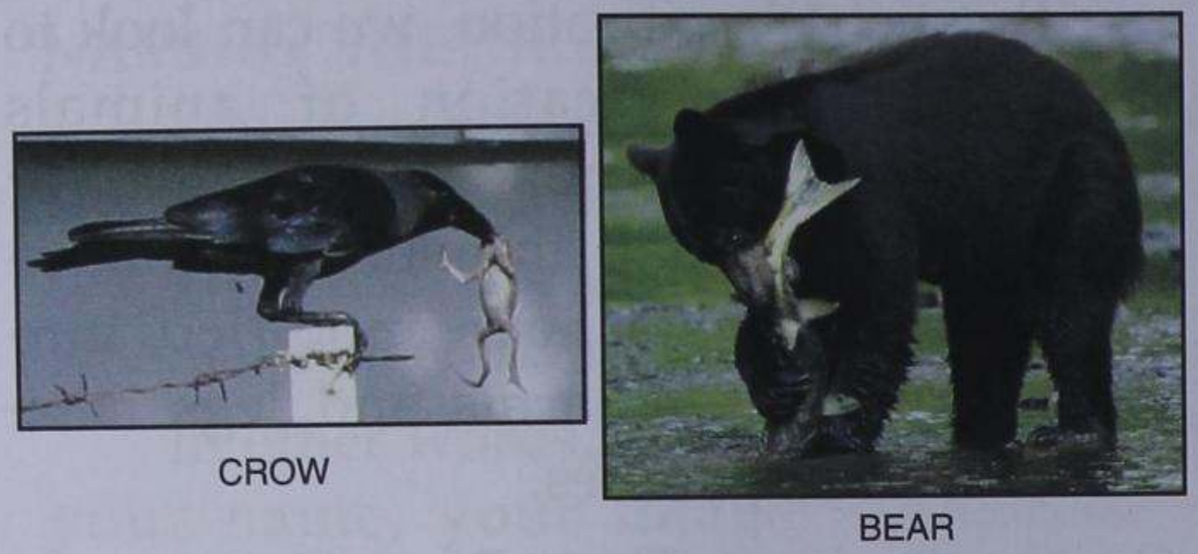


Fig. 3.25 Two omnivores

- **Parasites** live either inside or on the outside of the body of other animals and plants and take food from them. *Examples* : Head lice (singular - louse), leech, fleas, tapeworm, dodder ("akash-bel"), etc. (Fig. 3.26).

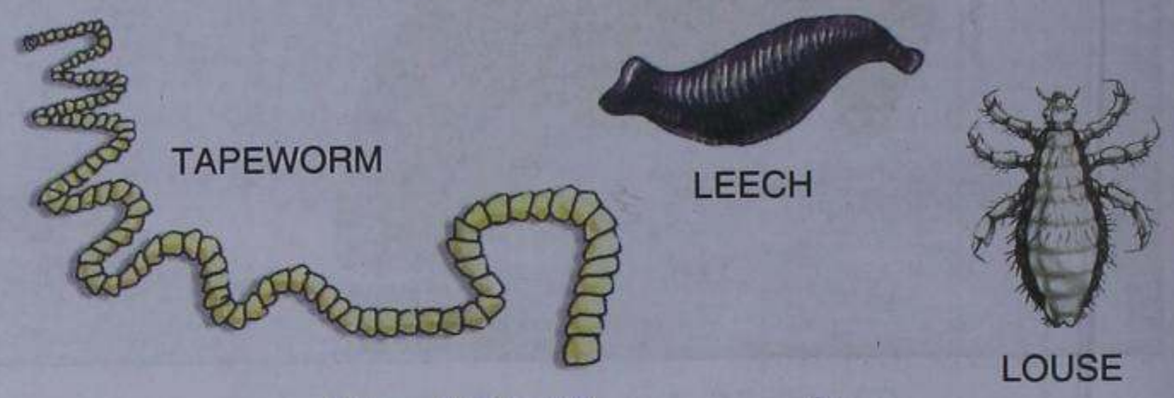


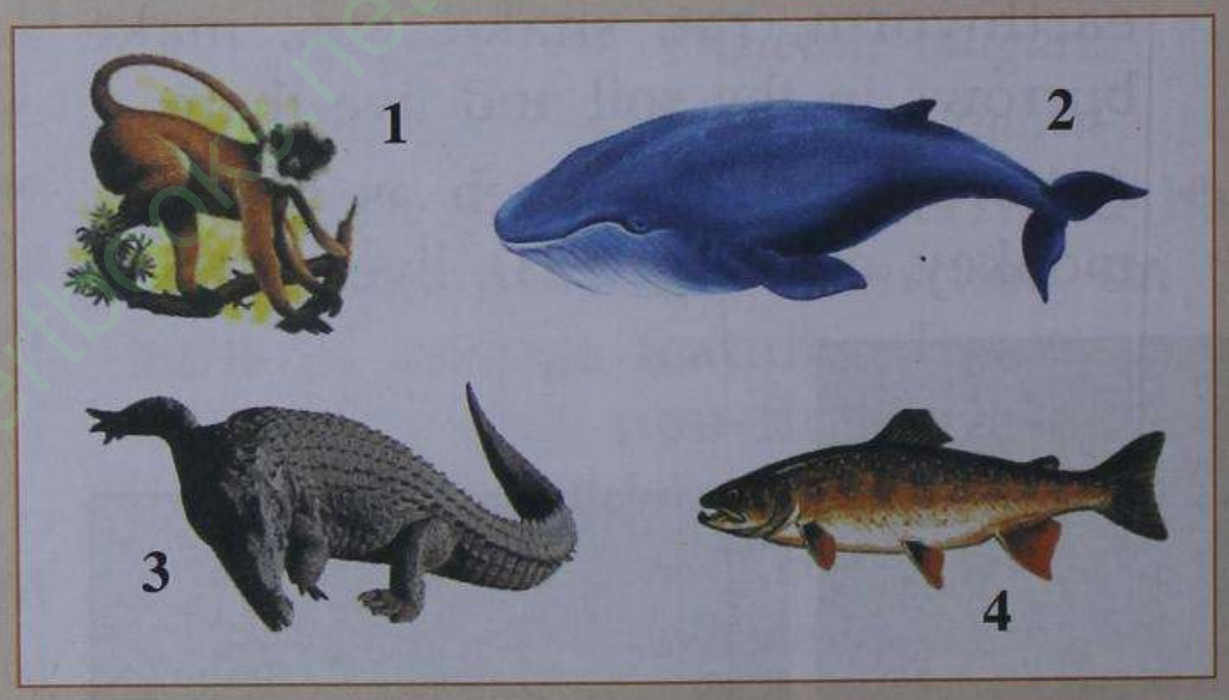
Fig. 3.26 Three parasites

ACTIVITY 5

Look at the four animals shown alongside.

Which four classes of vertebrates are represented by them ? Name these classes.

1. _____
2. _____
3. _____
4. _____



CLASSIFICATION OF ANIMALS AT A GLANCE

		Category	Common Examples
ANIMAL KINGDOM	INVERTEBRATES (animals without a backbone)	1. Single-celled animals (Protozoans). 2. Animals with pores for water intake (Poriferans). 3. Hollow sac-like animals (Coelenterates). 4. Flatworms (Platyhelminths). 5. Round (cylindrical) worms (Nemathelminths). 6. Segmented animals (Annelids). 7. Soft-bodied shelled animals (Molluscs). 8. Animals with jointed legs (Arthropods). 9. Spiny skinned animals (Echinoderms).	Amoeba, Paramecium Sponges Hydra Tapeworm, liverfluke Ascaris Earthworm, leech Snail, slug Ant, bees, prawn, butterfly, scorpion, millipede, centipede Starfish
	VERTEBRATES (animals with a backbone)	**CLASSES** **Fishes :** Body covered with scales, fins for swimming. **Amphibians :** Can live in water as well as on land, but must go to water for laying eggs. **Reptiles :** Mostly land vertebrates with dry and scaly skin. **Birds :** Body covered with feathers and having wings for flying. **Mammals :** Body covered with hair and suckle babies on their own milk.	 Rohu, catla, mahasheer Frog, toad Lizard, snake Pigeon, parrot, peacock, crow Cow, rat, cat, elephant, camel, lion, tiger, Man

REVIEW QUESTIONS

1. Give *two* examples of each of the following :

   (i) Amphibians : _____ _____

   (ii) Segmented worms : _____ _____

   (iii) Reptiles : _____ _____

   (iv) Coelenterates : _____ _____

   (v) Arthropods : _____ _____

   (vi) Flatworms : _____ _____

2. Give names of *two* animals which are found as parasites inside the human intestine.

   _____

3. Name *one* animal each which shows the following characteristics :

   (i) Fixed animals with a porus body : _____

   (ii) Star-shaped body : _____

   (iii) Can live in water as well as on land : _____

   (iv) Has a ribbon-like body : _____

4. Write *one* difference each between the following pairs :

   (i) Protozoa and porifera.

   (ii) Arthropoda and shelled animals.

   (iii) Invertebrates and vertebrates.

   (iv) Flatworm and roundworm.

5. How can you classify animals on the basis of their mode of life ?

6. Match the animals given under **column A** with their respective classification group given under **column B** :-

Column A	Column B
(i) Sponge	(a) Amphibia
(ii) Snail	(b) Reptilia
(iii) Butterfly	(c) Echinodermata
(iv) Toad	(d) Mollusca
(v) Lizard	(e) Arthropoda
(vi) Starfish	(f) Porifera

7. Fill in the blanks according to the kind of place where they live :

   (i) Horse is a ..... animal.

   (ii) ..... are aquatic animals.

   (iii) Rat is a ..... animal.

   (iv) Squirrel lives on trees and is called an ..... animal.

8. Write the characteristics of class Aves with reference to their body covering and jaws.

9. Categorise the following animals under their appropriate columns of classfication :

ANIMALS :

Dog	Grasshopper	Rat	Scorpion	Toad
Butterfly	Lizard	Turtle	Frog	Bat
Snail	Honey bee	Pigeon	Liverfluke	Leech
Catle	Snake	Rohu	Parrot	Ascaris
Earthworm	Cow	Rabbit	Monkey	Elephant

CLASSIFICATION :

WORMS	MOLLUSCS	FISHES	AMPIHBIANS	REPTILES	BIRDS	MAMMALS
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

10. Explain what is binomial system of nomenclature ? Who gave this sytem ?

A MINI PROJECT

Students of the class can be grouped in two batches, one batch will create a bulletin board on common animals, while the other batch will create a bulletin board on common plants. The students can take the help of books, periodicals and the internet.