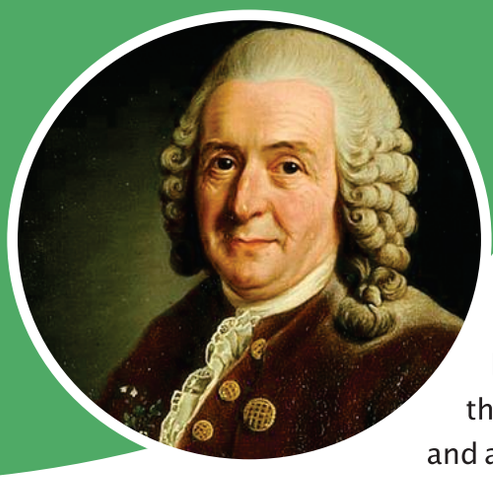
Chapter 1

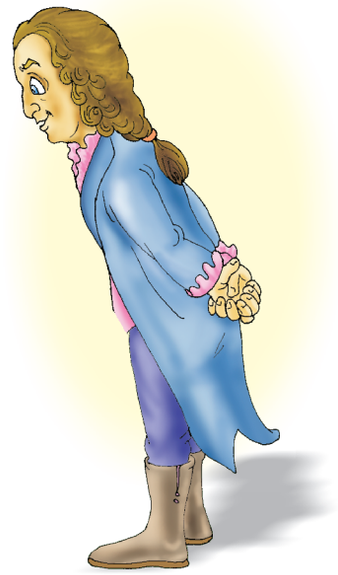
ANIMALS ON EARTH

with Carolus Linnaeus



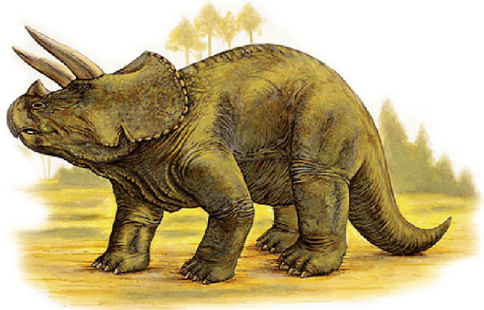
Carolus Linnaeus was born on 23rd May,1707 in Sweden. He was an eminent botanist, physician and zoologist who laid the foundations for the modern scheme of nomenclature. He is known as the 'father of modern taxonomy'. Linnaeus got most of his higher education at Uppala university in Sweden. He published the first edition of 'Systema Naturae' a book that classifies plants and animals in the year 1735.

Hej! God morgon! Hallo! Guten Morgen!
Confused? These are the Swedish and German versions of Hello! Good morning.
I am Carolus Linnaeus, a taxonomist. Do you know that my father adopted the Latin name "Linnaeus" after a giant linden tree that grew on the family homestead. I am the person who initiated the systematic classification of plants and animals.
You may ask, " What is the need to classify them"?
Well, it was confusing for the scientists to individually study the vast variety of animals found on the earth. So, it was necessary to categorise them into similar groups in order to understand how life first began to evolve on earth and how a single cell gradually evolved into complex life forms.
To help you understand this, let us go back millions of years in time on a safari through the Jurassic era. Who knows, you may want to become a microbiologist[1], an ocean medical expert, a paleontologist[2] or a taxonomist[3] like me once you are back from your safari!



What you already know...

Before we begin our expedition to the Jurassic era, let's check how much you know about the animal kingdom.



A dinasaur

1. **microbiologist** : a person who specialises in the study of microorganisms
2. **paleontologist** : a person who reconstructs an extinct animal from fossils
3. **taxonomist** : a person who specialises in the classification of organisms

1. Name two animals that you love and two animals that you are scared of. Give reasons for your choice.
2. Assume that a new species has been recently discovered. List three features on the basis of which you would classify it. Record your observation in the follow-up journal.

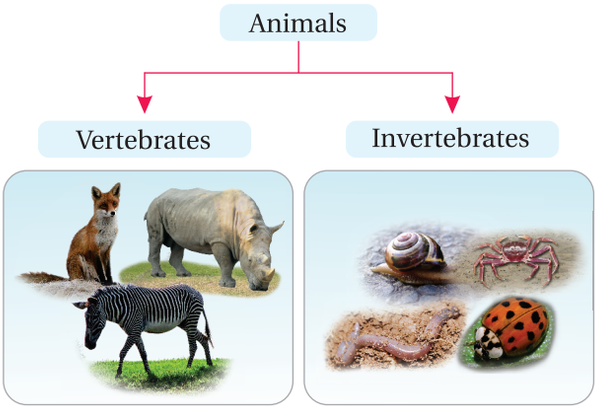
So, everyone seems to be ready with their backpacks, binoculars and notebooks. Don't forget to take important notes as they may be handy in your search.

What you need to know...

Classification

You must have often visited your school library. Have you noticed how the books are arranged neatly according to their subjects, titles, authors etc.? You will find science books in one section, mathematics in the other and so on. There is absolutely no confusion. Similarly, animals are classified according to their habitat, mode of respiration, reproduction and resemblance to their ancestors.

After much research, it was concluded that animals can be best classified on the basis of the presence or absence of backbone. Animals having a backbone are called vertebrates. Animals without a backbone are called invertebrates. Isn't it amazing to know that of the millions of animals living on earth only three percent are vertebrates?



What you need to do...

Make a list of five animals each that swim, crawl, fly or run and hop. Document them in the follow-up journal. Circle the animals that have a backbone. What is this group of animals called?

Keep the list handy because you may come across other such animals on your way.

What you have learnt...

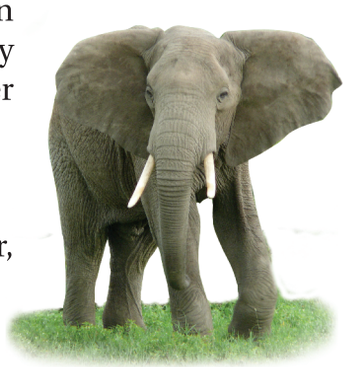
Classification is the process of categorising things on the basis of their structure, origin and behaviour.

What you need to know...

Now, you need to learn about different classes of vertebrates.

Mammals

What do we have in common with bats, giraffes and whales? We have seven neck bones and so do they. We sweat when we perform some physically strenous task and so do they. Now, let us see how we are similar to other mammals.



Bats and elephant

1. Distinguishing features

   a. The bodies of most mammals are covered with hair or fur. However, there are exceptions like the whale.

   b. Mammals have four limbs, arms, legs or flippers.

2. Habitat

   Mammals live in a wide range of habitats such as the cold arctic region, the rain forests, hot deserts and even the ocean. This is possible because they have the ability to keep their body temperature constant, whatever the weather conditions may be. They also have several special body features that help them thrive in their habitats.

3. Body temperature

   Have you ever noted down your body temperature? How much is it? Does it change daily? If not, then you are warm-blooded, which is a feature common to all mammals. Animals like snails, lizards, etc. are cold-blooded animals that hibernate[1] to escape the extreme cold temperatures.

4. Respiration

   Have you ever noticed how you breathe? Observe carefully how the air is sucked through your nose and how your lungs expand. Most mammals breathe in a similar manner, i.e. they breathe with the help of lungs.

5. Reproduction

   Look at the monkeys sitting on the tree. See how the baby monkeys are clinging to the parent monkeys and how they are taking care of their young ones. Most mammals give birth to young ones and the mother feeds them with her own milk. They also take care of their young ones.

Monkeys

1. **hibernation** : a state of inactivity in animals characterised by lower body temperature, slower breathing and low metabolic rate.

What you need to do...

- Make a list of animals you generally find in a zoo. On the basis of what you have learnt which of these will you classify as mammals. Find out where do they live and what are their babies called. Paste a picture of each mammal in your follow- up journal.
- Find out more about the aquatic mammals. Document your information in the follow-up journal.

What you have learnt...

Mammals are warm-blooded animals, with hair on their bodies. They breathe with the help of lungs , give birth to young ones and feed them with their own milk.

Let us cross over the bridge. Be very careful. There is an angry river growling beneath you. What's that? Hold on! it's a crocodile. So, we have a reptile before us basking in the sun.

What you need to know...

Reptiles

In Latin, 'reptile' means 'to creep'. Alligators, crocodiles, turtles, lizards and snakes belong to the happy family of reptiles. Look closely and you will find that most reptiles have some common characteristics:

1. Distinguishing features
   a. Reptiles have scales or a shell on their bodies.
   b. They have short or no legs.

   For example: snake, lizard and turtle

Tortoise

2. Habitat

   Reptiles are highly adaptable and found all over the world except Antarctica that as you know is very cold. Crocodile and alligators reside in swampy areas. However, their other friends such as the turtle may reside in seas and rivers. You must have seen lizards and snakes. These are reptiles that are seen in your garden.

3. Body temperature

As reptiles are cold-blooded creatures, they need extra energy to regulate their body temperature. During winters, as food becomes scarce, reptiles hibernate to conserve their energy. During hibernation, their breathing and heart beat slow down and there is a drop in the body temperature. So, next time you walk through the woods, see that you don't disturb anyone in sleep.

Snake

4. Respiration

Lungs are the primary and only means of respiration in most reptiles. Some reptiles like the turtle can also breathe through their skin. Another important feature is that normally all the reptiles can hold their breath while swallowing.

5. Reproduction

Most reptiles such as turtles, tortoise, crocodile, pythons, etc. lay eggs. However, there are a few reptiles such as chameleons and boa constrictor (a snake) that give birth to young ones.

Crocodile

What you need to do...

Given a choice, what would you like to be – a mammal or a reptile? Give reasons for your choice. Record your observations in the follow-up journal.

What you have learnt...

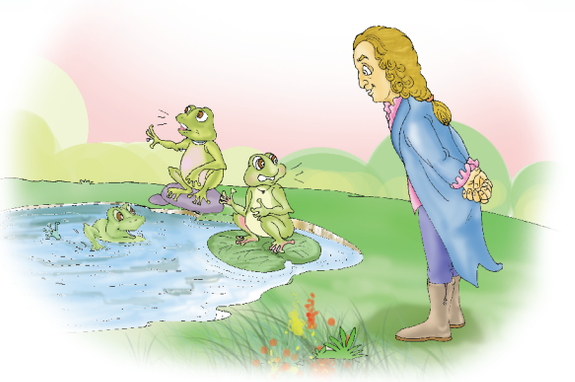
Reptiles are cold-blooded, egg-laying animals covered with scales and have short or no legs.

What you need to know...

Amphibians

Now, answer a question. What is the favourite drink of frogs? Any guesses? Let me tell you- It is 'Croaka-cola'. Well, that was a joke. But now let's watch them dancing in the rain alongwith their orchestra performing at full blast. This reminds me to tell you something about the family of amphibians of which the frog is a member.

Amphibians are cold-blooded animals that are able to live on land as well as in water. For example: Frogs, toads, salamanders, etc. So why don't we ask Mr. Frog himself about how does it feel to be an amphibian!



Q. Mr. Frog, how is life at the pond?

A. Well. It is calm and peaceful. I am living happily with my family. I have two tadpoles who are busy receiving swimming lessons from their mother.

Q. But tell me one thing, how do you manage to live on land as well as in water? Aren't you similar to fishes?

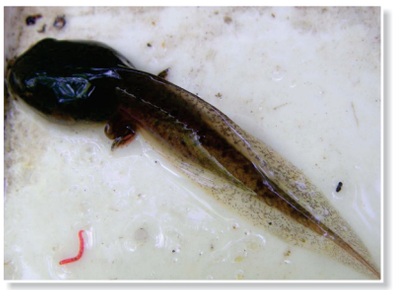
A. No! No! Who told you that? Let me clear this confusion. Actually, fishes spend their whole life in water whereas we spend only the early part of our lives, i.e. the tadpole stage in water. But we have moist skin; so, we do need to be near water.

Q. That's cool! But I have another doubt. How do you breathe in water as well as on land?

A. To tell you the truth, nature has bestowed us with this double gift. During the tadpole stage of our lives, we breathe through gills[1] just like the fishes do and when we grow up, we breathe through lungs just as you do.

Q. Mr. Frog, please tell me something about your babies, I mean tadpoles. How do they look when they are born and then when they develop into a handsome personality like you?

A. Ha! Ha! Ha! Thanks for the compliment. Basically, we are egg-laying animals. After the eggs hatch, we initially look like fishes. We have gills, a fin-like tail and lidless eyes. But, after three months, we loose our tails, develop four limbs and begin to breathe with the help of lungs.



A tadpole

Q. Wow! Okay one last question. Do all the amphibians look like you?

A. No, certainly not. There are three groups of amphibians:

1. Frogs and toads
2. Salamanders, who have smaller and weaker limbs, a tail, smooth skin and a neck .
3. Caecilians, who are smooth-skinned burrowing animals that look like earthworms with teeth in their jaws.

1. **gills** : respiratory organs

What you need to do…

- You have found a new planet that is hot and moist. Most of the area is covered with small ponds filled with water. There are many leafy trees laden with fruits.
- Name two animals that you think can survive in this environment. In addition, prepare a Venn diagram listing the similarities and dissimilarities between amphibians and reptiles. Write them in your follow-up journal.

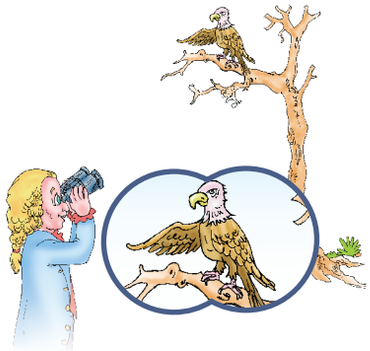
What you have learnt…

Amphibians are animals that can live both on land and in water.

Wasn't it an interesting chat with Mr. Frog? Can you hear a screeching sound? It appears to be coming from the sky. Quick! Take out your binoculars and focus them on that strange creature. Beware, it may come swooping down on us. Oh, it has landed gracefully on the tree top. Don't be scared of its ferocious looking beak and claws. Let's go and meet him.

What you need to know…

Birds



Q. Welcome, Mr. Eagle. Can you throw some light on your community?

A. Well, we are warm-blooded animals with a boat-shaped body covered with feathers that give us warmth and help us fly. Our bones are hollow; so, our body weight is very less. We have two legs and two wings.

Q. How do you manage to breathe while flying high up in the sky?

A. Good question! We have lungs just as you do but we also have air sacs in our body that get filled with air and help in quick exchange of gases. Some species may have seven to eight sacs extending from the neck to the back.

Q. Birds are known for their family ties. Can you shed some light on how do you bring up your family?

A. Basically, we are egg-laying animals. We make a nest to lay eggs. Then, we incubate[1] the eggs by sitting on them. In about 4-5 weeks, the eggs hatch and the young ones appear. We call them chicks. We also have to arrange food for them sometimes making up to 900 trips a day as the chicks are awfully hungry. Now, I must fly off as my chicks must be waiting.

1. **incubation** : process of providing warmth to eggs before hatching

What you need to do…

Make a list of a few birds and write the characteristic features of the specified body parts in the table given in your follow-up journal.

What you have learnt…

Birds are warm-blooded, egg-laying, hollow boned and winged animals. They have beaks of various shapes and sizes.

What you need to know…

**After that fruitful discussion with Mr. Eagle, I remember a poem that goes like this: "How I wish if I were a fish. It would be cool to swim in school.
With just one thought. Don't I ever get caught".
Life of a fish is really cool. Let's know more about them.**

Fishes

Fishes are cold-blooded, aquatic animals. Their bodies are covered with scales and they swim about with the help of fins. Let us follow a school of fish and learn more about them. Here is what the little fish has to say about herself.

Hello! My name is Nemo. Let me take you deep inside an ocean where you will see how we live in water.

We have a lot in common with amphibians. We both have a backbone, live in water and use fins to keep our balance. We get oxygen through gills that are located on the sides of our mouth. As water passes over the gills, oxygen is absorbed by the blood.

Our young ones hatch out of eggs as larvae,[1] feed on the small aquatic plants and slowly develop into fishes.

1. **larvae** : Young ones that hatch from the eggs

What you need to do…

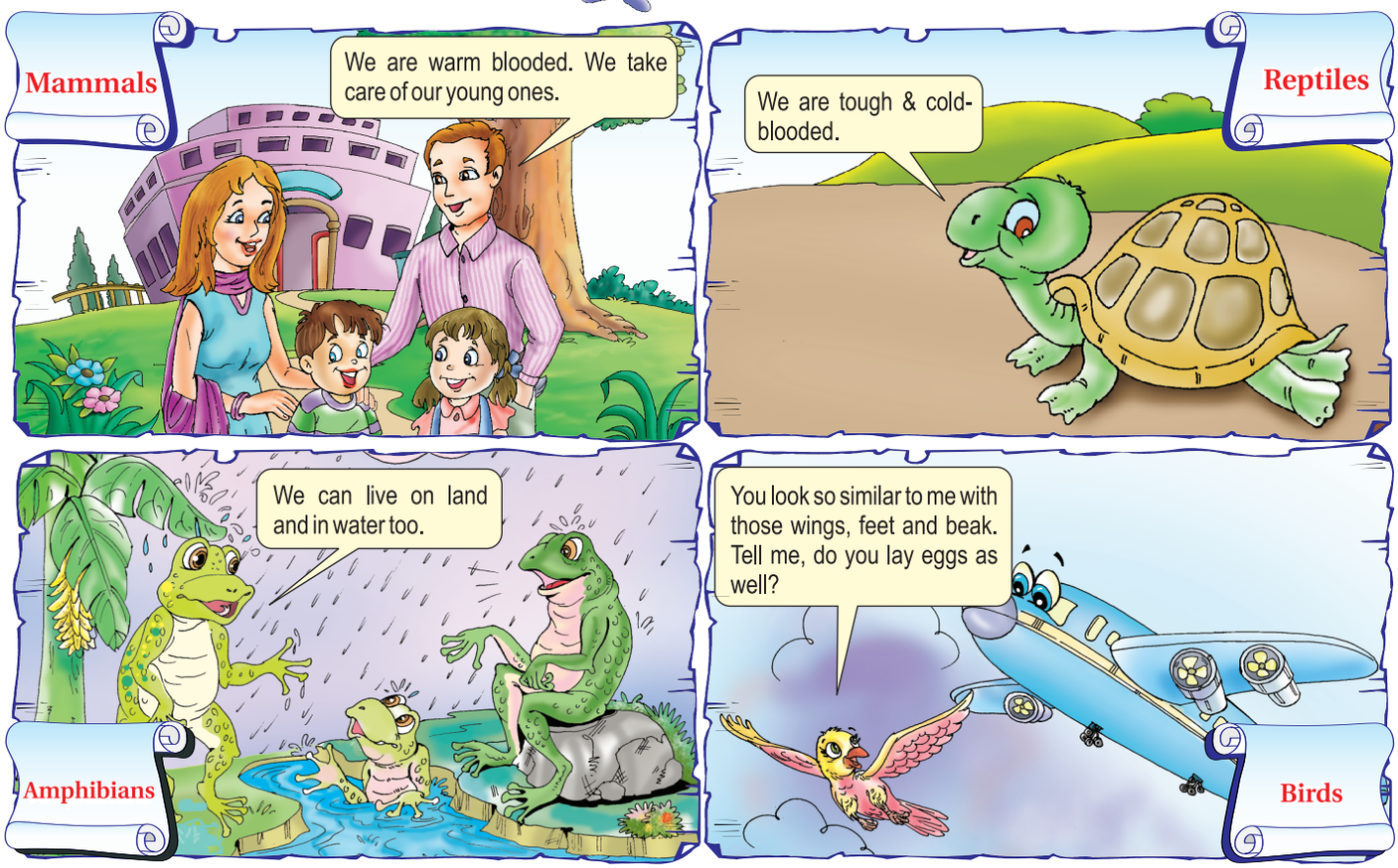
Form groups of three or four within the class for this activity called "What kind of fish are you?". Select a fish and note down its features. For example, if you select 'Shark', you will have to note down its features such as aggressive, killer instinct, enormous, etc. and check whether the features match your personality. Record them in your follow-up journal.

What you have learnt…

Fishes are cold-blooded animals that live in water and have a body covered with scales.

So, let us say good bye to Nemo. This is also the end of the historic trip to the Jurassic Park where we learnt about various types of vertebrates. Wasn't it great fun? Are you looking forward to more of such trips? Do let me know. Till then, bye....

What you need to remember…

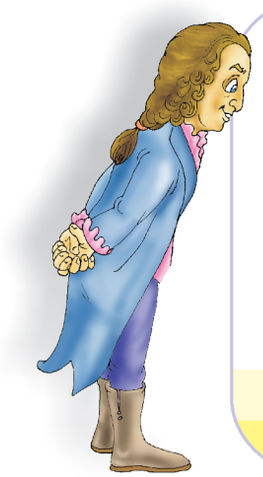


Time to work out…

1. Why was the need for classification felt?
2. Give two important features of mammals.
3. What are the distinct features of reptiles?
4. Give two examples of reptiles.
5. What do you understand by the terms warm-blooded and cold-blooded?
6. Write two differences between amphibians and reptiles?
7. How do birds fly?
8. Find out more about amphibians List two differences between a frog and a toad.
9. List one similarity and one dissimilarity between a fish and an amphibian.
10. What were the various factors taken into account while classifying animals?
11. List the similarities between a whale and a fish.
12. Point out the common features of the various categories of vertebrates.
13. Discuss the respiratory system of all vertebrates.
14. Do some research work in order to know more about the history and evolution of mammals. Compare the features of pre-historic mammals with the present-day mammals. For example, you can compare the giant mammoth with the present -day elephant.

For the apprentice…

Observe various specimens kept in the laboratory. Prepare a chart with the following titles: name, class, identifying features, examples, pictures of the animal.



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