

You have learnt that in the body of a living organisms several processes take place. Plants and animals have different parts or organs for different functions.

In this chapter we will study the various parts of the plants and their functions.

Parts of the plants and their functions

Look carefully at figure 8.1. This shows the various parts of the plant. It would be good if you uproot a plant, bring it to class and with the help of the figure identify various parts of the plant. The parts of a plant are roots, stem, leaves and flowers. The roots are parts of a system called the root-system. These are usually found within the soil while the stems, branches, leaves and flowers that constitute the shoot-system are above the ground.

Are any seeds shown in the figure? But we know that the life of the plants starts from seeds. Hence, let us also start our study with seeds.

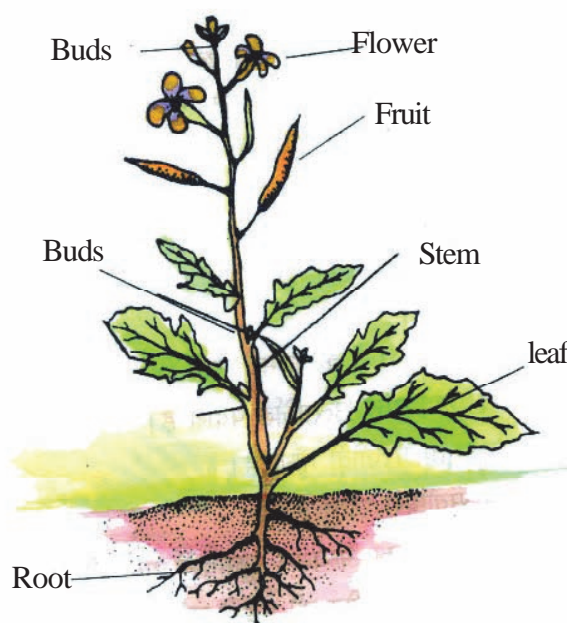


Figure 8.1 Parts of a plant

8.1 Structure of Seeds



ACTIVITY

1

You will have to collect 8 – 10 different types of seeds for this activity. Copy the Table 8.1 in your notebook. Observe the seeds and fill in the table.

**TABLE 8.1**

S. No.	Name of Seed	Colour of seed	Shape of seeds	Whether the surface of seed is smooth or rough	Any other special feature
1.	Gram	Reddish-brown	Round	Rough	_____
2.	Peas	Green	Round	Smooth	_____
3.	_____	_____	_____	_____	_____
4.	_____	_____	_____	_____	_____
5.	_____	_____	_____	_____	_____

Now draw pictures of the seeds in your notebook.

**ACTIVITY****2**

Soak some seeds of gram, peas, maize etc in water. Observe the soaked seeds the next day. To germinate the seeds, place the soaked seeds in a plate and cover with a wet and thick cloth. Observe it everyday and write information in the following table:

**TABLE 8.2**

S.No.	Name of Seed	Observation		
		First Day	Second Day	Third Day
1.	Peas	Seeds swollen	Can see white germinated part	Can see white and green germinated part clearly
2.	Maize	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____

Now try and remove the skin of the germinated seeds and compare the internal structure of seed with the Figure 8.2. If the skin comes off easily press the seeds gently between your thumb and forefinger to split the seed.

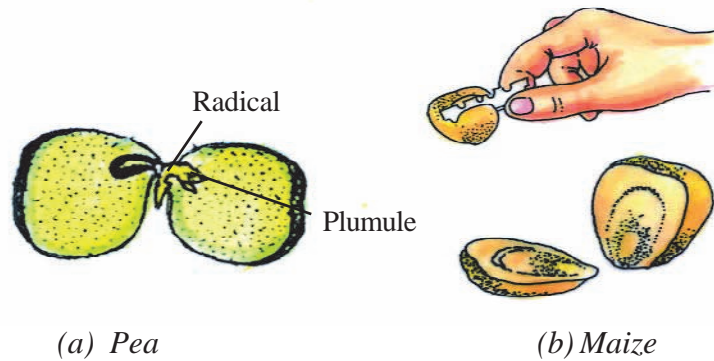


Figure 8.2 Internal structure of the seed



ANSWER THESE

1. Which takes longer time to germinate - seeds of peas or maize?
2. Write the names of those seeds in which the skins separate easily.
3. Write the names of those seeds in which the skins do not separate easily.
4. Draw pictures and label the structures seen inside the germinated seeds seeds in which there are two cotyledons are called dicotyledonous seeds e.g. peas, gram etc.

Seeds in which there is only one cotyledon are called monocotyledonous seeds e.g. Maize, Wheat etc.



ACTIVITY

3

Take moist soil in a glass tumbler. Place some germinating seeds in the tumbler such that you can see the parts that come out after germination through the sides. Observe these germinating seeds daily.

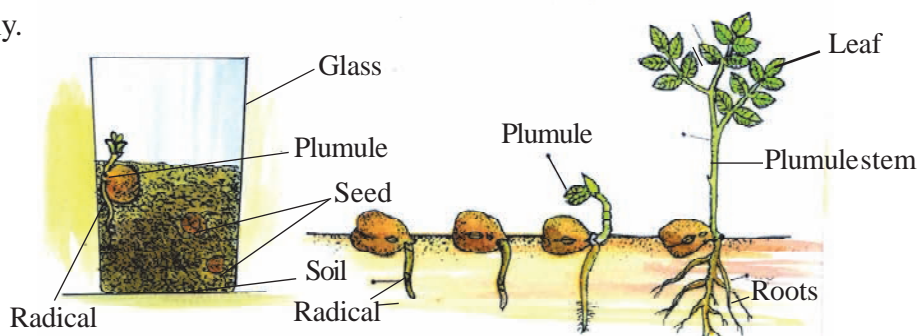


Figure 8.3 (a) Germination of seeds in a glass tumbler (b) Germination in gram

You observed that the white part that grows out of the germinating seed grows towards the soil – this is called the radical and it grows to form the roots. Similarly the green part growing out of the germinated seed grows upwards – this is called the plumule and it develops into the shoot system. The stem, leaves, flowers, fruits and seeds comprise the shoot system.

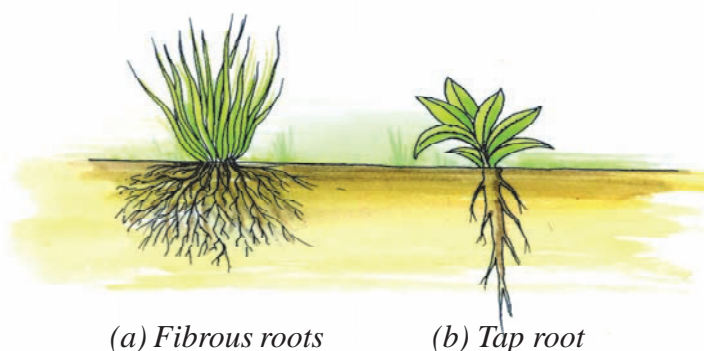
Hence the plants have two systems – the root system within the soil and the shoot system above the ground (Figure 8.1)

8.2 The Root System

The radical that grows out of monocotyledonous plants like wheat and maize stops growing after a certain length and the tip then branches into a fibre like structures. Hence, they are called fibrous roots (Figure 8.4 b). In the dicotyledonous plants like gram and peas the radical continues to grow and branches arise from it. These are called tap roots (Figure 8.4 a)

Hence roots are of two types –

1. Fibrous root
2. Tap root



(a) Fibrous roots

(b) Tap root

Figure 8.4 Types of Roots



ACTIVITY

4

All students should go with their teacher on an excursion to some place where different types of plants grow. Remember to take some necessary things like a notebook, pen, blade or knife, bag, newspaper etc. with you.

During the trip observe all plants and trees carefully. Uproot small plants and place them between the sheets of a newspaper. As far as possible collect only plants that grow wild and grasses. If you need to collect plants from a field or garden follow instructions given by your teacher. As you collect plants note their names. In case you do not know the names of the plants label them a, b, c etc. After you return from your excursion or trip carefully observe all the plants you have collected. Copy Table 8.3 in your notebook and complete it.

**TABLE 8.3**

S. No.	Name of plant	Type of root	Type of seed Monocotyledonous/Dicotyledonous
1.	Peas	Tap	Dicotyledonous
2.			
3.			
4.			
5.			

Functions of the roots

You may have noticed that you need to exert some force to uproot the plants. This is because the roots hold the soil firmly together due to which the plant stand erect in the soil. This is one function of the roots. Let us do an activity to learn about another function.



ACTIVITY

5

Take a tumbler filled with water. Now put some red ink in the water to colour it. Carefully uproot a plant having a soft stem. Clean its roots with water. Now stand this plant in the coloured water and place the tumbler in the sun. Observe the plant after two hours.

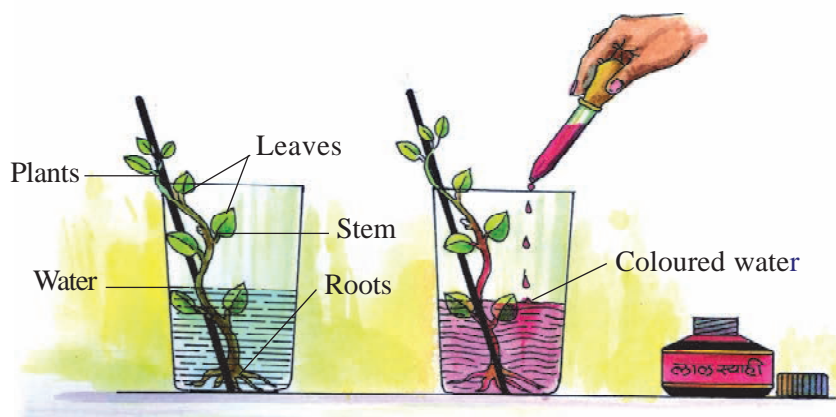


Figure 8.5 Absorption of water and mineral salts by roots

You will see that the coloured water has reached the leaves. Why did this happen?

The roots take up water and mineral salts and transport it to various parts of the plant. This process of taking up water and salts by roots is called absorption.

8.3 The Shoot System

You have learnt that stem, leaves, flowers fruits and seeds together constitute the shoot system.

Stem

In Chapter 7 you have learnt about herbs, shrubs, trees and climbers and about the special features of their stems.

You may have seen that leaves and branches arise from particular positions on the stem called nodes. The part between two nodes is called the inter-node. Maize, bamboo and sugarcane have nodes that are distinct and form swollen joints (Figure 8.6).

Now go on an excursion and try to recognize the nodes and internodes on different plants.

Functions of the Stem

1. The stems help the plant to stand erect.
2. The stem bears leaves, flowers and fruits.
3. In Activity 5 you saw that the red coloured water that was absorbed by the roots reaches the leaves and flowers through the stem. Thus it is clear that the water and mineral salts absorbed by the root are transported by the stem to various parts.
4. The stem also transports the food synthesized by the leaves to various parts of the plant.

Structure and Functions of the Leaves



ACTIVITY

6

Observe the leaves collected during the excursion and fill in the details after copying the following table in your notebook.

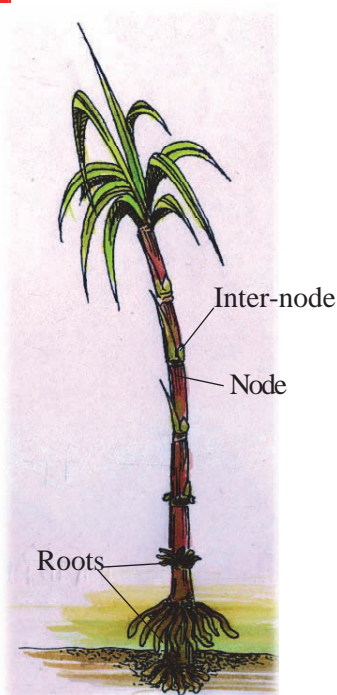


Figure 8.6 Plant of Sugarcane

**Table 8.4**

S.No.	Name of leaf	Shape	Colour	Margin	Surface	Tip
1.	Peepal	Heart shaped	Green	without any cut	Smooth	Pointed
2.						
3.						
4.						

**ANSWER THESE**

1. What is the colour of most of the leaves?
2. What is the difference between the two surfaces of the leaves?
3. Are the upper surfaces of all leaves similar?
4. How do the margins of the leaves differ?
5. Draw pictures of the leaves you have collected.

The leaf is an important part of the plant. You have seen that it is usually green in colour. The leaf is green due to a green pigment called chlorophyll. The leaves synthesize food with the help of chlorophyll. This process is called photosynthesis.

**ACTIVITY****7**

Place a leaf between two sheets of your notebook with the rough surface on top. Now gently rub a pencil or a crayon on the sheet over the leaf. Slowly the shape of the leaf will emerge on the paper and become distinct. Take rubbings of leaves of different shapes and size.

Flower

The flower is the reproductive organ of the plant. You would have seen many flowers of different types. Are all flowers similar? In what ways do flowers differ from each other?

**ACTIVITY****8**

Take flowers of *Dhatura* or *Besharam* and study their various parts. The outermost green whorl is called the calyx (Figure 8.7 a). It protects the flower before it opens. The coloured whorl seen inside the calyx is called the corolla. This attracts the insects like butterflies.

Separate the whorls carefully. Surrounding the central portion you will see several structures with swollen tips. These are called stamens. The swollen tips of the stamens are the anthers, which contain very tiny pollen grains. The stamens are the male parts of the flower. On removing the stamens the vase-like structure seen in the middle is the pistil (Figure 8.7 b). This is the female part of the flower.

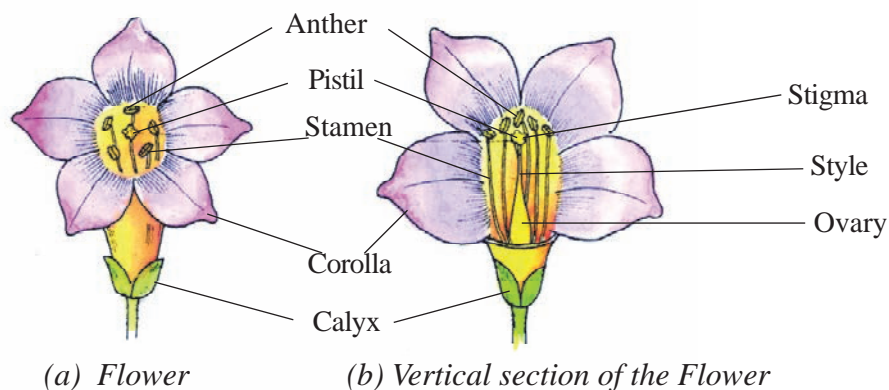


Figure 8.7 Parts of a flower.

The swollen basal portion of the pistil is the ovary. The elongated neck above the ovary is the style. On top of the style is the stigma. The ovary develops into the fruit. Cut a flower with a blade, study its structure and compare it with the Figure 8.7 b.

Such flowers which have both stamen and pistil in them are called bisexual flowers. The flowers which have either pistil or stamen are called unisexual flowers.

Fruit

The ovary of the flower gets converted into the fruit. You may have eaten fruits like mango, tamarind, *ber*, papaya and seen their seeds. The seeds give rise to the new plant. The seeds store food for the baby plants.

8.4 Modifications in Plants

Sometimes some parts of the plant have to carry out functions other than the ones that they normally do. The parts that do a separate function also look different from what they look like normally. Such parts are called modified parts. The roots, stems and leaves may be modified in different plants.

Modifications of roots



ACTIVITY

9

Look at radishes, carrots, turnips and sweet potatoes carefully. Do they look different from other roots? All these roots store food and hence they get swollen and their shapes change.

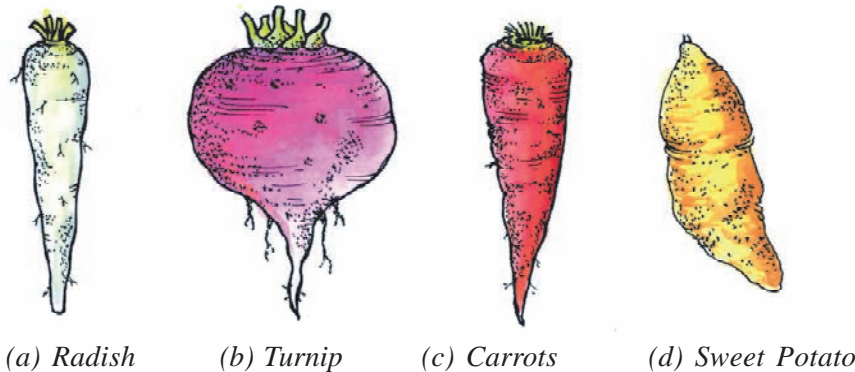


Figure 8.8 Modifications of Roots.

You may have seen rope-like roots arising from the branches of Banyan. These roots enter the soil and give support to the branches. (Figure 8.9 a). Similarly the lower part of the stems of sugarcane, maize and *Kewra* gives out roots that give support to the plant.

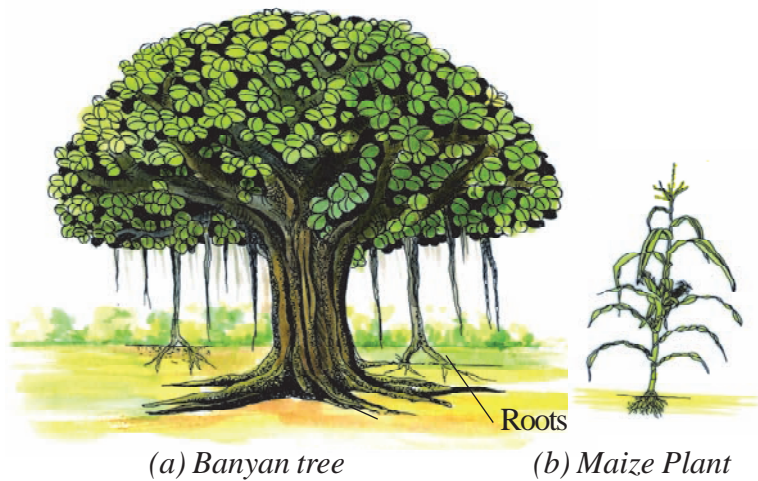


Figure 8.9

Modifications of stem

In some plants stems perform functions other than what they normally do. Such stems are said to be modified stems.



ACTIVITY

10

With the help of a hand lens look carefully at the pits (eyes) seen on the surface of the potato tuber (Figure 8.10). What do you see in them? You will see buds inside them. Similarly carefully observe ginger, *Colocasia (arbi)*, and an onion cut vertically. With the help of the Figure 8.10 identify the node, the inter node and buds in these.

Though these are found inside the soil they are not roots but are modified stems. They are stems since they have nodes, internodes, buds and scale leaves. None of these are found in roots. These stems store food.

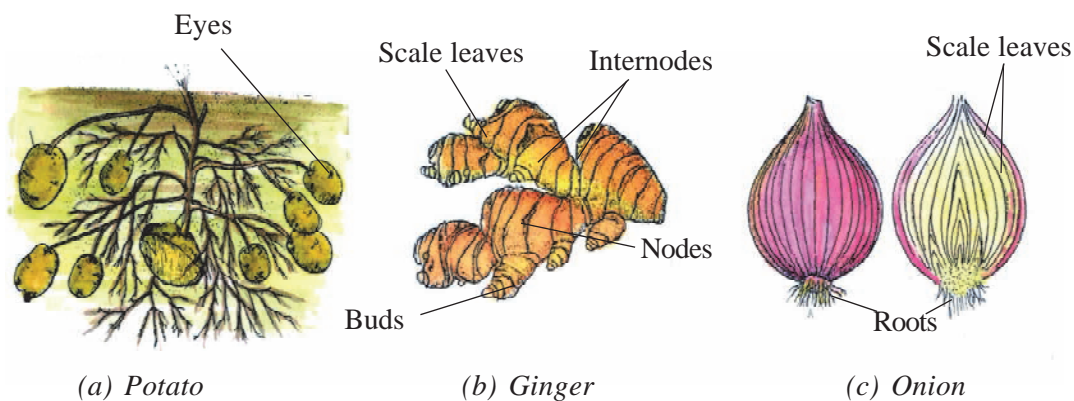


Figure 8.10 Modifications of the stem

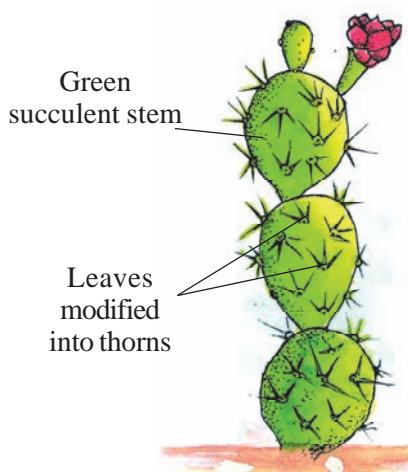


Figure 8.11 Opuntia

Look at figure 8.11 of the Opuntia [Cactus] carefully. These grow in areas with water scarcity. What is the structure and colour of its stem? Can you see any leaves on it?

Actually this is a modified stem. It is green, swollen succulent and it stores water. The leaves are modified into thorns which protect the plant. Find other such similar plants around you and discuss about it's similarities among your friends.

You may have seen creepers of pumpkin, gourd, bottle gourd, cucumber and the grape vine. Look at the creeper of the bottle gourd in Figure 8.12. Can you see small structures on the stem? What is special about their shape? These thread-like spiral structures are called tendrils. When the stems are weak and cannot bear the

weight of the plant, then the tendrils wind around any thing near them and help the plant to climb up.



ANSWER THESE

1. Why do stems and roots get modified?
2. Give the differences between fibrous and tap roots.
3. Give the names of any three modified stems and any three modified roots that you eat.
4. Identify which of these are roots, which are stems and write them in your notebook.
Radish, Potato, Ginger, Sweet Potato, Carrot, Onion,



Figure 8.12 Creeper of the Bottle Gourd

Modifications of Leaves

Look at the pea plant in Figure 8.13. Can you see anything special about its leaves? How are the leaves helping the plant stay erect? Like the stem and the roots the leaves can also get modified to perform some special purposes. The upper part of the leaves in peas gets modified into tendrils and help the plants climb.

You have seen that the leaves of cactus get modified into thorns, that protect the plants.

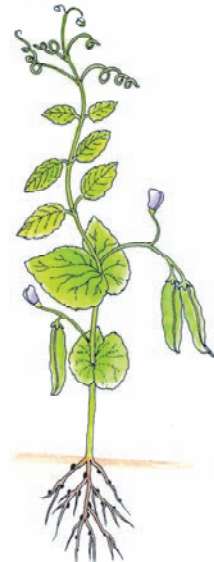


Figure 8.13
A Pea plant



WE HAVE LEARNT

- There are two main systems in the plant. The root system and the shoot system.
- Modified roots store food and give support to plants.
- Modified stems can manufacture and store food.
- Leaves manufacture food for the plant.
- Flower is the reproductive organ of the plant.
- Seeds are inside the fruits.
- Seeds germinate and make new plants.

**EXERCISE****1. Choose the correct option**

1. The ovary develops into –
 - a. Seed
 - b. Fruit
 - c. Stem
 - d. Tendril
2. Internodes are found on-
 - a. Root
 - b. Stem
 - c. Flower
 - d. Leaf
3. Fibrous roots are found in –
 - a. Basil (*Tulsi*)
 - b. Grass
 - c. Peas
 - d. Beans
4. An example of modified root is –
 - a. Radish
 - b. Potato
 - c. Ginger
 - d. Colocasia (*Arbi*)
5. In the centre of the flower is found –
 - a. The pistil
 - b. The stamens
 - c. The calyx
 - d. The corolla

2. Fill in the blanks –

1. The potato is an example of a modified _____.
2. The flowers are the _____ organ of the plant.
3. The leaves are green due to the presence of _____ in them.
4. The dicotyledonous plants have _____ roots.
5. The root in sugar cane perform the function of _____.

3. Answer these –

1. Draw diagrams of any one plant and label its parts.
2. Which system does the radical develop into?

3. Give the characteristics of the Opuntia.
4. Give examples of two plants that have stem tendrils.
5. Draw a labelled diagram of a flower.
6. Differentiate between the monocotyledonous and dicotyledonous plant.

THINGS TO DO

1. Collect the plants like Opuntia, sugar cane, turnip, radish, onion, carrot, sweet potato etc. growing around you. Also collect their parts with the help of your teacher, preserve them as specimens in the biology laboratory and find out the following information about them –

Name: Ginger

Identification: Thick, succulent, scaly leaves, with nodes and inter nodes.

2. With the help of your friends collect different types of seeds and exhibit them in your class room.
3. For your collection file collect 15 different leaves and 10 different flowers. (Before putting them in the file, dry the leaves and flowers by placing them between some thick sheets and pressing them with some heavy weight like some stacked books). compare the file with your friends and find the difference and discuss on them.

