

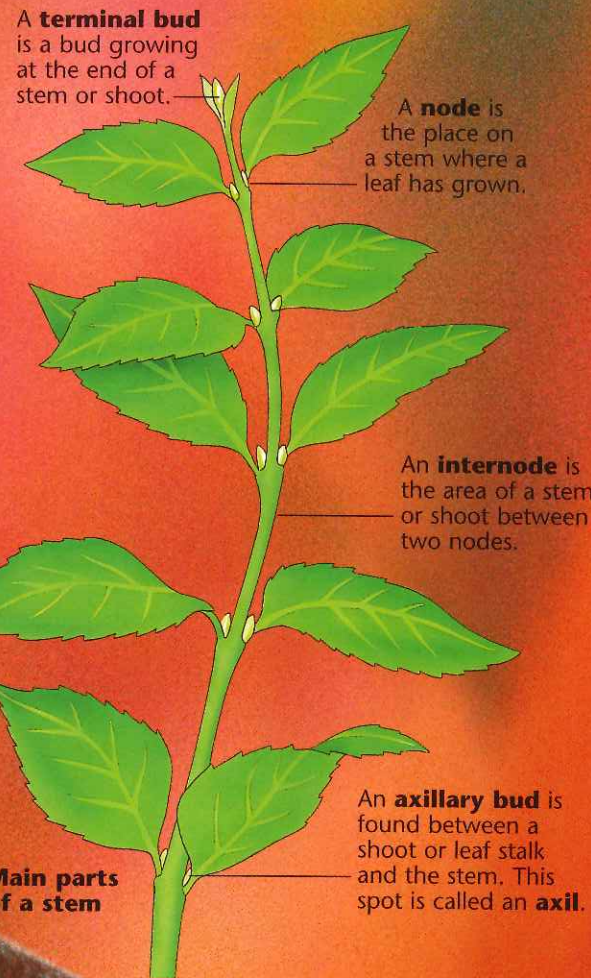
STEMS AND ROOTS

A plant is mainly supported by its stem and roots. In most plants, these also play an important part in carrying fluids. The stem and roots are made up of various parts, which change as the plant gets older. You can find out more about these changes on pages 14-15.

STEM STRUCTURE

The **stem** is the major above-ground or **aerial** part of a plant. It supports the plant, usually growing upward. Stems contain a system of **vascular tissue**, which carries water and minerals throughout the plant.

A **shoot** is a new stem which grows out of a seed or off the main stem of a plant. A **bud** is a small growth on a stem, which develops into either a new shoot or a flower. There are two different kinds of buds, called **terminal** and **axillary buds**. Axillary buds are also known as **lateral** or **secondary buds**.



This thick stem contains a system of tubes, which carry water and food through the plant.

GROWTH

A group of cells which divide to provide new growth is called a **meristem**. The main meristems are at the tip of the shoot and root. They are called **apical meristems**. A meristem formed in the main stem or a shoot is part of a terminal bud.



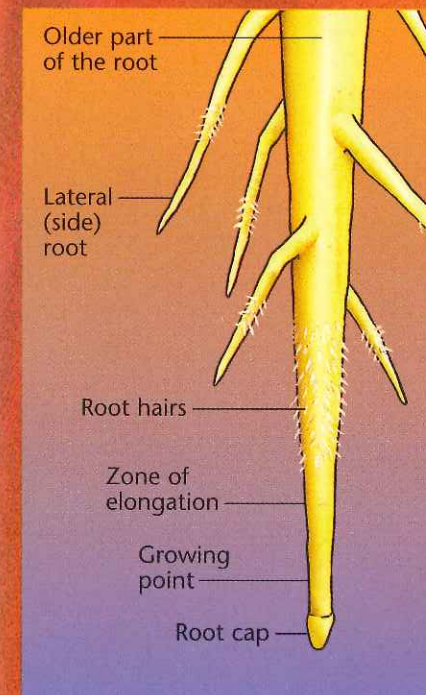
PARTS OF A ROOT

The **root** of a plant usually grows down into the ground. Its main purpose is to take in water and minerals from the soil. These are absorbed through tiny, tube-shaped cells called **root hairs**. The root also acts as an anchor, holding the plant firmly in the soil.

A root grows when cells just behind its tip divide. This area is called the **growing point**. The area of new cells produced is called the **zone of elongation**. The new cells have soft cell walls, which allow them to stretch lengthways as water is taken into the root.

As the new cells lengthen, they push the tip of the root further into the soil. A layer of cells called the **root cap** protects the root tip as it is pushed down into the ground.

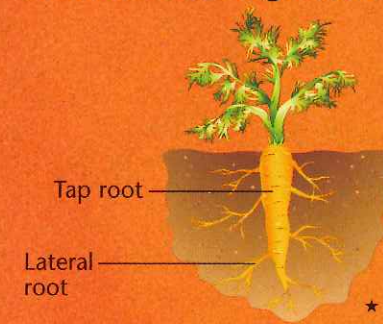
Parts of a root



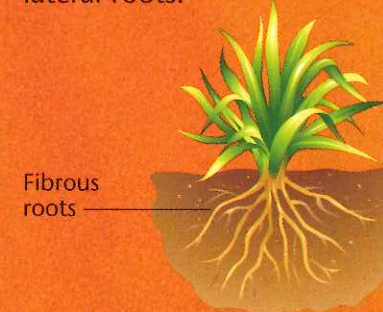
TYPES OF ROOTS

Roots can be many shapes and sizes, depending on the plant from which they grow. Some have particular tasks, such as allowing the plant to cling to other objects.

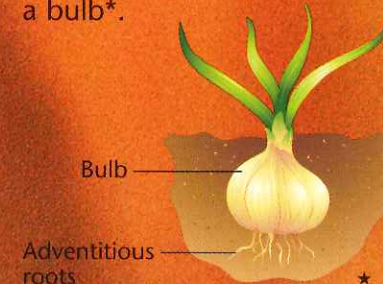
A **tap root**, or **primary root**, is a large root with smaller ones growing out of it. These small roots are called **lateral roots** or **secondary roots**. Many vegetables, such as carrots, are swollen tap roots and are known as **root vegetables**.



Fibrous roots are a system of many equal-sized roots, all of which produce smaller lateral roots.

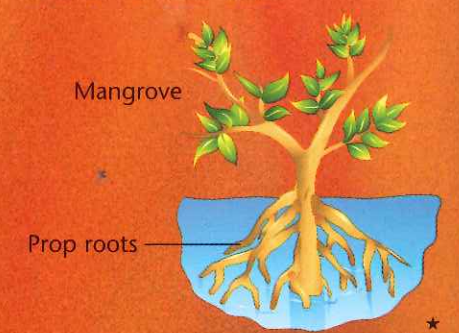


Adventitious roots grow directly from a stem. They are produced from gardeners' cuttings, or grow out of a special kind of stem called a **bulb***



Aerial roots do not normally grow in the ground. Many can absorb moisture from the air. Some plants, such as ivy, also use them for climbing.

Prop roots are a particular kind of aerial root that grow outwards from a stem, then down into the ground. They support heavy plants, such as mangroves, which grow in ground which is often underwater.



See for yourself

Look at a plant, and see how many parts of its stem you can identify. Notice what shapes and sizes they are. Be careful not to damage the plant.

Internet links

Go to www.usborne-quicklinks.com for links to the following Web sites:

Web site 1 An easy-to-understand look at cell division with images showing root cell division.

Web site 2 Detailed information about stems and roots, with clear photographs and diagrams.

Web site 3 Find out how strong plant roots can be.

Web site 4 A thorough look at different types of roots and stems, with useful diagrams and photographs.