

Growth Springs Eternal

Some vascular (veined) plants, also called tracheophytes, are able to continue growing year after year. This is made possible by meristems, groups of stem cells that retain the ability to divide. There are two types of meristems: apical, which carry on the plant's primary growth, and lateral, which give rise to the tissues that increase the plant's girth. As the meristematic cells form new cells, the plant grows and renews its organs. Thanks to their growth buds, the plants maintain their vitality and strengthen their organs or replace them often. Because of this process, the renewed plants are able to increase their number of branches, flowers, and leaves. ●



Without Bracts
Some buds, such as those in plants of the cabbage family (Brassicaceae), are not covered by bracts. Instead, the vegetable's growth zone is covered by outer leaves.

BRACTS
Protective leaves that contain gummy substances, which keep the bud from drying out.

NEW LEAVES
unfold, and growth again occurs in the growth zone.

Awakening

Apical buds can remain dormant for long periods of time. With the right physiological and environmental conditions, they can awaken and unfold.

PROPHYLLS
The first leaves to form

MAIN AXIS
contains small, compressed nodes and internodes.

SHOOTS OF AXILLARY BUDS

LEAF SHOOTS
When the bracts open, these small leaves expand.

GROWTH ZONE



INFRAPETIOLAR BUD

The axillary bud is joined to the petiole of a leaf. The growth of the leaf carries the bud outward. This often occurs in plants with inflorescences, or flowers that grow on branches.

SUPERPOSED BUD

The axillary bud is joined to the stem. As the cells of the internode multiply, they carry the axillary bud, which then appears to be inserted above the leaf.

PHYLLOTAXIS
is the name of the order of plants whose leaves are arranged along the nodes of the branches. Each node can have from one to several leaves.

Branching

Growth buds can be found at the end of the main axis (apical bud) or at the joint where the leaves meet the stem (lateral bud). Growth can take different forms, depending on the type of bud that predominates. If apical buds are more common, the branch growth is called monopodial. If lateral buds predominate, the branch growth is called sympodial. Conifers are an example of monopodial growth. Sympodial growth is widespread among dicotyledon herbs and is found in practically all monocotyledons.

SYCAMORE MAPLE
Acer pseudoplatanus



ALTERNATING
One leaf per node, arranged alternately in successive nodes. Found in monocots and dicots.

Arrangement of Leaves
 GIANT SEA HOLLY
Erythronium giganteum

VERTICILLATE
Several leaves per node. Whorls are formed in a spiral arrangement around successive nodes.

Arrangement of Leaves
 GUIN ROCKROSE
Cistus ladanifer

OPPOSITE
Two leaves per node. They are arranged perpendicularly to center and later nodes.

Arrangement of Leaves
 CLARY SAGE
Salvia sclarea

Lateral Buds

These buds occur on the side of the stem; typically, only one is located in the stem joint. In some cases many lateral buds are arranged in a series around a column (serial buds). They can also be arranged around the same crosswise line along the branch or stem (collateral buds).

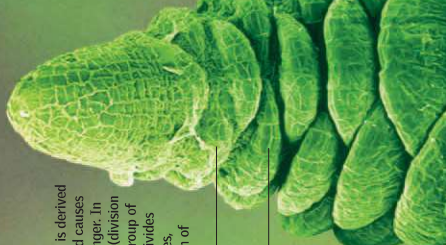
Serial Buds
These buds are situated one above the other at the joint where the protective leaf meets the stem, forming a vertical file. The honeysuckle and the bougainvillea are examples of this type of bud.

Collateral, or Adjacent, Buds
are situated one on either side in the joint of the same leaf, forming a horizontal line. In garlic each clove is an axillary bud.

Serial Buds
 Leaf Scar

Serial Buds
 Leaf Scar

Initial Cells
 STEM APEX



APICAL BUD
The apical meristem is derived from the embryo and causes the stem to grow longer. In seed-bearing plants (division Spermatophyta) a group of meristematic cells divides along different planes, increasing the length of the stem.

Leaf Shoots

A lengthwise cross-section of a bud shows the curving and overlapping leaf sprouts that protect the bud's growth zone.

