Botanical Society of Britain & Ireland

Identiplant

UNIT 2a: TERMINOLOGY - BUDS, LEAVES AND BRANCHING

Introduction

It is impossible to describe a plant accurately without some botanical terminology. **Unit 2 explains the essential terms that will be used throughout the course. No others will be necessary, apart from a few that are specific to certain families.**

The best way to learn the terminology is to use it yourself, so the first assignment includes describing some leaf shapes. The structure of the flower often indicates a plant's family so it is essential to understand it. The shape and position of the ovary may be sufficient by itself to tell you which family the plant belongs to. In Unit 2b there is therefore a section explaining how to construct a 'floral formula', which is simply a shorthand way of describing a flower. To do this, you will have to pull the flower apart, probably count the parts, and examine it very closely with a lens. **These skills are essential in order to understand the flora and use keys successfully.** You will also appreciate the beauty and intricate details of flowers when you look at them with an insect's eye view.

You are not expected to sit down and learn all the terms in these units but rather, to understand what they mean. Then you should try to use them when answering the questions. If possible, **PRINT PAGES OF UNITS 2a) AND 2b) AND KEEP FOR REFERENCE.** From Unit 4 onwards, you will have to find wild plants and list their diagnostic features. You will need to use the proper terminology but it is impractical to keep scrolling back and forth on a screen to find the right words. By the end of the season you will know them.

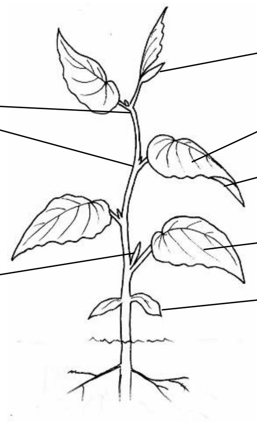
If this is all completely new to you, you are bound to make mistakes, but this doesn't matter at all. You are not being assessed – your tutor doesn't give numerical marks but their role is to find your mistakes and tell you the correct or a better answer. You should read your tutor's comments very carefully and learn from them. **If all the questions have been attempted, and corrected if necessary, your tutor will grade the unit as 'Complete' and you don't have to repeat anything.**

Copyright © 2023 BSBI

Botanical Society of Britain & Ireland

Plant Growth Form or Habit

The stem is the **axis** of the plant from which leaves, shoot buds and flowers arise. Something facing towards the main stem is **adaxial**. Away from the stem is **abaxial**. So, generally, the upper surface of a leaf is the adaxial surface, the lower surface is abaxial. ('Ad' means towards, as in advance or admit. 'Ab' means away from, as in absent.)



Leaf arrangement can be opposite (two per node), whorled (several per node) or alternate (one per node). Leaf axillary buds will normally be dormant, but some grow into side branches. The branching may be opposite or alternate; this is determined by the leaf arrangement.

At a certain point a bud may switch from vegetative growth to flower production. The flower-bearing part of the plant is an **inflorescence**. It may be **terminal**, produced by the apical bud and therefore terminating the growth of the shoot, or **axillary**. An axillary flower or inflorescence arises from a bud in a leaf axil. The shoot continues to grow and may produce flowers from successive nodes for an extended period.

Annuals complete their life-cycle within one year and rely on seeds for their survival.
Biennials live for 2 years, flowering in their second year. They generally form a rosette in the first year then 'bolt' in the second. The year 1 and year 2 plants may look very different.
Perennials live for more than 2 years. **Trees** and **shrubs** have woody stems that persist through the winter (with or without leaves). **Herbaceous perennials** ('herbs' to a botanist) die back to ground level and form new shoots in spring.

Some perennials reproduce vegetatively by stems that grow horizontally and root at the nodes to form new plants. **Stolons** (commonly known as runners) grow above ground. The strawberry has very long stolons but many plants have shorter, less conspicuous ones e.g. Sweet Violet.

Rhizomes are stems that grow at or below ground level and generally look more like roots. If below ground their presence has to be inferred from the growth pattern of the plant.
Suckers are shoots arising from the roots of trees or shrubs. The leaves of suckers may be very different from those on the parent tree so should not be relied upon for identification.

 Copyright © 2023 BSBI

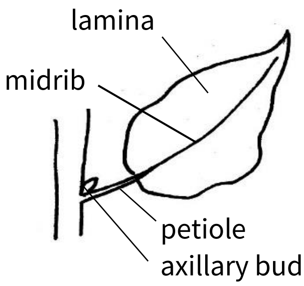
Leaves

The seed leaves or **cotyledons** are simple in shape. They are followed by the **foliage leaves**.

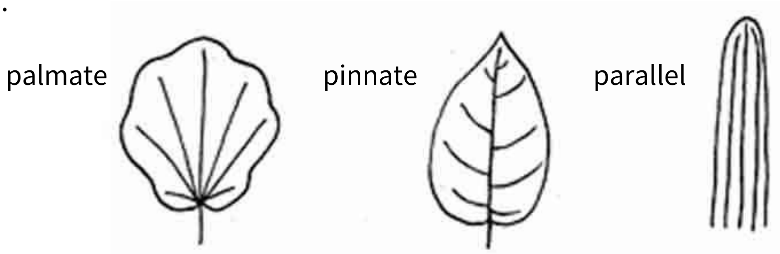
Basal leaves arise at ground level. **Cauline leaves** are borne on the stem. The basal leaves are generally the largest and most complex in shape. It may be important to observe these for identification, although they sometimes wither before flowering time. Cauline leaves often become smaller and simpler towards the inflorescence.

A **bract** is a reduced leaf that subtends a flower or inflorescence branch (i.e. the flower arises from the axillary bud of the bract). Sometimes the bracts are just small scales.

A leaf is **simple** if its blade (**lamina**) is not subdivided. It is still described as simple even if it is deeply lobed, like a dandelion, provided that the lobes don't go all the way to the **midrib**. The leaf stalk is called the petiole. When a leaf lacks a stalk it is described as **sessile**.

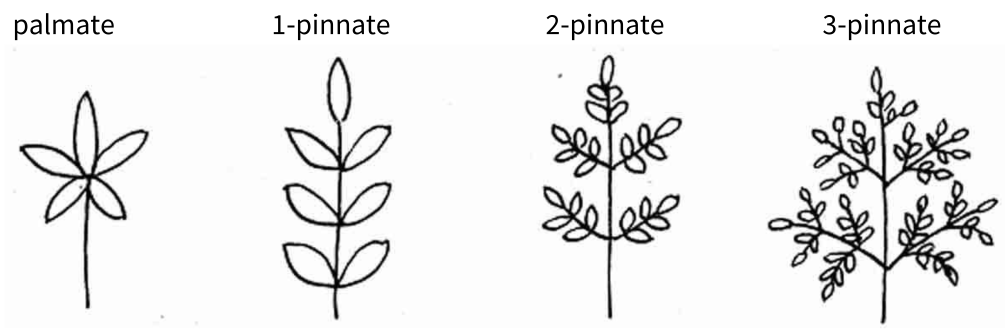


The arrangement of **lateral veins** may be **palmate** or **pinnate**, or **parallel** in linear leaves like grasses.



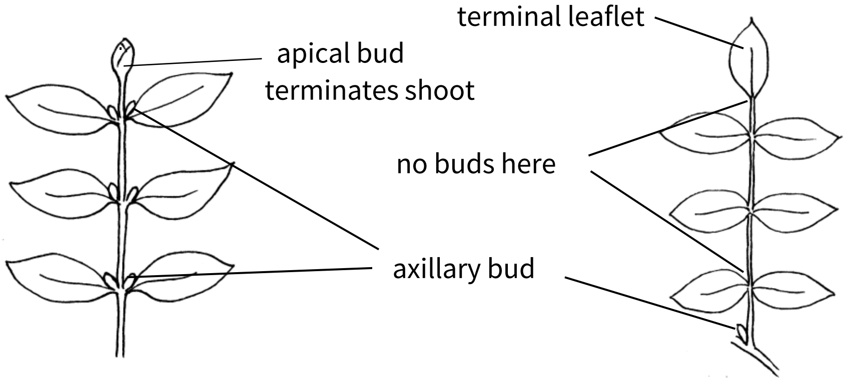
Compound leaves are subdivided into **leaflets**. A compound leaf can be described as trifoliate (with 3 leaflets; alternatively ternate in some floras), palmate (with more than 3 leaflets, all arising at one point) or pinnate (with more than 3 leaflets, arising in pairs along the midrib).

The leaflets of a pinnate leaf may be subdivided again one or more times, when the leaf is described as 2-pinnate, 3-pinnate etc. Some of the Apiaceae (carrot family) have especially complex leaves, the largest of which may be up to 6-pinnate. N.B. you do not count the midrib (which becomes the **rachis** between the leaflets in a compound leaf); the first lateral division is no. 1.



Copyright © 2023 BSBI

It is most important to distinguish between a single **leaf<u>let</u>** (= part of a compound leaf) and a simple leaf.

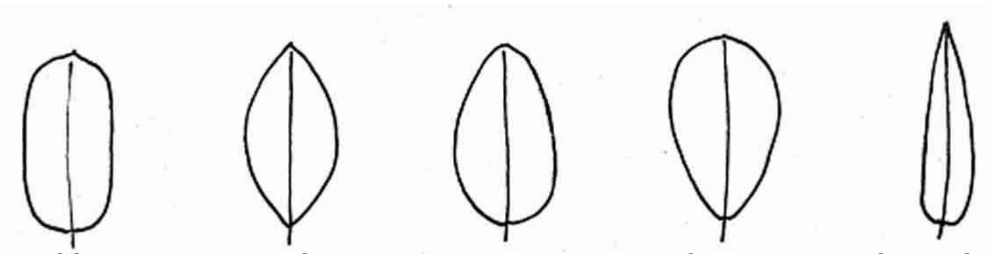


A shoot with 6 opposite, simple leaves and a terminal bud

A single compound leaf with 7 leaflets

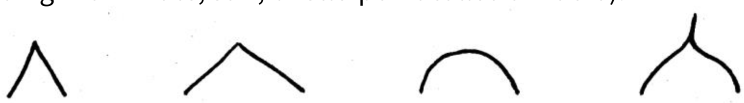
A leaf may be **petiolate** (stalked) or **sessile** (unstalked – 'sitting' on the stem). The blade of a sessile leaf may run down into the stem and may even continue downwards to form a **winged stem**.

Describing leaf or leaflet shape:
First, look at the overall outline of the leaf, ignoring teeth, lobes etc. The commonest shapes are:



oblong **oval** **ovate** (egg shaped) **obovate** (upside-down egg) **lanceolate**

Then look at the leaf tip. It may be **acute** (less than 90°), **obtuse** (more than 90°), **rounded**, or **mucronate** (ending in a minute, stiff, bristle-point called a mucro).



acute **obtuse** **rounded** **mucronate**

The leaf margin takes a great variety of forms which can be broadly classified as **entire** (smooth, without teeth or lobes), **toothed** (sometimes double toothed), **lobed** or **cut**.

entire **toothed** **lobed** **cut**

The base may be **rounded**, **sagittate** (arrow shaped), **cuneate** (wedge shaped) or **cordate** (heart shaped).

There may be a pair of **stipules** at the base of the petiole, where it joins the stem. They may be large and leaf-like or just small scales that are easily overlooked. Another possibility is for the leaf base to ensheath the stem.

Finally, look with a lens for hairs. They may be restricted to certain positions, e.g. only on the abaxial surface, at the vein junctions or on the petiole. They may be stiff or woolly, **patent** (sticking out) or **adpressed** (or **appressed**). They can be **forked**, **hooked**, **stellate** (with several branches like umbrella spokes) or **glandular**. **Glabrous** means without hairs.

Describing the almost infinite variety of leaf forms is a great challenge for flora writers and there are many terms in addition to the ones given above. They will always be in the glossary however. Accurate observation is much more important than knowing the words.

In 2009 a book was published that was a revolution in plant identification:

The Vegetative Key to the British Flora, Poland & Clement, BSBI, 2009, 2nd edition 2019
We no longer have any excuse for ignoring plants that we don't recognise and that are not in flower. This key really works but it takes very detailed observation and some determination to use. The following description is of the leaf of *Ribes rubrum,* Red Currant, as an example:

> "Lvs hairless or veins sparsely hairy below, to 8cm wide, wider than long, obtusely (3)5-lobed, cordate at base, dull dark green above, ciliate, with stomata below only. Petiole 4-8cm, ciliate with few long nonglandular simple hairs nr dilated base, shortly crisped-hairy at least nr lf, with few red short stalked or ± sessile glands."

 Copyright © 2023 BSBI

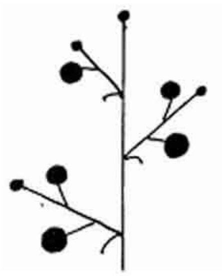
The Inflorescence

The flower may be **solitary**, as in the tulip, but generally a number of flowers are grouped in an inflorescence. This may be loose and few flowered, as in the buttercup, or with many flowers in a tight cluster as in the clovers or teasel. Inflorescence branching patterns are very varied and there are numerous terms which it is not necessary to learn. Just a few are useful.

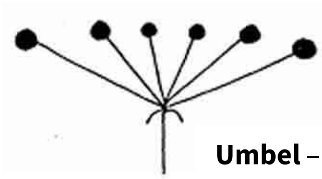
Inflorescences are grouped into two main types: **racemes** have indeterminate growth i.e. the youngest flowers are at the top and the inflorescence can go on growing and producing more flowers for an extended period. **Cymes** have determinate growth i.e. the top flower opens first, followed by the ones below. In practice, this distinction is not so obvious.

RACEMES

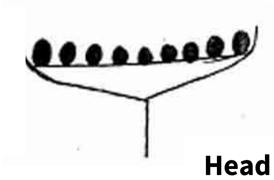
Spike – a raceme with unstalked (sessile) flowers



Panicle – a compound raceme, well developed

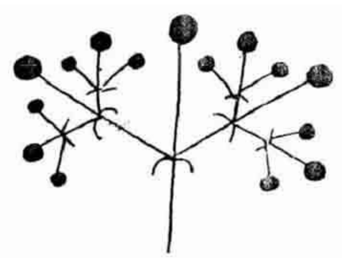


Umbel – the Apiaceae have conspicuous umbels i.e. umbels of umbels!

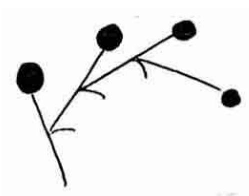


Head or capitulum – a feature of the Asteraceae

CYMES



Compound cyme



One-sided cyme forming the scorpioid inflorescence seen in many members of the Boraginaceae

Copyright © 2023 BSBI

WARNING! Size of plant parts.

Plants are phenotypically plastic i.e. they can change their form in response to environmental conditions. Animals are very different; if they are in an unsuitable place they will get up and move but plants are non-motile so must adapt and cope. Soil nutrients, water and especially light can have a dramatic effect on leaf size and overall plant height and shape. **Never rely on leaf size as a diagnostic character**, although 'up to x cm' may be used, or the length : breadth ratio might be given. Suckers and plants growing in deep shade tend to have very large leaves whilst plants growing on bare, trampled ground can have very tiny ones.

Flower size is much more constant than leaf size because this is matched to the size of the pollinating insect. As a general rule, a stressed plant will produce a few flowers of ± normal size rather than a large number of small ones.

Copyright © 2023 BSBI