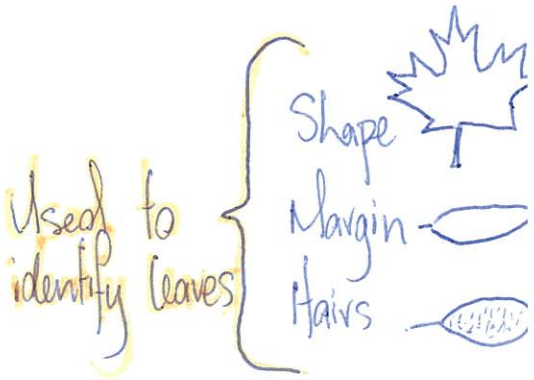
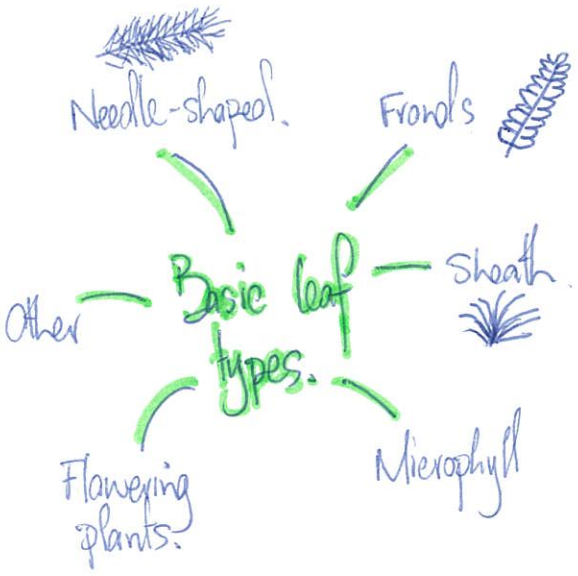
Leaf morphology

External leaf characteristics (such as shape, margin, hairs, etc.) are important for identifying plant species, and botanists have developed a rich terminology for describing leaf characteristics. These structures are a part of what makes leaves determinant; they grow and achieve a specific pattern and shape, then stop. Other plant parts like stems or roots are non-determinant, and will usually continue to grow as long as they have the resources to do so.



Basic leaf types

- Ferns have fronds
- Conifer leaves are typically needle-, awl-, or scale-shaped
- Angiosperm (flowering plant) leaves: the standard form includes stipules, a petiole, and a lamina
- Lycophytes have microphyll leaves.
- Sheath leaves (type found in most grasses)
- Other specialized leaves (such as those of *Nepenthes*)



Arrangement on the stem

Different terms are usually used to describe leaf placement :

- **Alternate** — leaf attachments are singular at nodes, and leaves alternate direction, to a greater or lesser degree, along the stem.
- **Opposite** — leaf attachments are paired at each node; **decussate** if, as typical, each successive pair is rotated 90° progressing along the stem; or **distichous** if not rotated, but two-ranked (in the same geometric flat-plane).
- **Whorled** — three or more leaves attach at each point or node on the stem. As with opposite leaves, successive whorls may or may not be decussate, rotated by half the angle between the leaves in the whorl (i.e., successive whorls of three rotated 60°, whorls of four rotated 45°, etc). Opposite leaves may appear whorled near the tip of the stem.
- **Rosulate** — leaves form a rosette