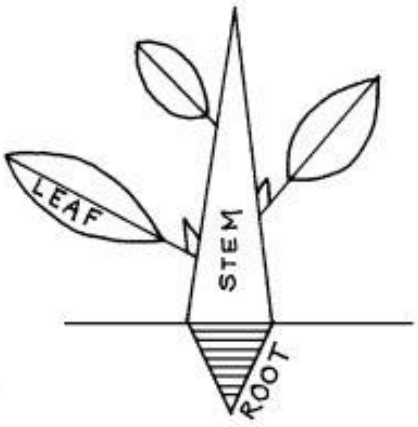
20 September 2000

Vegetative Morphology of Vascular Plant Sporophytes

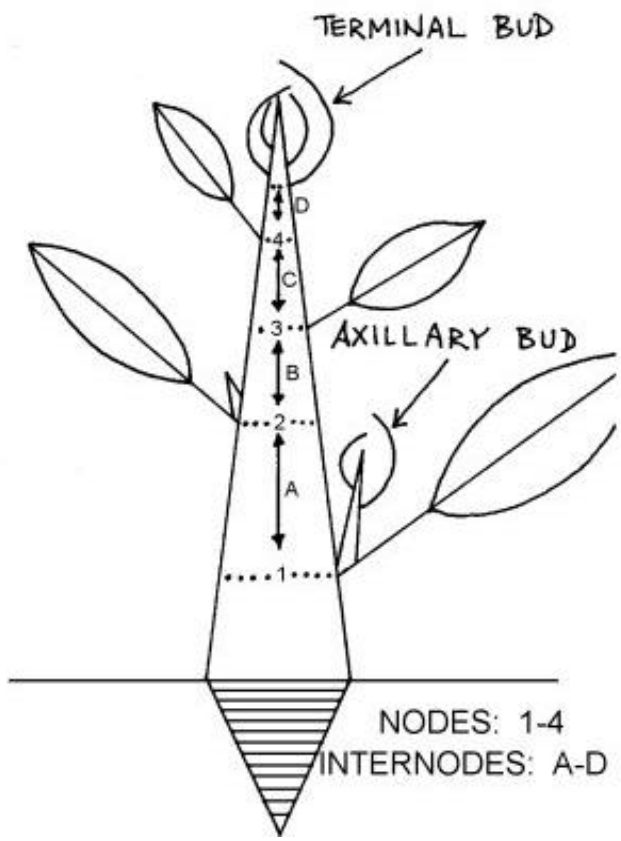
What's a *sporophyte*? It, and the *gametophyte*, are the two stages of the life cycle of vascular plants (ferns and fern allies, seed plants) and bryophytes, and will be described next week. Gametophyte organization in ferns and fern allies (Pteridophyta) is similar to that of bryophytes. The gametophytes of seed plants (Spermatophyta) are much smaller, dependent on the sporophyte, and will be described later in the course.

Root-Shoot Organization



Like leafy liverworts and mosses (also introduced, briefly, next week), the aerial portion of most vascular plants can be understood as being made up of more or less branched axes (**stems**) and appendages (**leaves**). Together, these axes and their appendages are referred to as **shoots**. However, in the vascular plants two novelties warrant mention: (1) **roots** - a second, axial system that enables the plant to aggressively obtain water and dissolved nutrients from its surroundings. Roots typically develop from the root axis of the embryo. However, in many groups also regularly arise in other locations as well, as well as adventitiously, e.g. a result of injury; (2) **vascular tissue** - specialized tissues for conducting water (xylem) and photosynthate (phloem) differentiate in stems, leaves, and roots.

Stem features



nodes and internodes -

nodes are the points on the stem at which leaves are attached, while
internodes are the intervening portions of the stem.

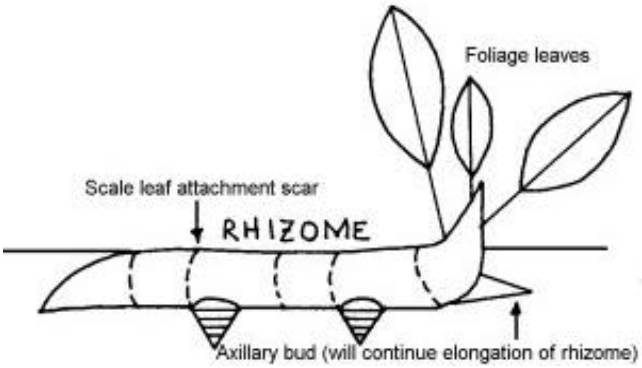
leaf scars and bundle scars -

these are the scars left behind after a leaf falls off, that permit one to deduce the arrangement (and number) of the leaves and of the vascular bundles that supply the leaf.

buds -

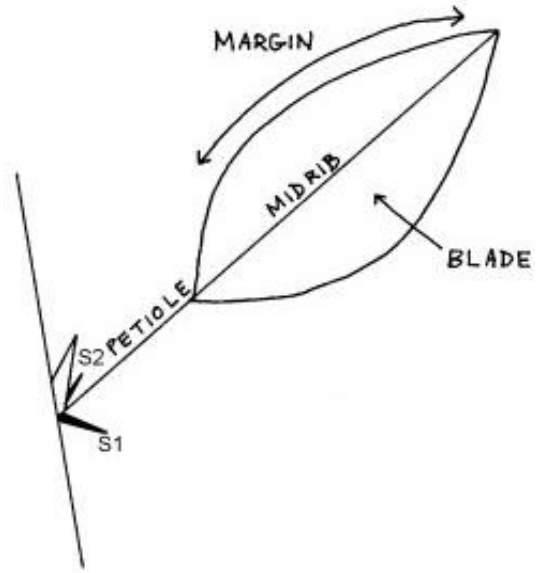
terminal buds represent the growing point (apical meristem) at the tip of a stem, enclosed by immature or modified leaves.
axillary (lateral) buds are apical meristems, similarly enclosed, that are formed in the axils of leaves.

Shoot modifications, and other features



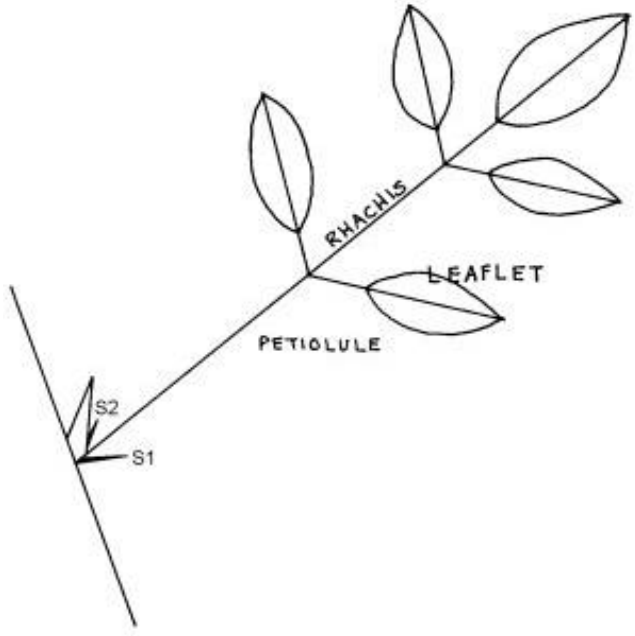
rhizome - prostrate, underground shoot
stolon - like a rhizome, but above ground
bulb - shoot with internodes extremely short and the leaf bases swollen as storage organs (e.g. onion)
corm - shoot with internodes short and the stem swollen as a storage organ (e.g. Gladiolus)
shoot dimorphism - production of two kinds of shoots(short shoots, long shoots)

Leaf features



persistence - how long leaves remain attached to the stem

composition - parts of the leaf, and how they're put together
petiole
blade
margin
simple leaves
compound leaves
leaflet
rhachis



arrangement - of leaves on the stem (phyllotaxy)
alternate (distichous, spiral)
opposite (decussate)
whorled

type -
broad-leaved
scale-like
needle-like

shape - of the leaf blade

lobing and margination - of the leaf blade