Venation

The arrangement of veins in a leaf (venation) or leaflet blade may also be either pinnate or palmate.

In pinnatly veined leaves there is main vein, called midrib with secondary veins branching from it, but in palmatly veined leaves, several veins fan out from the base of the blade.

The larger veins are parallel to one another in monocots and diverge from one another in various ways in dicots.

In a few leaves, no midrib or other large veins are present. Instead, the veins fork evenly and progressively from the base of the blade to the opposite margin. This is called dichotomous venation.

Specialized leaves

Tendrils

There are many plants whose leaves are partly or completely modified as tendrils. These leaves when curled tightly around more rigid objects, help the plant climbing or in supporting weak stems.

In ***garden peas*** the leaves are compound, and the upper leaflets are reduced to whip-like strands that, like all tendrils, are very sensitive to contact.

It should be noted that the tendrils of many plants are not modified leaves (e.g. ***grapes***) but have developed from stems.

Specialized Leaves

Tendrils

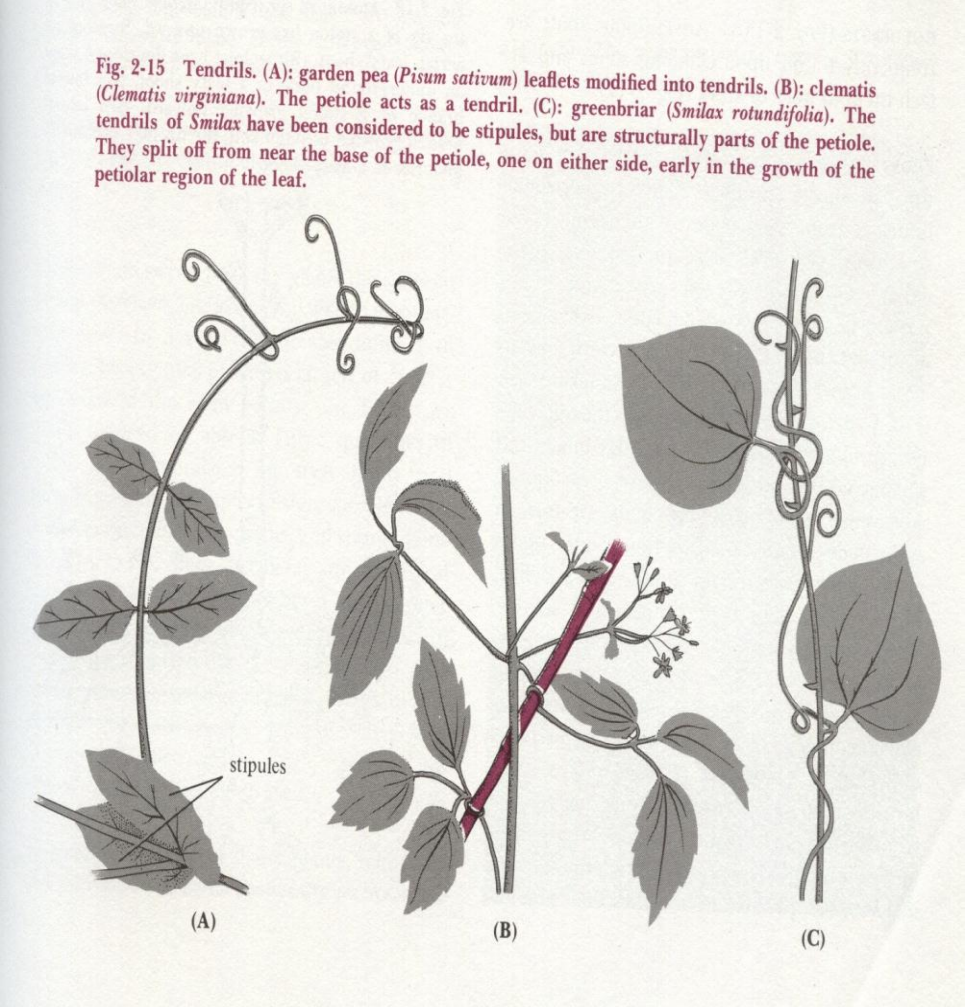


Fig. 2-15 Tendrils. (A): garden pea (*Pisum sativum*) leaflets modified into tendrils. (B): clematis (*Clematis virginiana*). The petiole acts as a tendril. (C): greenbriar (*Smilax rotundifolia*). The tendrils of *Smilax* have been considered to be stipules, but are structurally parts of the petiole. They split off from near the base of the petiole, one on either side, early in the growth of the petiolar region of the leaf.

Spines, Thornes, and Prickles

Many desert plants have their leaves modified as a spines. This reduction in leaf surface correspondingly reduces water loss from the plants, and the spines also apparently protect the plants from browsing animals.

Photosynthesis in such desert plants, which would otherwise take place in leaves, occurs in the green stems.

In a number of woody plants, the stipules at the bases of the leaves are modified as short, paired spines.

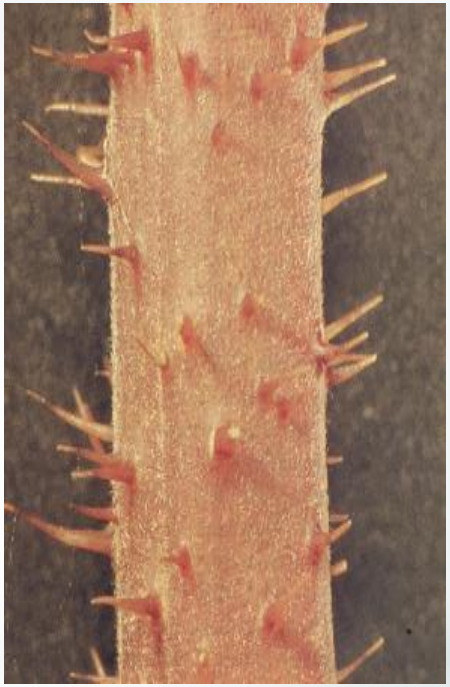
Many spine-like objects arising in the axils of leaves are modified stems rather than modified leaves.

Such modifications should be referred to as thorns to distinguish them from true spines.

The prickles of roses, however, are neither leaves nor stems but are outgrowths from the epidermis or cortex just beneath it.

Spines

Thorns



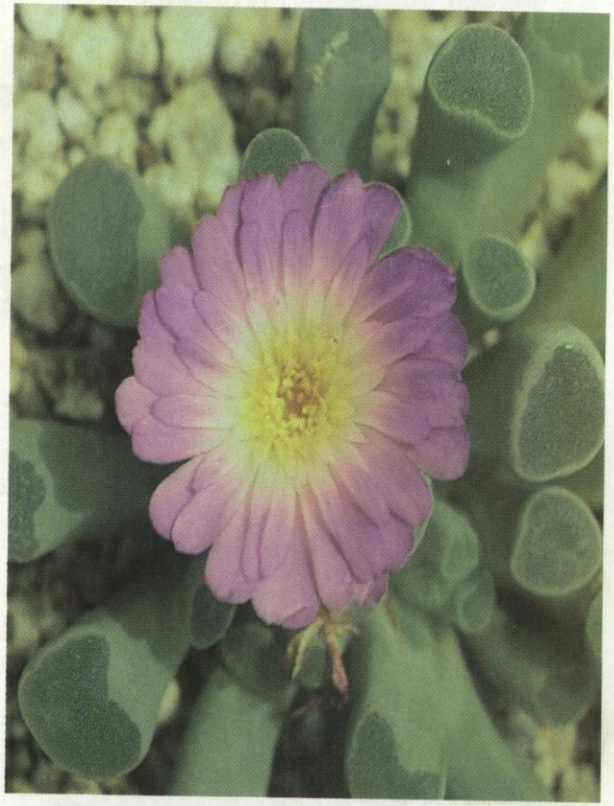
Prickl
es

Storage leaves

Some desert plants have succulent leaves (leaves retain water). The modification that permit water storage, involve large, thin walled parenchyma cells without chloroplasts to the interior of chlorenchyma tissue just beneath the epidermis. These *nonphotosynthetic cells* contain large vacuoles that can store proportionately substantial quantities of water.

Storage

FIGURE 7.13 A window plant. Note the transparent tips of the window leaves.



Reproductive leaves

The succulent leaves of air plants have little notches along the leaf margins in which tiny plantlets are produced, complete with roots and leaves.

Reproductive Leaves

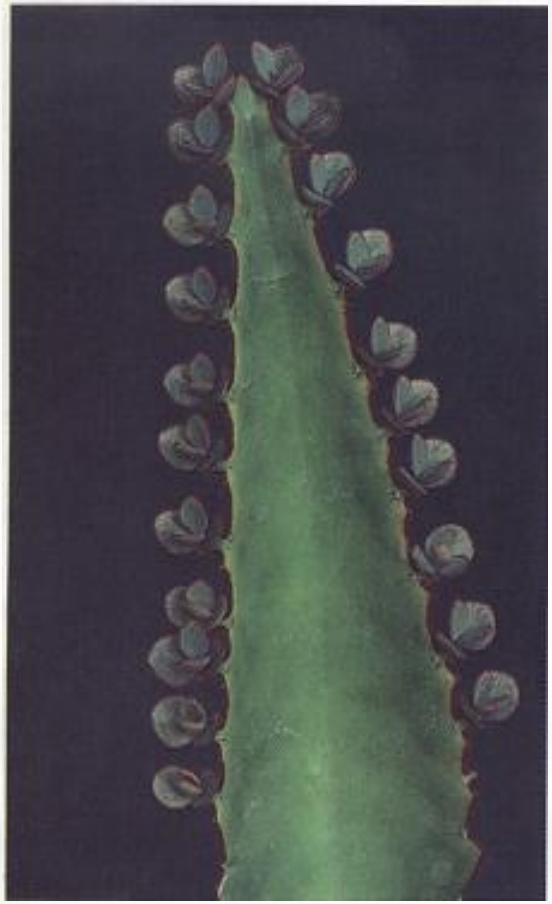


FIGURE 7.14 A leaf of an air plant, showing plantlets being produced along the margins.

Floral leaves (Bracts)

Specialized leaves known as bracts are found at the basis of flowers or flower stalk. In some plants such as *the Christmas flower* (poinsettia), the flowers have no petals, but the brightly colored floral bracts that surround the small flowers make up for the absence of petals.

Floral Leaves
Bracts

FIGURE 7.15 A poinsettia "flower." There are several flowers without petals in the center. The most conspicuous parts of the "flower" are the colored bracts (modified leaves) surrounding the true flower.

*Types of Specialized Leaves