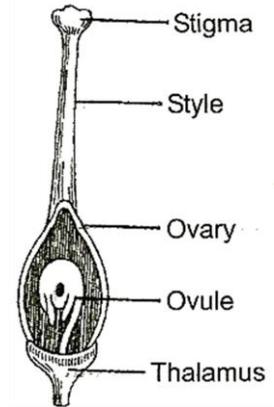


6.3. Gynoecium

The **gynoecium** refers to all female organs of a flower. The unit of the gynoecium is the **carpel**, defined as a modified, typically conduplicate megasporophyll that encloses one or more ovules.

A **pistil** is that part of the gynoecium composed of an **ovary**, one or more **styles**, and/or one or more **stigmas**. Pistils or ovaries may be **simple**, composed of one carpel, or **compound**, composed of two or more carpels.



6.3.I. Pistil and locule numbers: (figures 1.36)

Carpel number is often critical in classification and identification of flowering plants. A line or mark of carpels union or fusion is called a **suture**; there are **dorsal suture** and **ventral suture** (which consider the carpels fusion line). Carpel number is determined as; if the gynoecium is **apocarpous**, the number of carpels is equal to the number of pistils, as in *Ranunculus*; this is because each pistil is equivalent to a single carpel in any apocarpous gynoecium. (For example, pistils of *Delphinium* have one stile and stigma, is a **monocarpous**, pistils of all members of the Asteraceae have two styles and stigmas, and thus carpel number is interpreted as two), **syncarpous**, gynoecial fusion is one in which carpels are connate (the pistil compound) and is the most common type in flowering plants (figure 1.36).

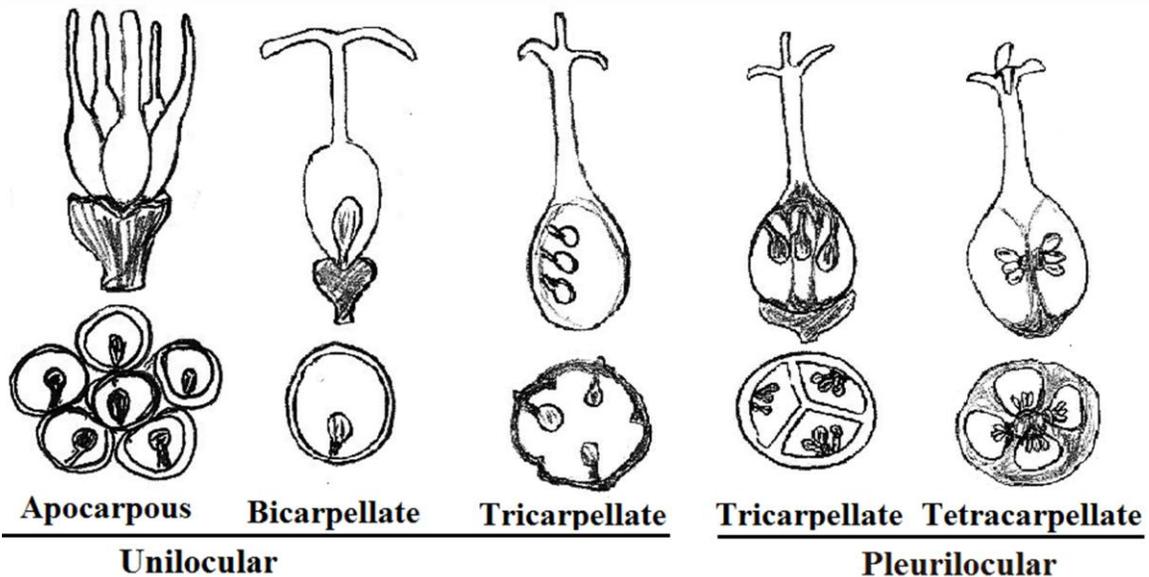


Figure 1.36: Pistil and locule numbers

6.3.V. Placentation types

The tissues of the ovary that bear the ovules (the immature seeds) are **placenta**, a **funiculus** is a stalk that may lead from the placenta to the ovule. **Placentation** refers to the positioning of the ovules and takes into account the number and position of placentae, septa, and locules (figure 1.37).

1. **Basal**, a single ovule with a placenta borne at the base of a unilocular ovary as occurs in the Asteraceae and Poaceae.
2. **Apical** or **pendulous**, with a placenta at the top of the ovary, as in Apiaceae and Moraceae.
3. **Marginal**, with the placentae along the margin of a unilocarpellate (simple) ovary, as in the Fabaceae, *Vicia faba*.
4. **Free-central**, with the placentae along the column in a compound ovary without septa, such as in the Caryophyllaceae, *Dianthus caryophyllus*.
5. **Axile**, with the placentae arising from the column in a compound ovary, common in many flowering plants such as the Liliaceae, Malvaceae (e.g. *Hibiscus esculentus*), and Solanaceae.
6. **Parietal**, with the placentae on the ovary walls or upon intruding partitions of a unilocular, compound ovary, such as in the Violaceae, Brassicaceae, and Cucurbitaceae (e.g. *Cucumis melo* and *Cucumis sativus*).
7. **Laminar** or **Lamellate**, with ovules arising from the surface of the septae, as in *Papaver* sp.

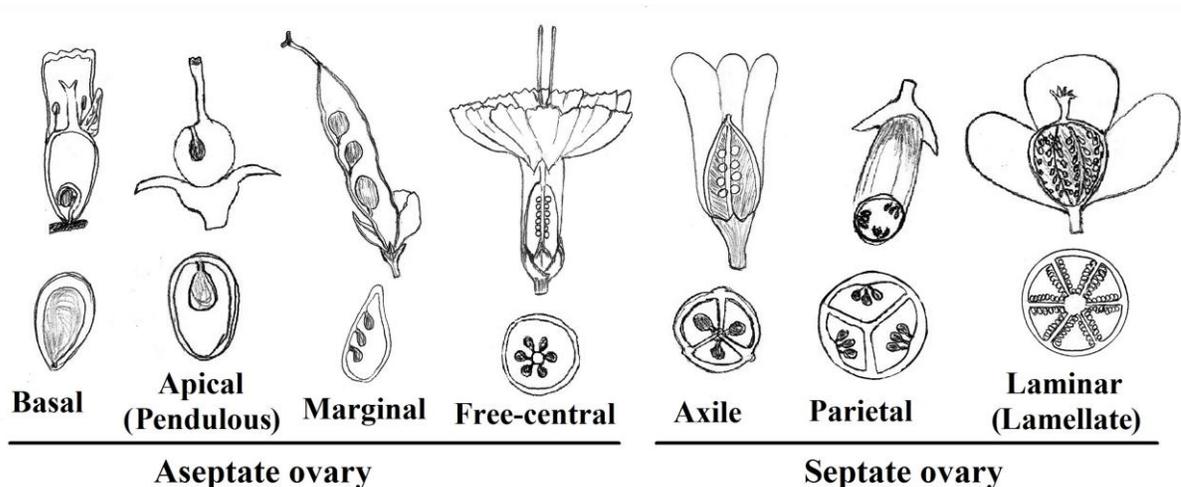


Figure 1.37: Different types of placentation

6.4. Flower sex

Most flowers are **perfect** or **bisexual**, having both stamens and carpels. Bisexual flower sex is likely the ancestral condition in angiosperms. Many angiosperm taxa, however, have **imperfect** or **unisexual** flower sex. In this case, flowers are either **pistillate** / **female**, in which only carpels develop, or **staminate** / **male**, in which only stamens develop (figure 1.38).

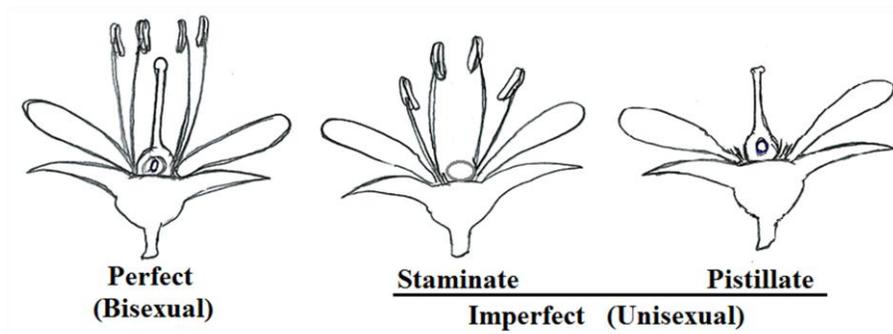


Figure 1.38: Different types of flower sex

6.5. Plant sex

Plant sex refers to the presence and distribution of perfect or imperfect flowers on individuals of a species. **Hermaphroditic**; plant is one with only bisexual flowers. **Monoecious**; plant is one with only unisexual flowers, both staminate and pistillate on the same individual plants. **Dioecious**; plant is one with unisexual flowers, but with staminate and pistillate on separate individual plants. Plant sex can vary within individuals of a species, and there may also be a combination of perfect and imperfect flowers in different individuals. **Polygamous**; plant with both bisexual and unisexual flowers (figure 1.39).

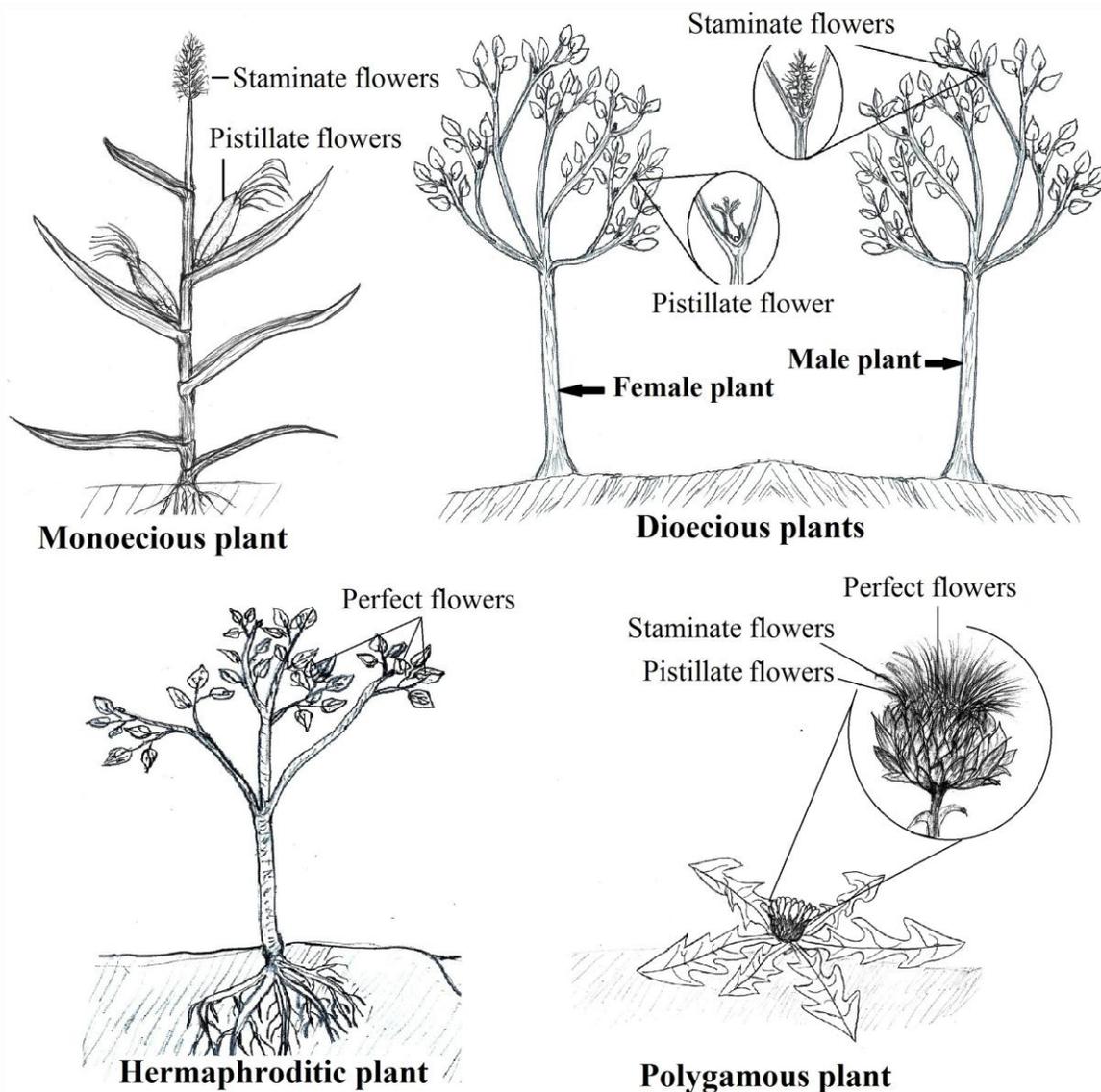


Figure 1.39: Plant sex types

7. Inflorescences

Inflorescence is an aggregate of one or more flowers, the boundaries of which generally occur with the presence of vegetative leaves (bracts). Other terms deal with various (stem) axes in an inflorescence, **peduncle** (adjective pedunculate) is the stalk of an entire inflorescence. **Compound receptacle** (also called a torus) is a mass of tissue at the apex of a peduncle that bears more than one flower. **Scapose**, arising of lacking peduncle, and with a basal rosette of well-developed leaves, such inflorescence has termed a scape (adjective scapose), In the case of dwarfing or absence of the stem, the plant the plant habit is **acaulescent**. **Rachis** is a major, central axis within an inflorescence, a **rachilla** is the central axis of a grass or sedge spikelet. **Ray** is a secondary axis of a compound umbel. Inflorescence morphogenesis and formation is called **inflorescence development**, there are two main types of inflorescence according to its development (figure 1.40).

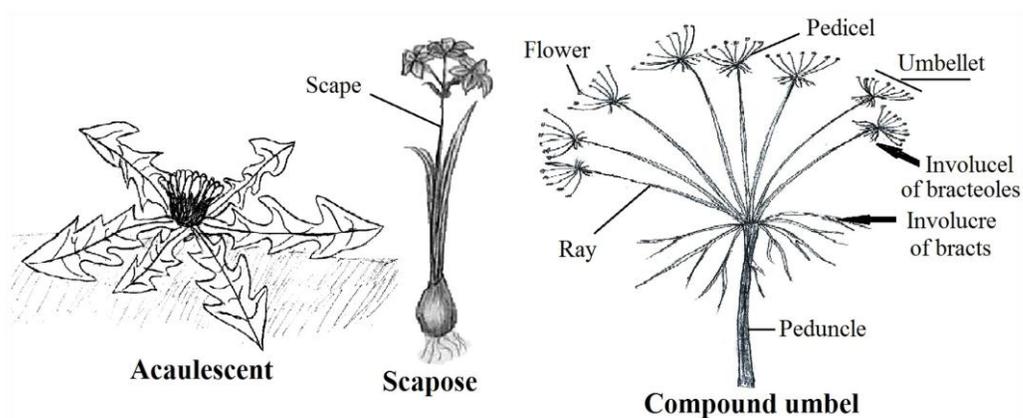


Figure 1.40: Typical inflorescences structures (various axes in inflorescences)

7.1. Determinate inflorescences (Cymose; Monochasial and dichasial inflorescences) (figure 1.41)

Determinate inflorescence is one in which the apical meristem of the primary inflorescence axis terminates in a flower; typically, the terminal flower matures first, with subsequent maturation occurring from apex to base. Determinate inflorescences are characteristic of cymose.

7.1.I. Monochasium inflorescence (figures 1.41)

A. Simple monochasium, is a cyme that develops along one axis only, as in *Iris* and *Convolvulus*.

B. Compound monochasium, (figures 1.41)

i. Helicoid cyme or bostryx is a monochasium in which the axes develop on only one side of each sequential axis, appearing coiled at least early in development, as in *Hypericum* and many sp. of Boraginaceae like *Anchusa*.

ii. **Scorpioid cyme** or **cincinnus** is a monochasium in which the branches develop on alternating sides of each sequential axis, typically resulting in a geniculate (zig-zag) appearance, as in *Linum*.

7.1.II. Dichasium inflorescence one that develops along two axes, forming one or more pairs of opposite, lateral axes (figures 1.41).

A. Simple dichasium, is a three-flowered cyme, having a single terminal flower and two, opposite lateral flowers, as in *Convolvulus* and *Galium*.

B. Compound dichasium, is a many flowered cyme of repeatedly branching simple dichasia units.

C. Polychasium: is a branched cyme, similar to a compound dichasium but lacking a consistent dichasial branching pattern.

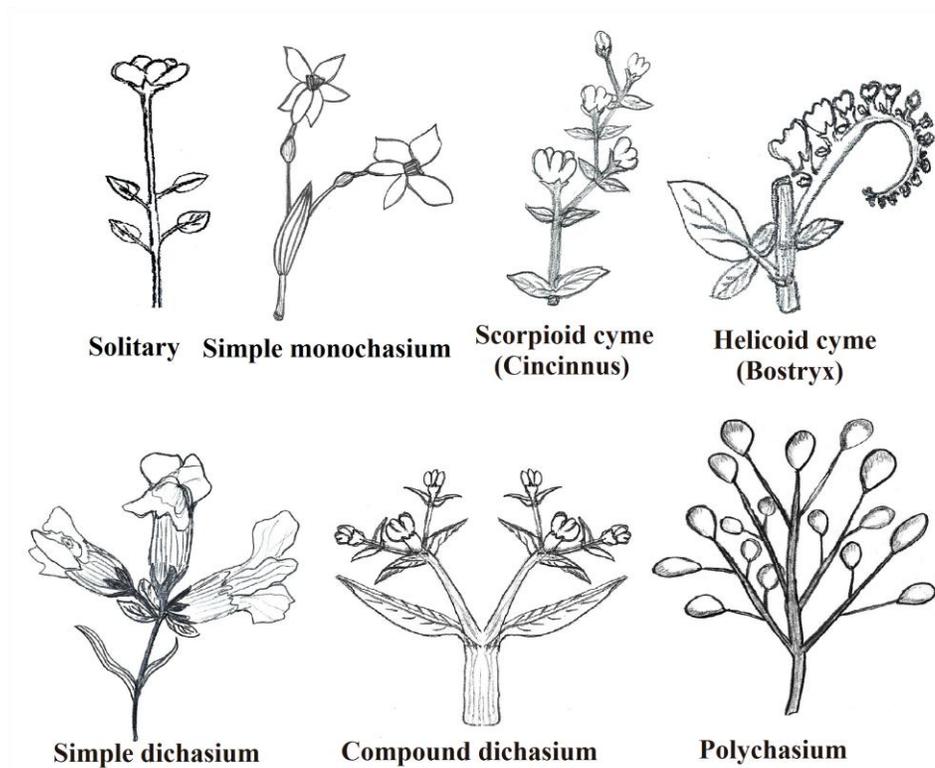


Figure 1.41: Different monochoasial and dichasial of determinate inflorescences

7.2. Indeterminate inflorescence (Racemose) (figure 1.42).

Indeterminate inflorescence is one in which the apical meristem of the primary inflorescence axis does not develop into a flower; typically, the basal flower matures first, with maturation occurring from base to apex. Indeterminate inflorescences.

1. **Simple spike**: is an indeterminate inflorescence, consisting of a single axis bearing sessile flowers.
2. **Compound spike**: is an indeterminate inflorescence, branches repeatedly once or twice bearing sessile flowers.

3. **Raceme:** is an indeterminate inflorescence in which the single axis bears pedicellate flowers.
4. **Panicle:** is like a branched raceme, defined as an indeterminate inflorescence having several branched axes bearing pedicellate flowers.
5. **Simple corymb:** is unbranched, consisting of a central axis bearing pedicellate flowers, the collection of flowers being flat-topped or convex; simple corymbs are like racemes in which the lower pedicels are much more elongate than the upper.
6. **Compound corymb:** is branched, consisting of two or more orders of inflorescence axes bearing flat-topped or convex, pedicellate flowers; compound corymbs are like panicles in which the lower axes and pedicels are much more elongate than the upper.
7. **Simple umbel** is a determinate or indeterminate, flat-topped or convex inflorescence with pedicels attached at one point to a peduncle.
8. **Compound umbel** is another secondary inflorescence in which the peduncle bears secondary axes called **rays** that are attached at one point and unit, simple umbels attached at the tip of the rays.

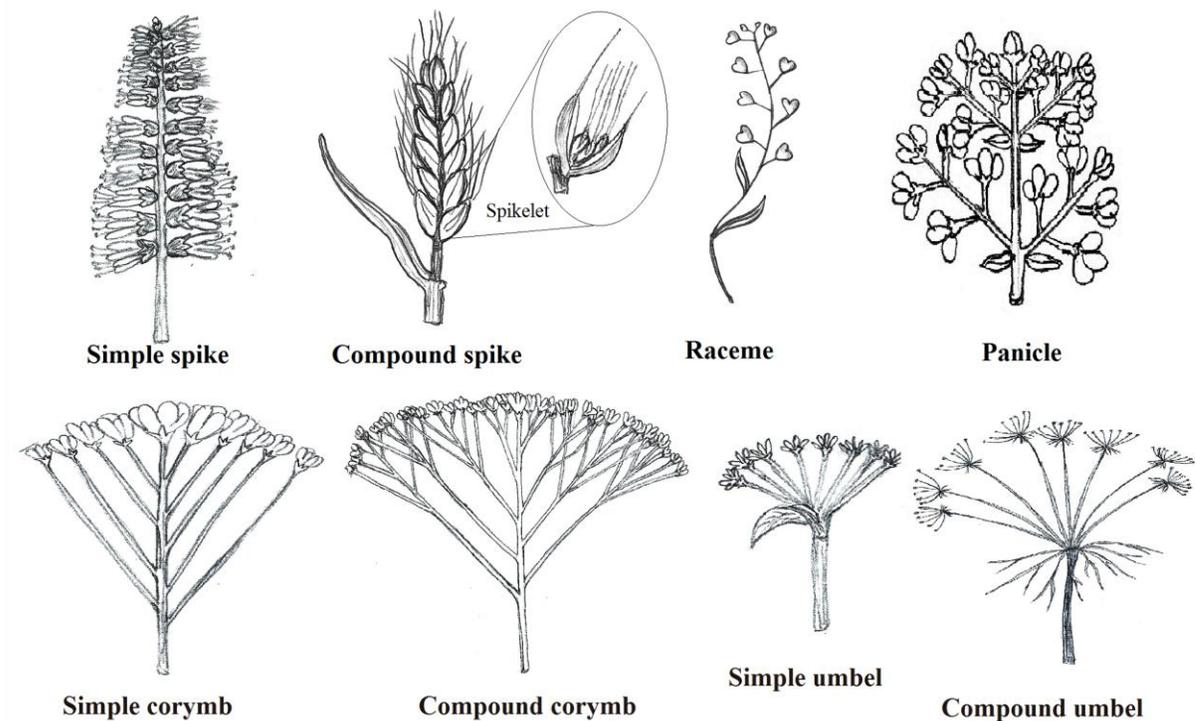


Figure 1.42: Different indeterminate inflorescences (Racemose)

7.4. Specialized inflorescences (figure 1.43).

Some inflorescences are quite specialized and often restricted to certain taxonomic groups as:

1. **Catkin** (also called an ament, the plants that bear aments are called amentiferous) in *Salix alba* L.,
2. **Cyathium** in *Euphorbia helioscopia* L.
3. **Head** or **capitulum** are typical of the Asteraceae and Dipsacaceae.
4. **Syconium** or **hypanthodium** in *Ficus microcarpa* L.
5. **Spadix** is a spike with a thickened or fleshy central axis, typically in the Araceae.

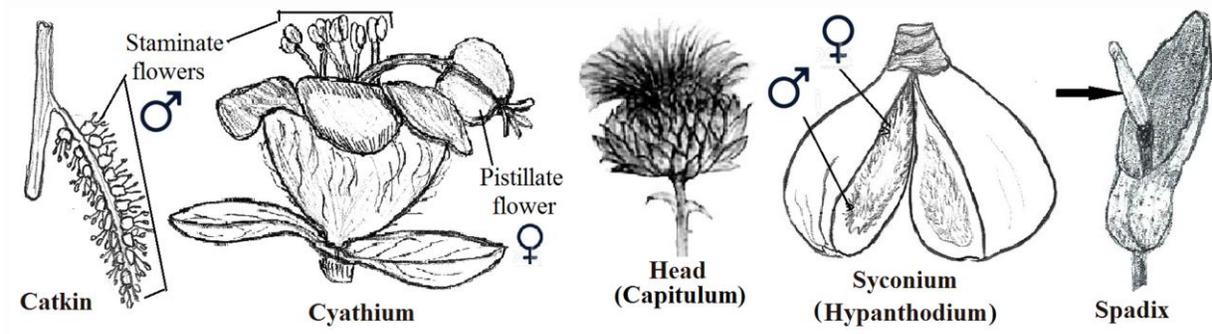


Figure 1.43: Specialized inflorescence types