

Systematic Botany. Lecture 7–13

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Outline

Compositae, Aster family

Description

Classification and representatives



Compositae, Aster family

Description



General features of Compositae

Compositae, or Asteraceae—aster family

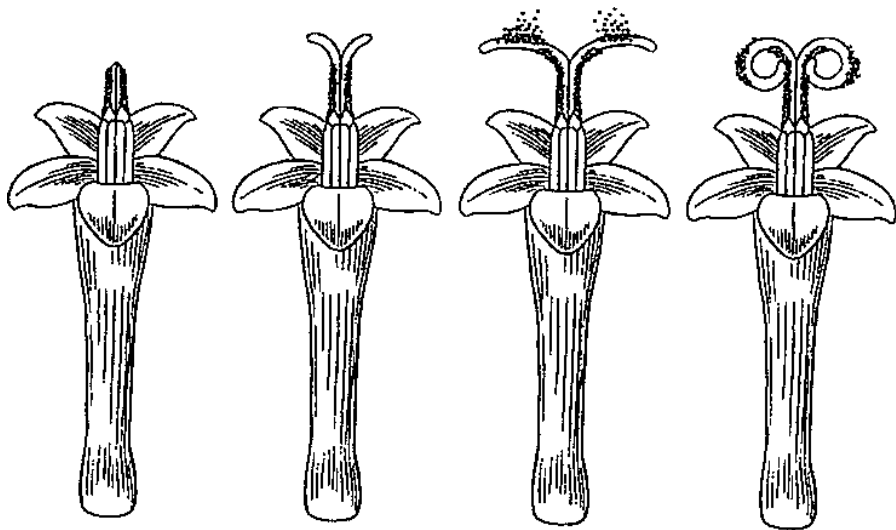
- ▶ More than 20,000 species
- ▶ Cosmopolitan, but better represented in temperate and subtropical regions
- ▶ Prefer open spaces



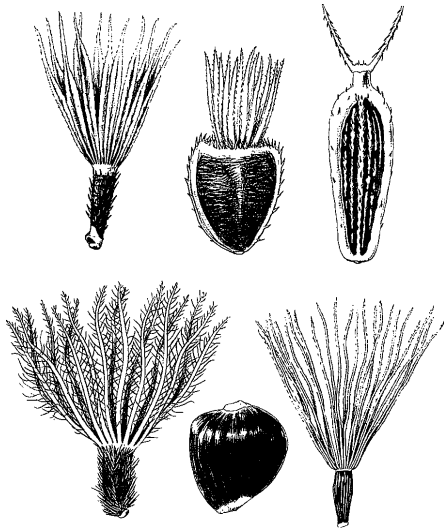
Flowering head, pseudanthium



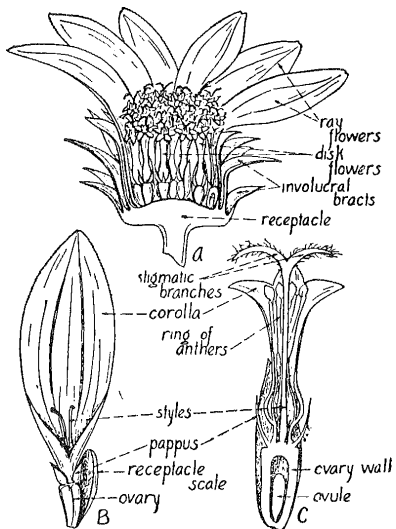
Secondary presentation of pollen



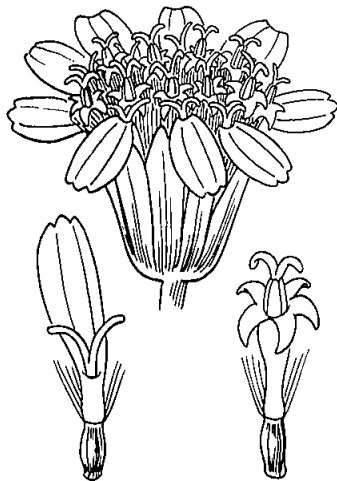
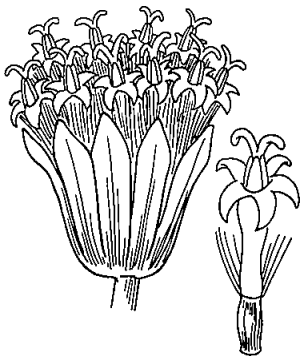
Pappus



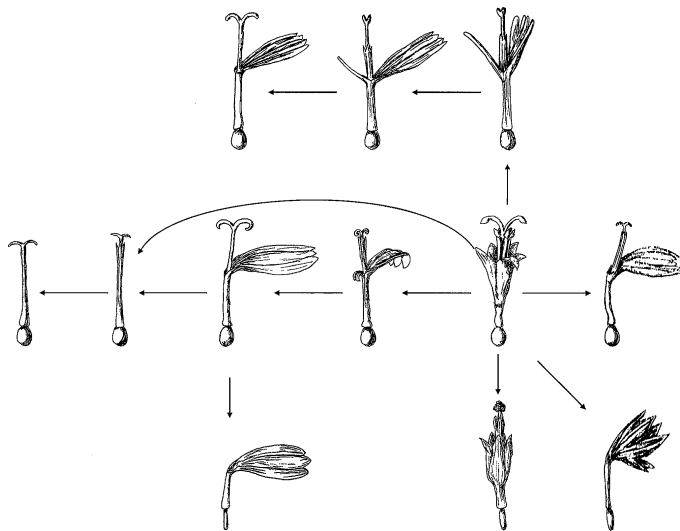
Sunflower (*Helianthus*) head



Disk flower vs. disk + ray flower



Evolution of flower types



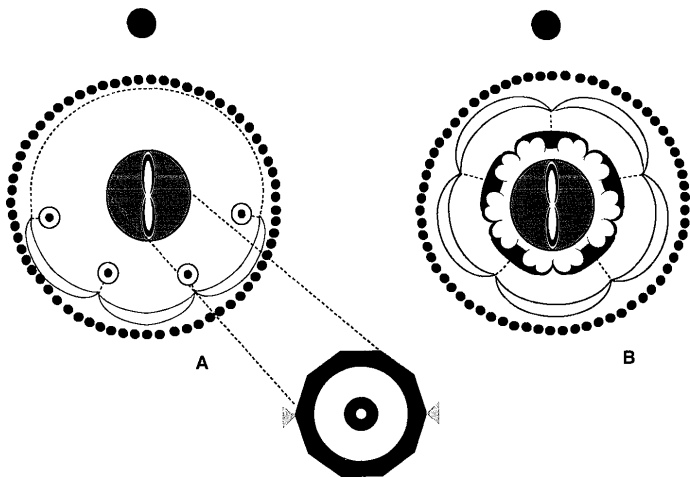
Morphology of Compositae

- ▶ Herbs, rarely woody plants; store carbohydrates as **inulin** (not starch), sometimes have resin or laticifers (subfamily Cichorioideae)
- ▶ Leaves **alternate or opposite**, without stipules, with pterodromous (net) venation
- ▶ Flowers (disk and ray) are in involucrate heads which mimic one flower
- ▶ Calyx reduced to hairs or bristles (**pappus**), petals fused in tube or ligula (with 5 or 3 teeth)
- ▶ Stamens 5, fused by anthers
- ▶ Pistil has 2 carpels, ovary **inferior**
- ▶ Fruit is **achene**, mature seed has almost no endosperm



Formula and diagram

Compositae flower



* $K_{\infty}C_{(5)}A_{(5)}\overline{G_{(2)}}$ (tubular flower) or $\uparrow K_{\infty}C_{(3\vee 5)}A_{(5)}\overline{G_{(2)}}$ (ligulate flower)



Tubular and ligulate flowers in *Matricaria* sp. (chamomile)



Compositae, Aster family

Classification and representatives



Classification and representatives of Compositae

Oil plants, vegetables, ornamentals and medicinal plants distributed in 12 (!) subfamilies, most important are three subfamilies:

- ▶ Mutisioideae: bilabiate + ray flowers
 - ▶ *Gerbera*—gerbera, South Africa



Gerbera with bilabiate disk flowers

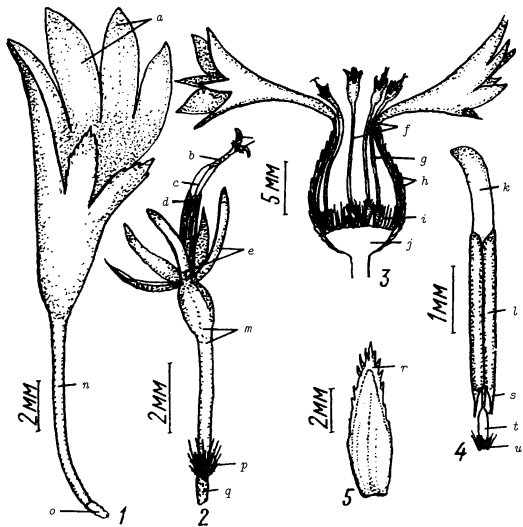


Carduoideae

- ▶ Carduoideae: deeply lobed disk flowers; stems spiny; leaves dissected
 - ▶ *Centaurea*—knapweed
 - ▶ *Cynara*—artichoke
 - ▶ *Carthamus*—safflower
 - ▶ *Carduus*—thistle; pappus without branches
 - ▶ *Cirsium*—thistle; pappus hairs branched



Knapweed



Cynara cardunculus (artichoke)



Carthamus tinctorius (safflower)

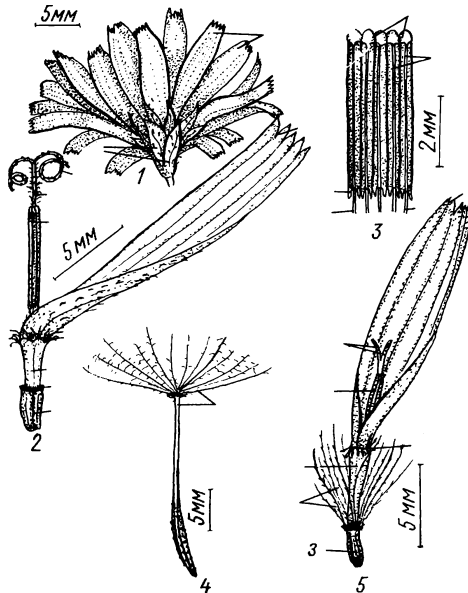


Cichorioideae

- ▶ Cichorioideae: mostly disk and/or 5-toothed ligulate flowers + laticifers with latex (milky sap)
 - ▶ *Taraxacum*—dandelion
 - ▶ *Lactuca*—lettuce
 - ▶ *Crepis*—hawkbeard
 - ▶ *Lygodesmia*—skeleton weed
 - ▶ *Sonchus*—sow thistle
 - ▶ *Hieracium*—hawkweed
 - ▶ *Cichorium*—chicory



Chicory



Asteroideae

- ▶ Asteroideae: tubular + 3-toothed ligulate flowers
 - ▶ Astereae: pappus consists of bristles; leaves entire
 - ▶ *Aster*—aster, divided now into *Eurybia*, *Oreostemma*, *Symphyotrichum*, etc.
 - ▶ *Erigeron*—fleabane
 - ▶ *Solidago*—goldenrod



Asteroideae

- ▶ Asteroideae
 - ▶ Anthemidae: alternate, pinnate leaves; membranaceous involucre bracts; disk + ray; pappus often absent
 - ▶ *Artemisia*—sagebrush
 - ▶ *Achillea*—yarrow
 - ▶ *Chrysanthemum*—chrysanthemum



Asteroideae

- ▶ Asteroideae
 - ▶ Eupatorieae: mostly opposite leaves; disk flowers with short lobes; pappus elements are bristles
 - ▶ *Eupatorium*—thoroughwort
 - ▶ *Liatris*—blazing star



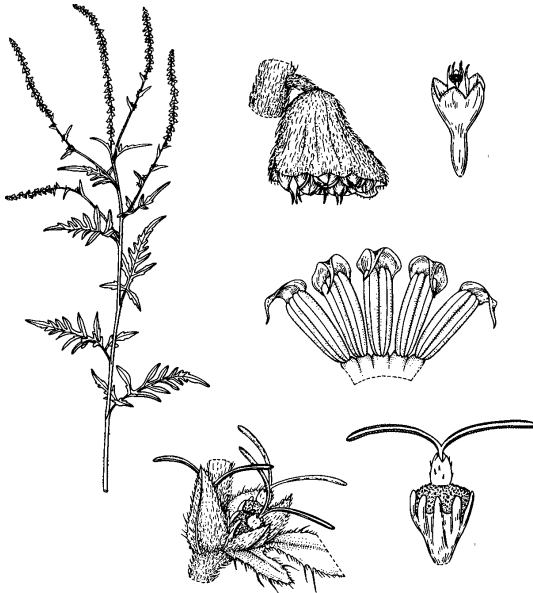
Asteroideae

▶ Asteroideae

- ▶ Heliantheae (2.5k species!): mostly opposite leaves; disk + ray flowers; pappus from scales, sometimes absent
 - ▶ *Helianthus*—sunflower
 - ▶ *Tagetes*—marigold and lots of other ornamentals
 - ▶ *Ambrosia*—ragweed
 - ▶ *Bidens*—bur-marigold and many, many others



Ragweed



Tagetes patula (marigold)

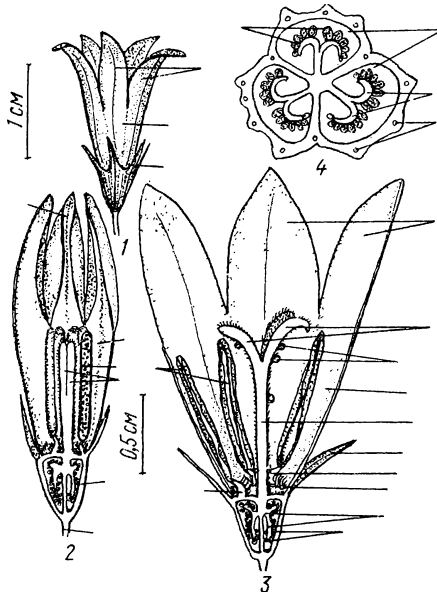


Families close to Compositae

- ▶ Campanulaceae—bellflower family (includes Lobeliaceae)
- ▶ Differs by solitary flowers or flowers in sparse inflorescences



Bellflower



Summary

- ▶ Compositae and Campanulaceae are two close families; both have secondary pollen presentation, fused petals and inferior ovary



For Further Reading



A. Shipunov.

Systematic Botany [Electronic resource].

2011—onwards.

Mode of access:

http://ashipunov.info/shipunov/school/biol_448



Van Bruggen, Th.

The vascular plants of South Dakota.

1996. 3rd ed.

University of South Dakota, Vermillion, SD. P. 226–231.

