

Systematic Botany. 2. Compositae

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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



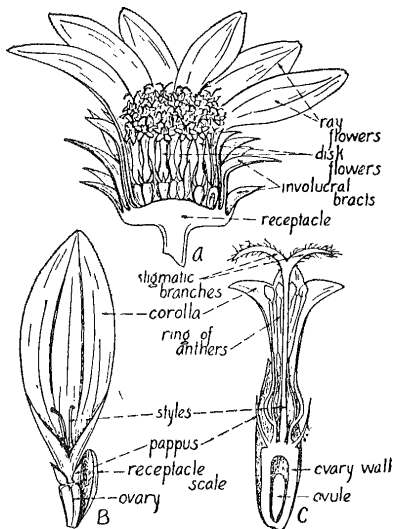
Flowering head, pseudanthium



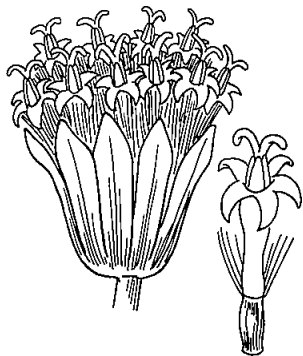
Tubular (disk) and ligulate (ray) flowers in *Matricaria* sp. (chamomile)



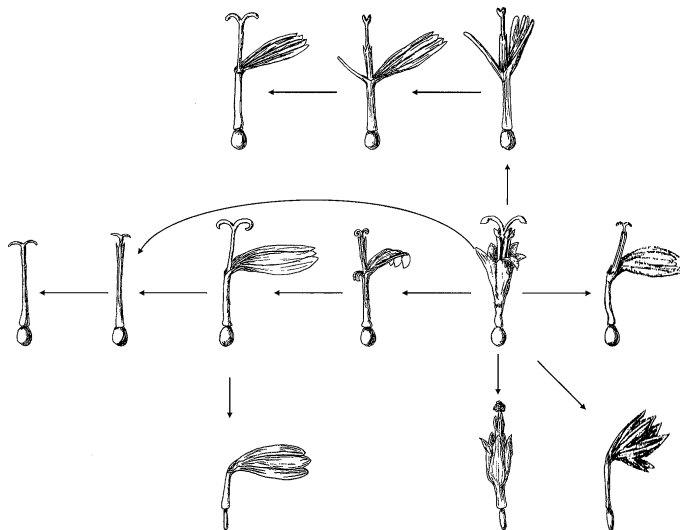
Sunflower (*Helianthus*) head



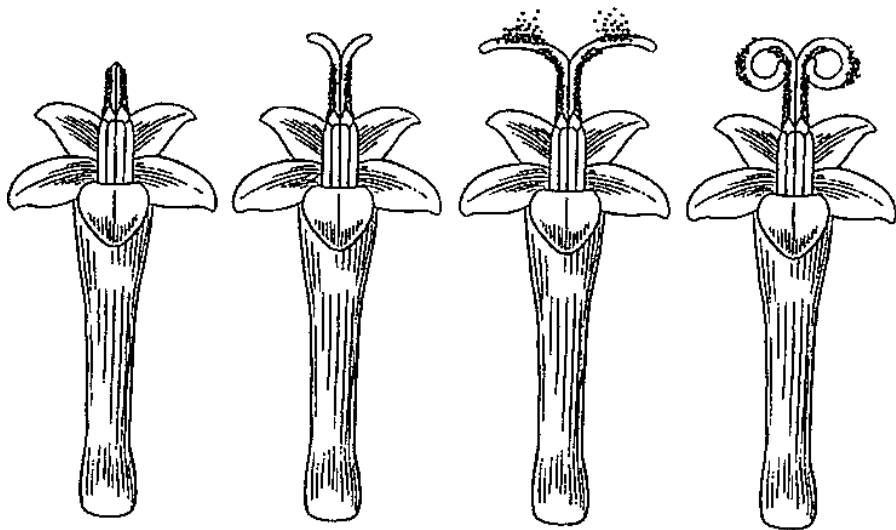
Disk vs. ray heads



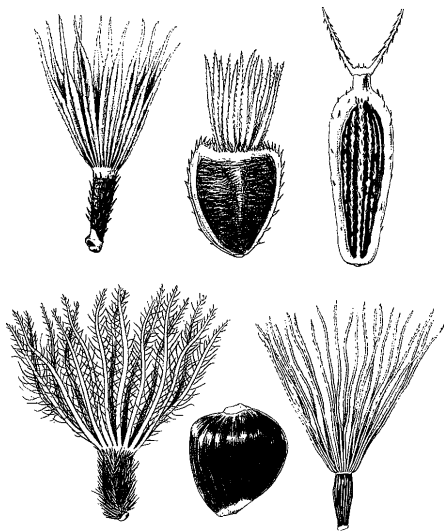
Evolution of flower types



Secondary presentation of pollen



Pappus

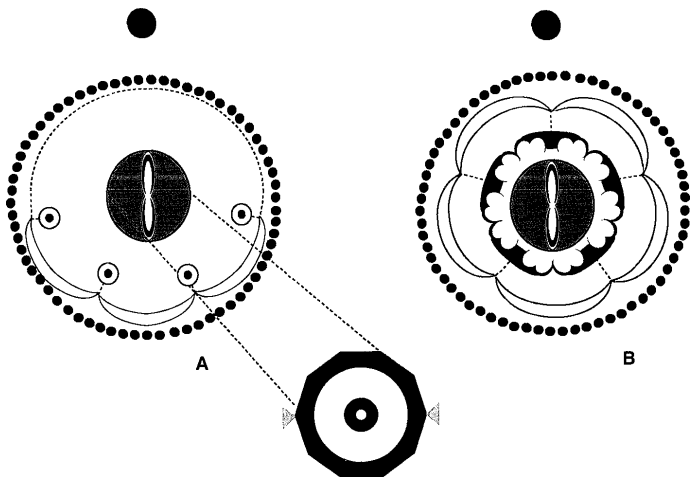


Morphology of Compositae

- ▶ 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



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)



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

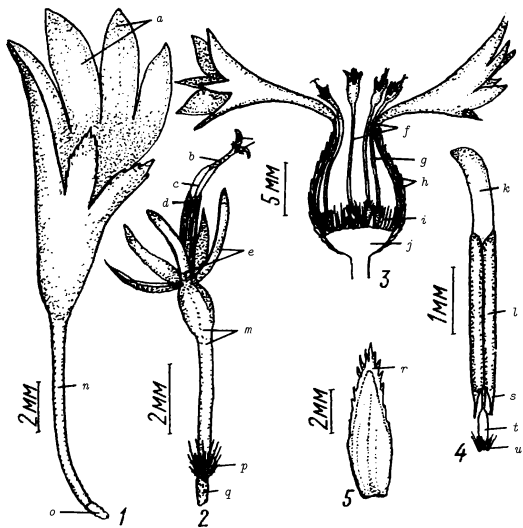


Carduoideae

- ▶ 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)

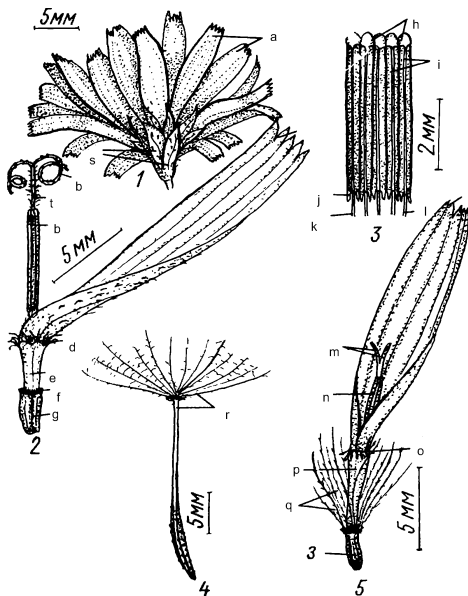


Cichorioideae

- ▶ Cichorioideae: mostly ligulate heads: 5-toothed ligulate flowers only. Have 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



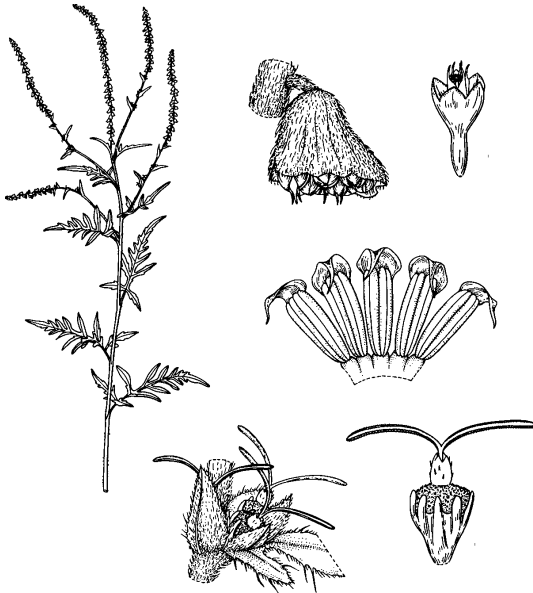
Asteroideae

▶ 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)

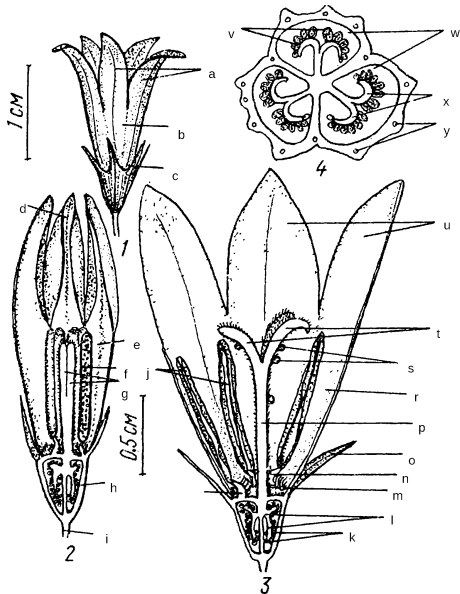


Families close to Compositae

- ▶ 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 (1)



A. Shipunov.

Systematic Botany [Electronic resource].

2011—onwards.

Mode of access:

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



A. Shipunov.

Flora of North Dakota: Checklist

2017—onwards.

Mode of access:

<http://ashipunov.info/shipunov/fnddb2>



Minot State University Herbarium (MISU)

(continued)



For Further Reading (2)



Flora of Great Plains.

1986.

University Press of Kansas, Lawrence, KS.



Flora Van Bruggen, Th.

The vascular plants of South Dakota.

1996. 3rd ed.

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



Barkley T.M., Brouillet L., Strother J.L. 187. Asteraceae Martinov.
Composite Family. Flora of North America. Volumes 19, 20, 21.

Mode of access: http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=10074

