

# Systematic Botany. Lectures 8–12

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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



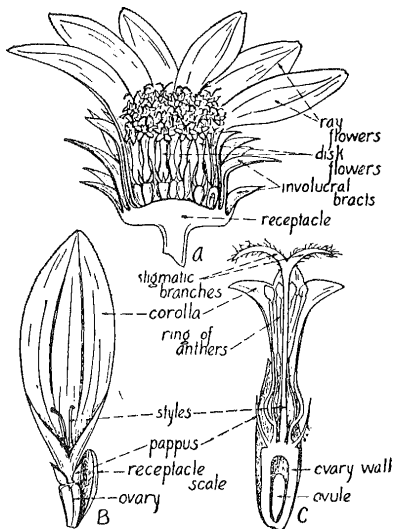
## Flowering head, pseudanthium



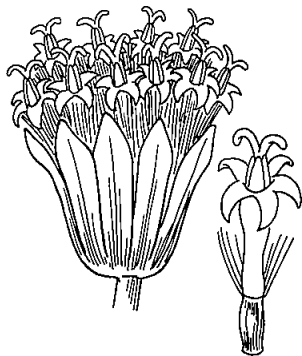
## Tubular (disk) and ligulate (ray) flowers in *Matricaria* sp. (chamomile)



# Sunflower (*Helianthus*) head

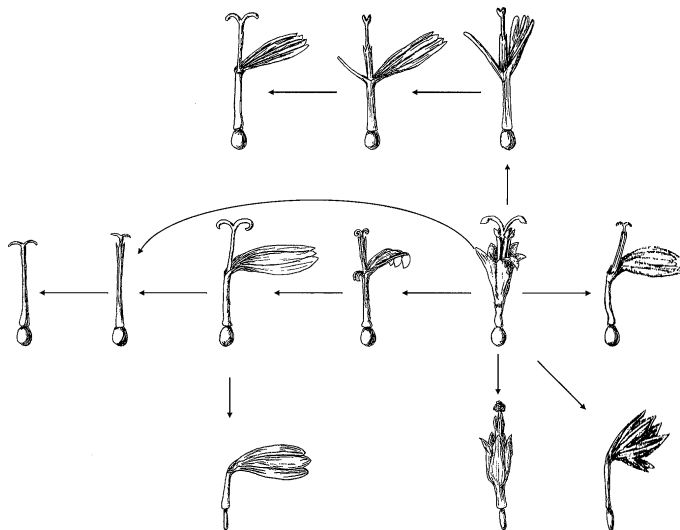


## Disk vs. ray heads

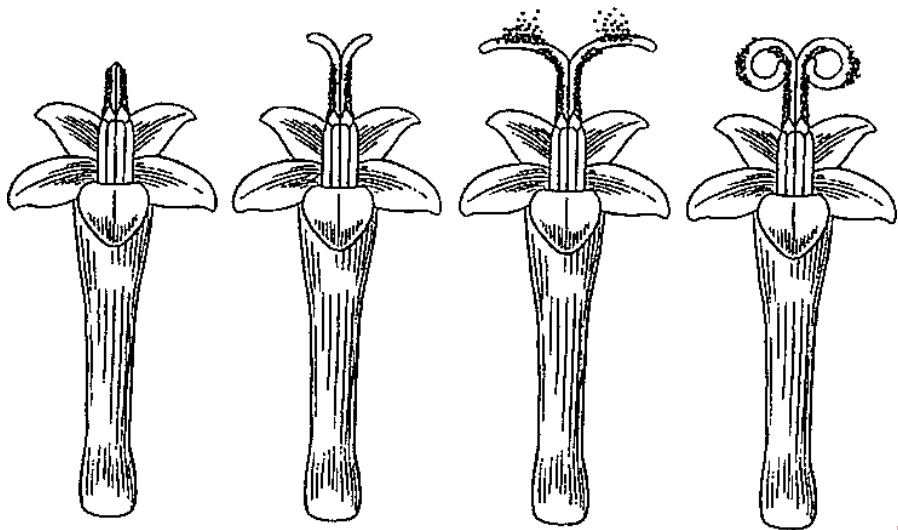




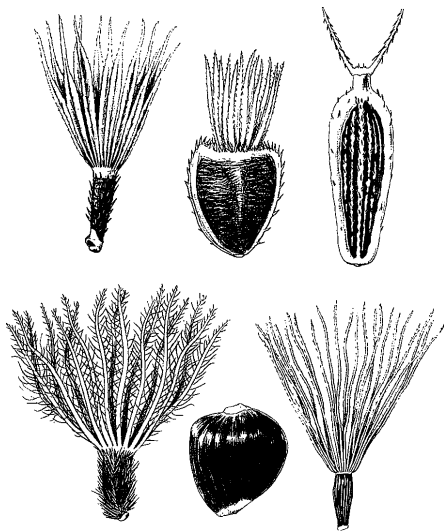
# Evolution of flower types



## Secondary presentation of pollen



# Pappus

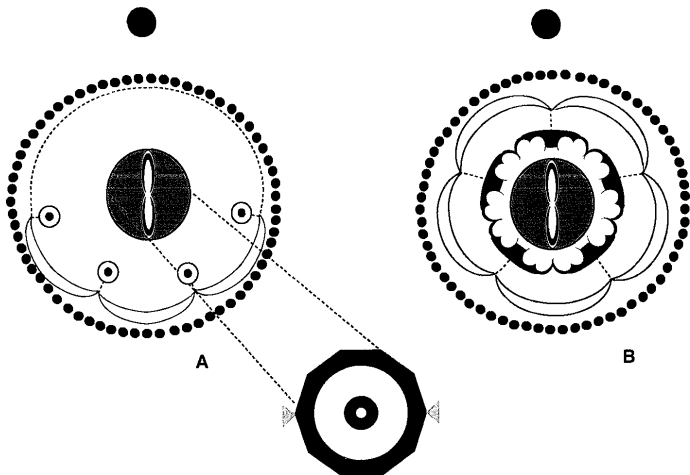


# Morphology of Compositae

- ▶ 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



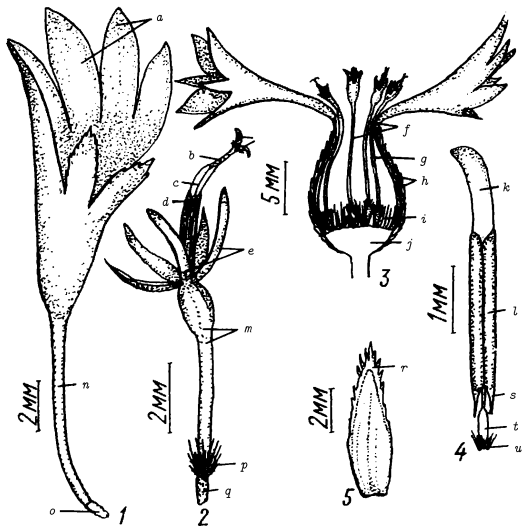


# Carduoideae

- ▶ 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)

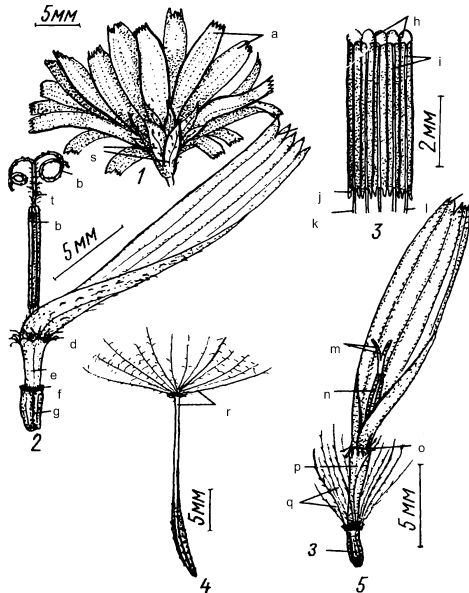


# Cichorioideae

- ▶ 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



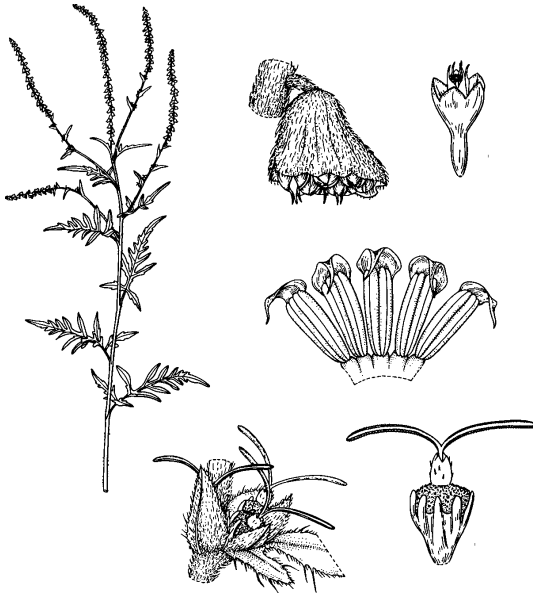
# Asteroideae

## ▶ 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)

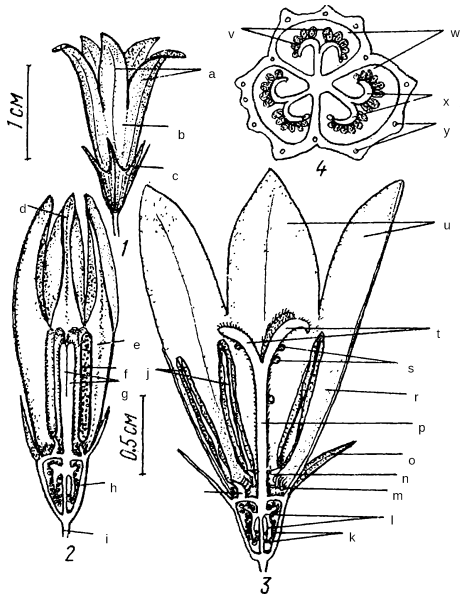


## Families close to Compositae

- ▶ 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](http://ashipunov.info/shipunov/school/biol_448)



A. Shipunov.

Flora of North Dakota: Checklist

2012—onwards.

Mode of access: <http://ashipunov.info/shipunov/fnddb>



Minot State University Herbarium (MSU)

*(continued)*





## For Further Reading (2)



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](http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=10074)

