Introduction to Botany. Lecture 25

Alexey Shipunov

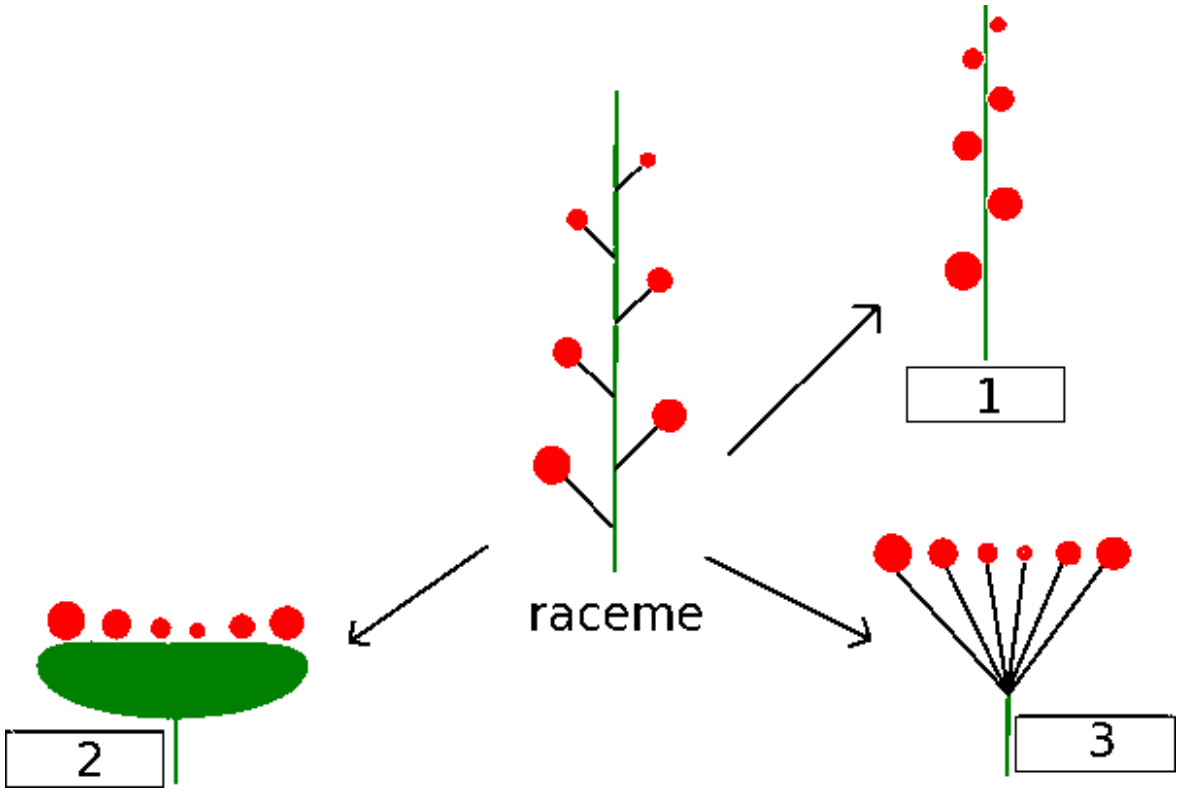
Minot State University

November 1st, 2010

Outline

Outline

Monday test (3 points)



Provide names for inflorescences 1, 2 and 3

Definition

- “Mature ovule”
- Chimeric organ consists of seed coat, endosperm and embryo

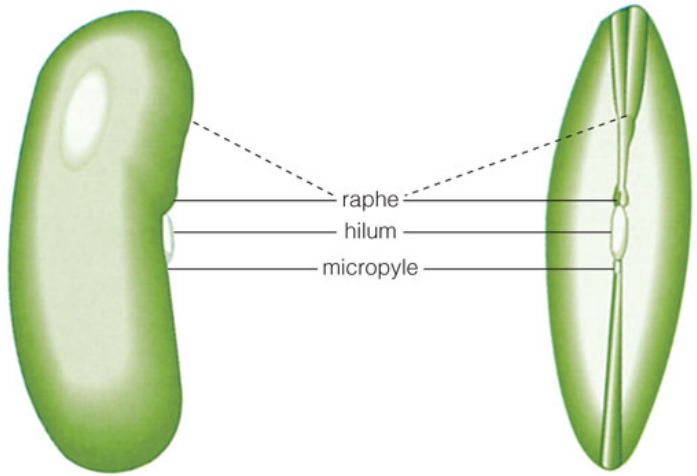
Origin of seed layers

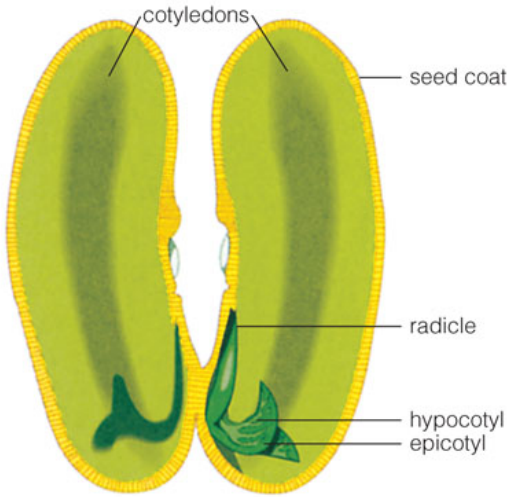
Layer	Ploidy	Origin
Seed coat	$2n$	Integument
Endosperm_2	$3n$, sometimes $2n$	Fertilized central cell of embryo sac
Embryo	$2n$	Fertilized egg
Endosperm_1	n	Female gametophyte
Perisperm	$2n$	Nucellus

Seed structure

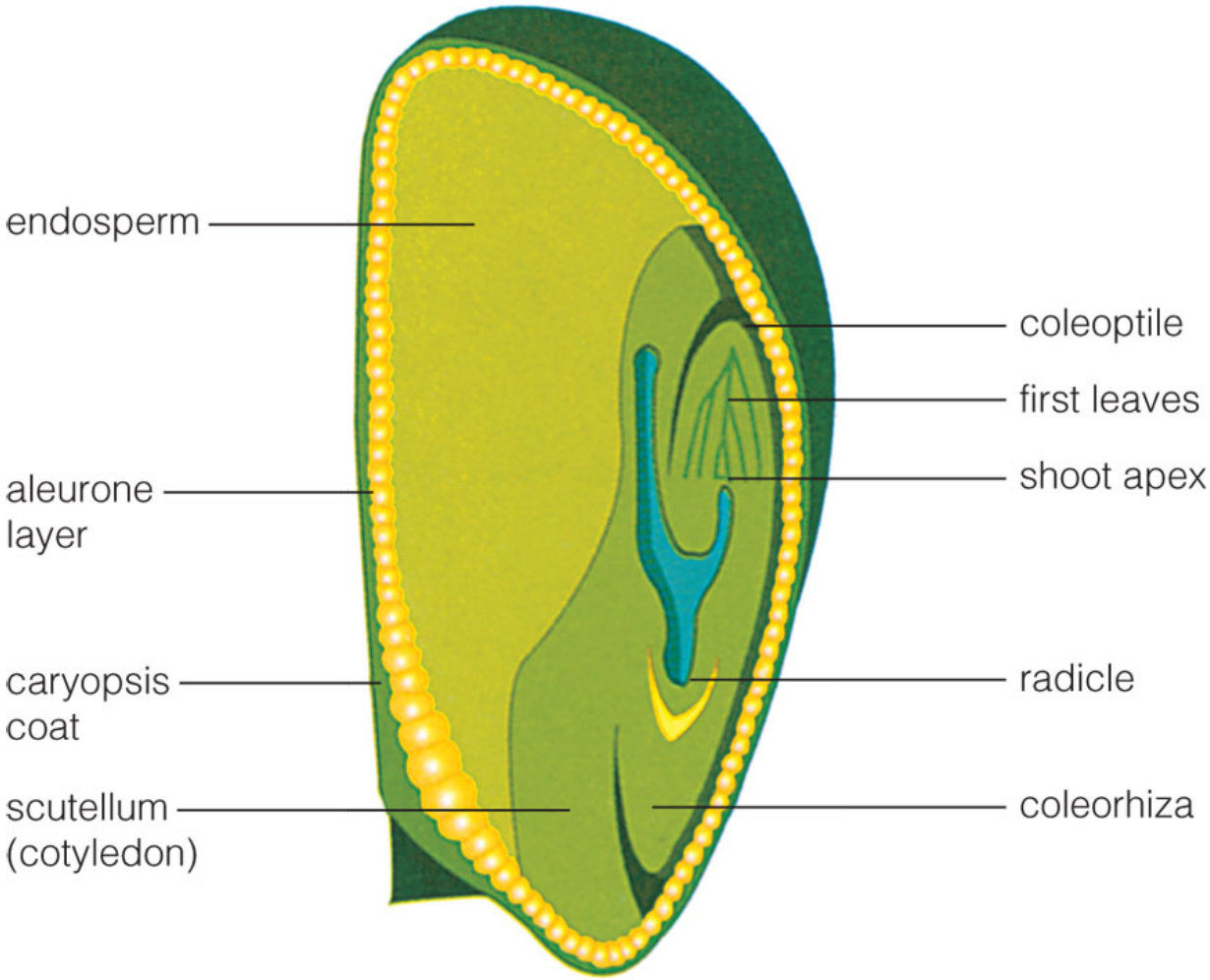
- Seed with endosperm (onion)*: cotyledon, radicle, apex
- Seed without endosperm (beans and other Leguminosae)*: cotyledons, radicle, hilum, raphe
- Grass (Gramineae) seeds*: coleoptile, coleorhiza, scutellum

Bean seed





Grass seeds



Cotyledons

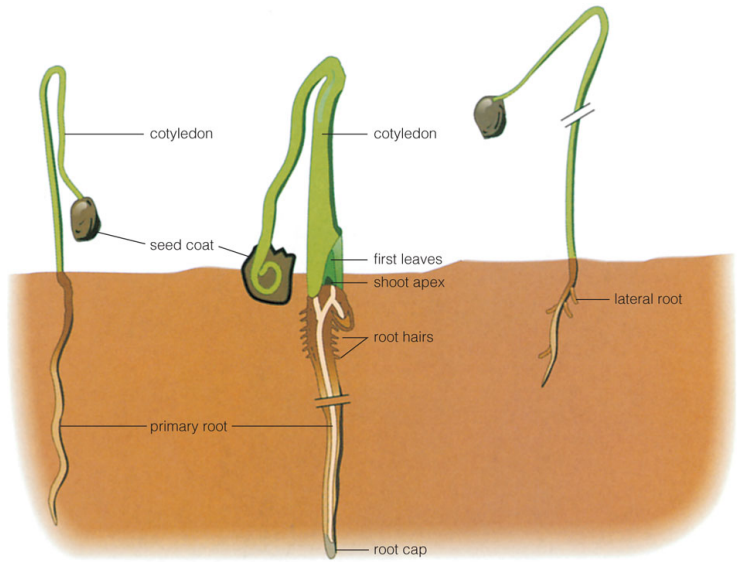
- Monocots have lateral bud and terminal primary leaf (cotyledon)*
- Other seed plants have terminal bud and multiple (2 to many) primary leaves (cotyledons)*

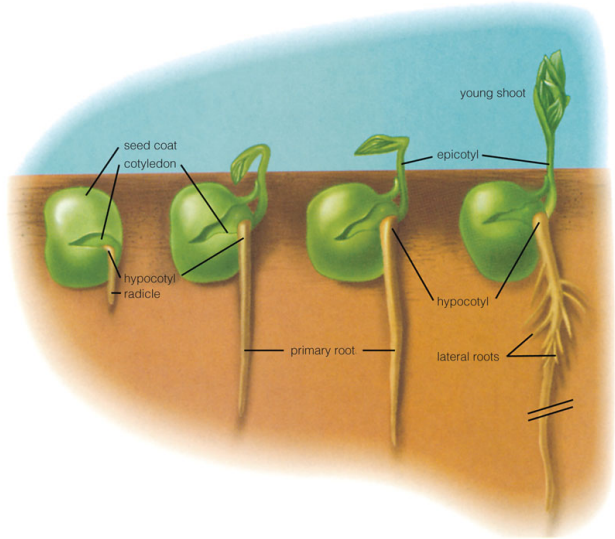
Pinus sp.: multiple cotyledons

Germination

- Epigeal (e.g., onion, pea)
- Hypogeal (e.g., bean, grasses, palms)

Epigeal and hypogeal germination





Definition and origin

- **Fruit** is a ripened ovary, flower or inflorescence
- Fruit coat and pericarp (exocarp + mesocarp + endocarp) origin mostly from pistil wall

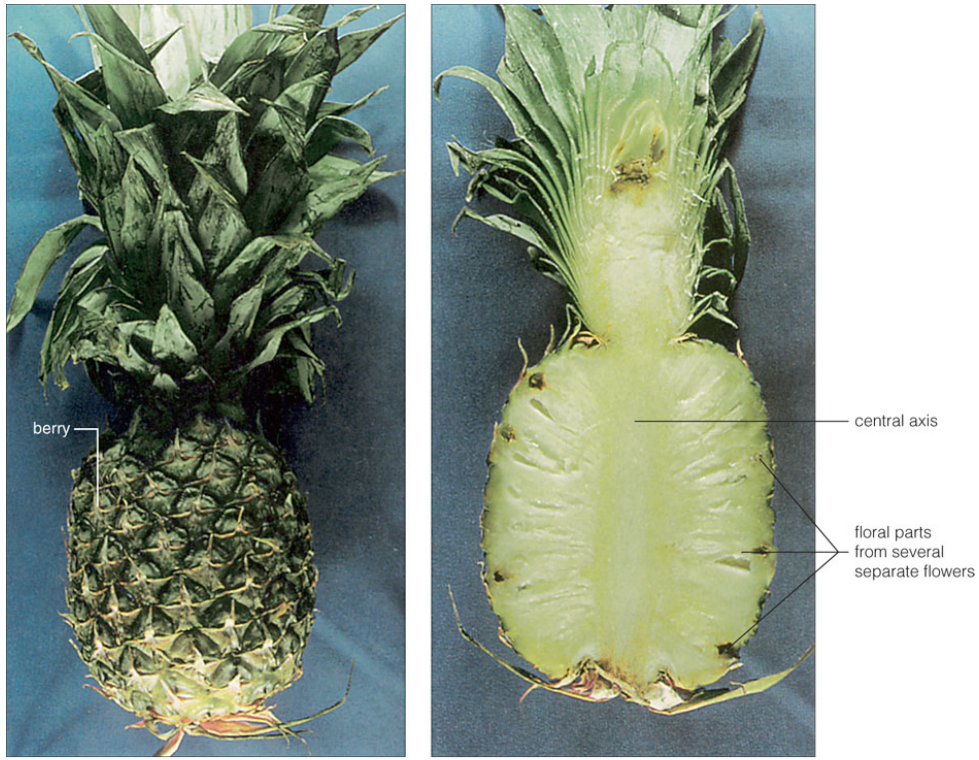
Trivial classification: criteria

- Simple, multiple (aggregate) or compound
- Dry or fleshy
- Dehiscent, schizocarp or indehiscent

Multiple fruit of *Fragaria* sp. (strawberry)

Multiple fruit of *Rubus* sp. (raspberry)

Compound fruit of Ananas comosus (pineapple)

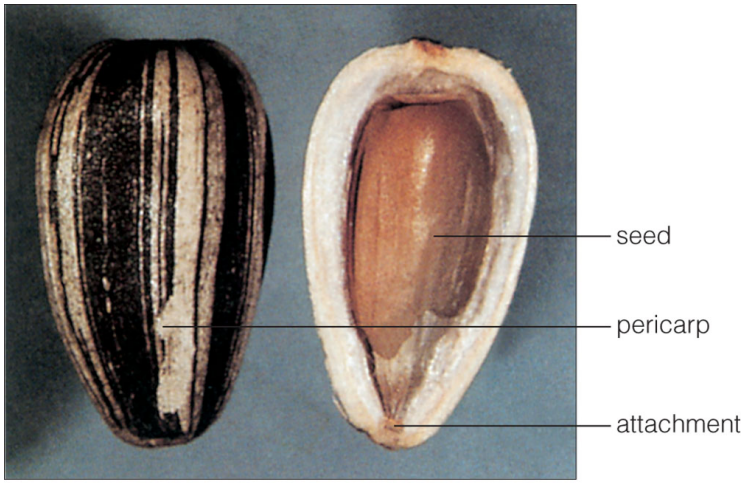


Compound fruit of *Ficus carica* (fig tree)

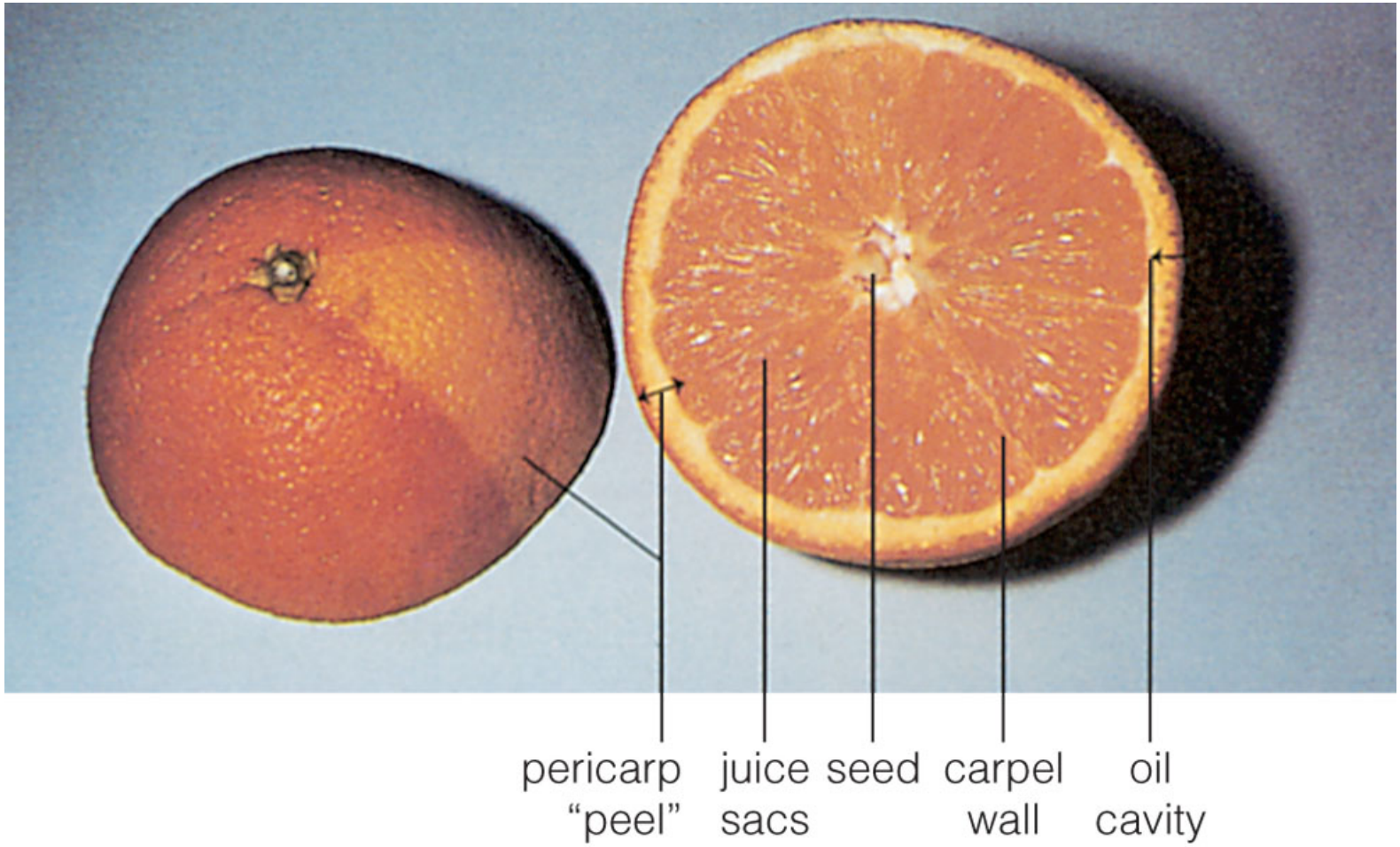
Trivial classification: examples

Type	Consistency	Opening	Example
Simple	Fleshy	Indehiscent	Drupe, Berry, Hesperidium, Pome
Simple	Dry	Dehiscent	Legume (pod), Capsule, Silique
Simple	Dry	Schizocarpic	Regma, Samara, Shizocarp
Simple	Dry	Indehiscent	Caryopsis (grain), Nut (incl. acorn), Achene
Multiple	Fleshy	Indehiscent	Complex drupe
Multiple	Dry	Dehiscent	Follicle
Multiple	Dry	Indehiscent	Complex nut
Compound	Fleshy	Indehiscent	Multiple berry
Compound	Dry	Indehiscent	Multiple nut

Schizocarp and achene



Hersperidium



Classification of Spjut (1994)

- Spermatocarpia (“fruits” of gymnosperms)
- Anthocarpia (angiosperms)
  - Simple fruits
  - Rhexocarpic (dehiscent) fruits
  - Schizocarpic fruits: samara etc.
  - Multiple fruits
    - Discocarpi: pomes
    - Etairionari: follicles, strawberries etc.
  - Compound fruits
    - Cryptocarpi: fig
    - Phenocarpi: pineapple
    - Anthecocarpi: grasses

Fruit and seed dispersion

- Self-dispersed (exploding, or ballistic fruits etc.): exploding cucumber, touch-me-not
- Wind-dispersed (with “wings” and “parachutes”):
- Water-dispersed (with floating pericarp): coconuts, water lilies
- Animal-dispersed (hooked or edible)

Ecballium elaterium (exploding cucumber) explodes

External video at http://player.vimeo.com/video/5139053

Impatiens noli-tangere (touch-me-not) explodes

Summary

- **Seed** is a chimeric organ consists of seed coat, endosperm and embryo
- **Fruit** is a ripened ovary, flower or inflorescence

For Further Reading

Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.
Plant Biology. 2nd edition.
Thomson Brooks/Cole, 2006.
Chapter 14.