

Chapter 6

Plant Life Cycle: Fruits and Seeds



Lecture Outline

Wind- and animal-pollination

Double fertilization review

From ovule to seed

Fruits protect seeds and aid in their dispersal

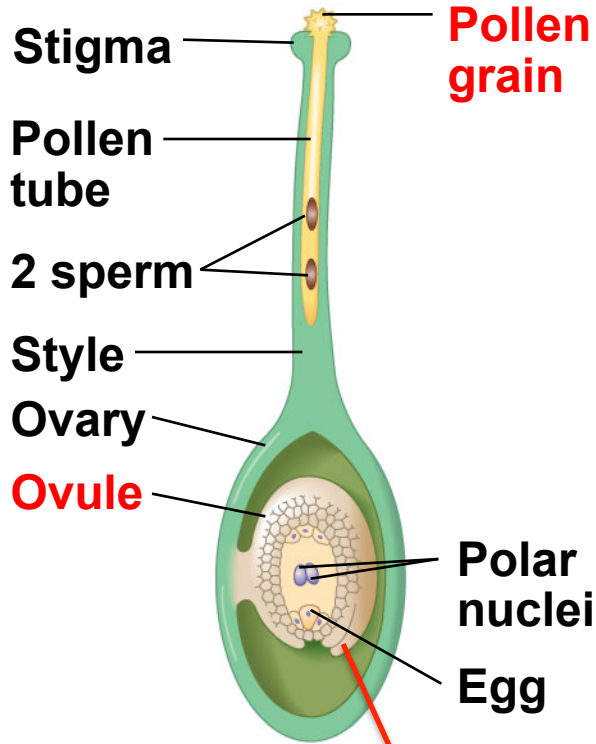
Fruit types (simple fleshy, simply dry, aggregate, and multiple)

Seed structure and germination

Flowers, fruits and seeds movie

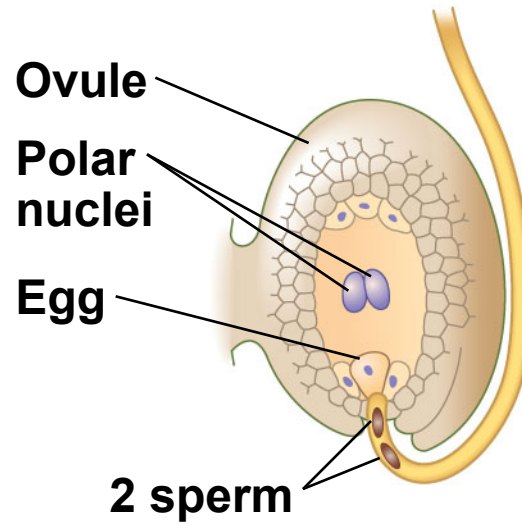
Double fertilization review

1

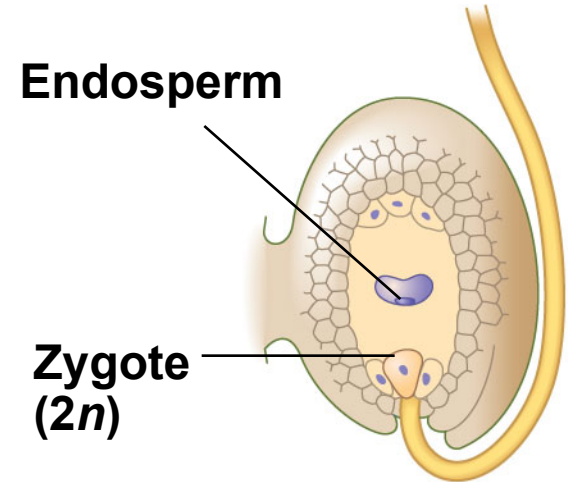


2

pollen grain = male gametophyte

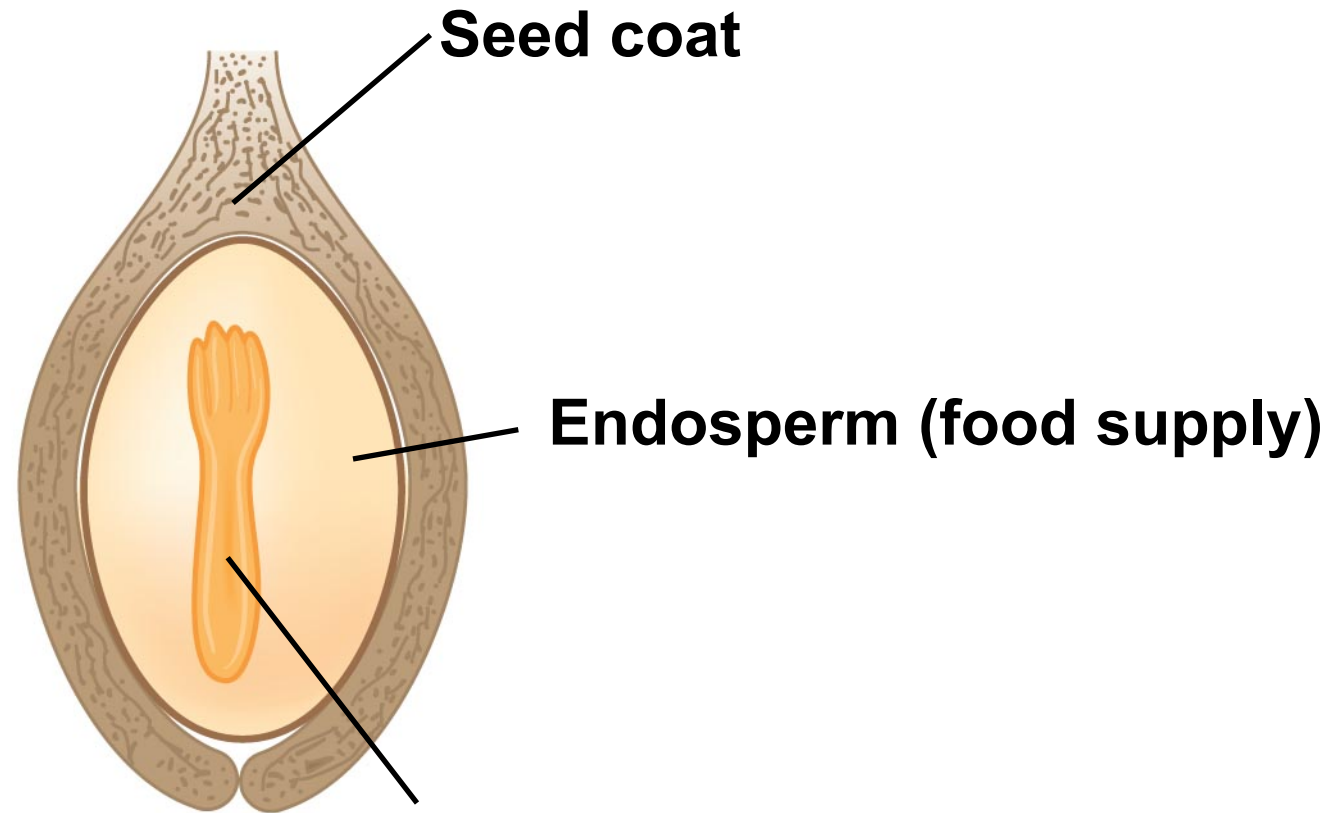


3



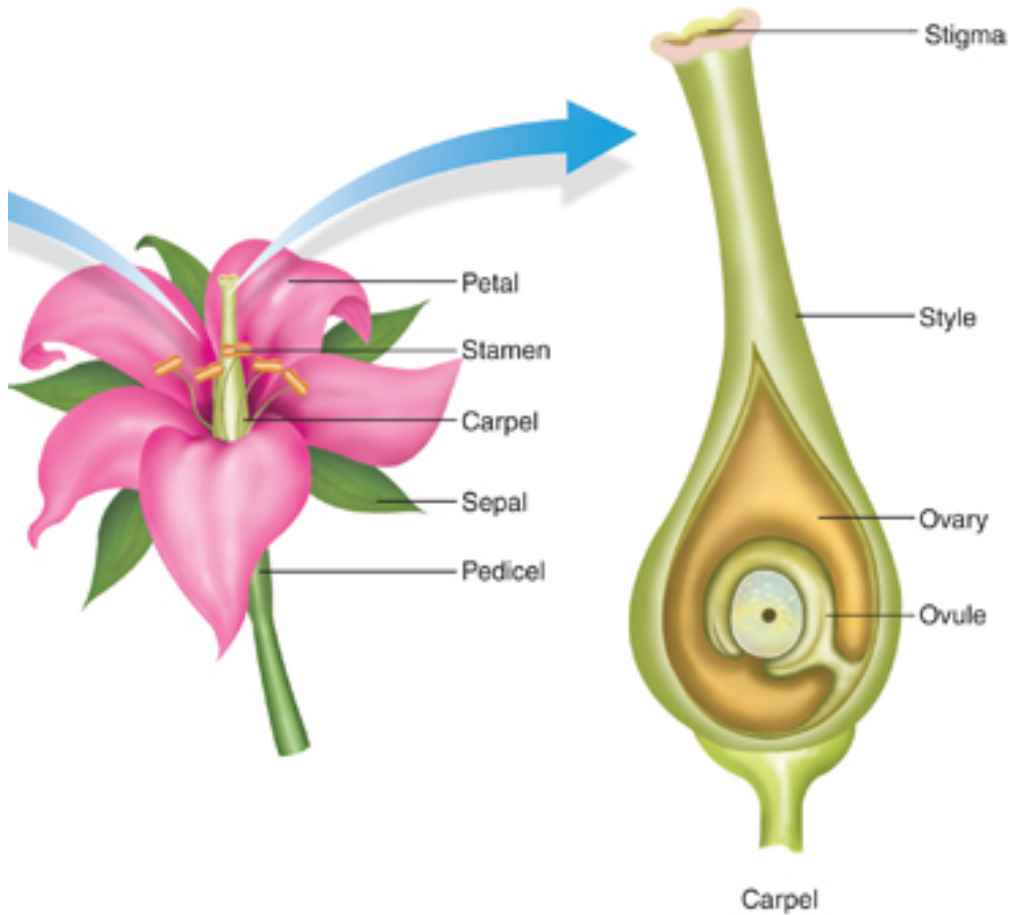
ovule = female gametophyte

A ***seed*** is a mature ovule containing an embryo and a food supply covered by a protective seed coat



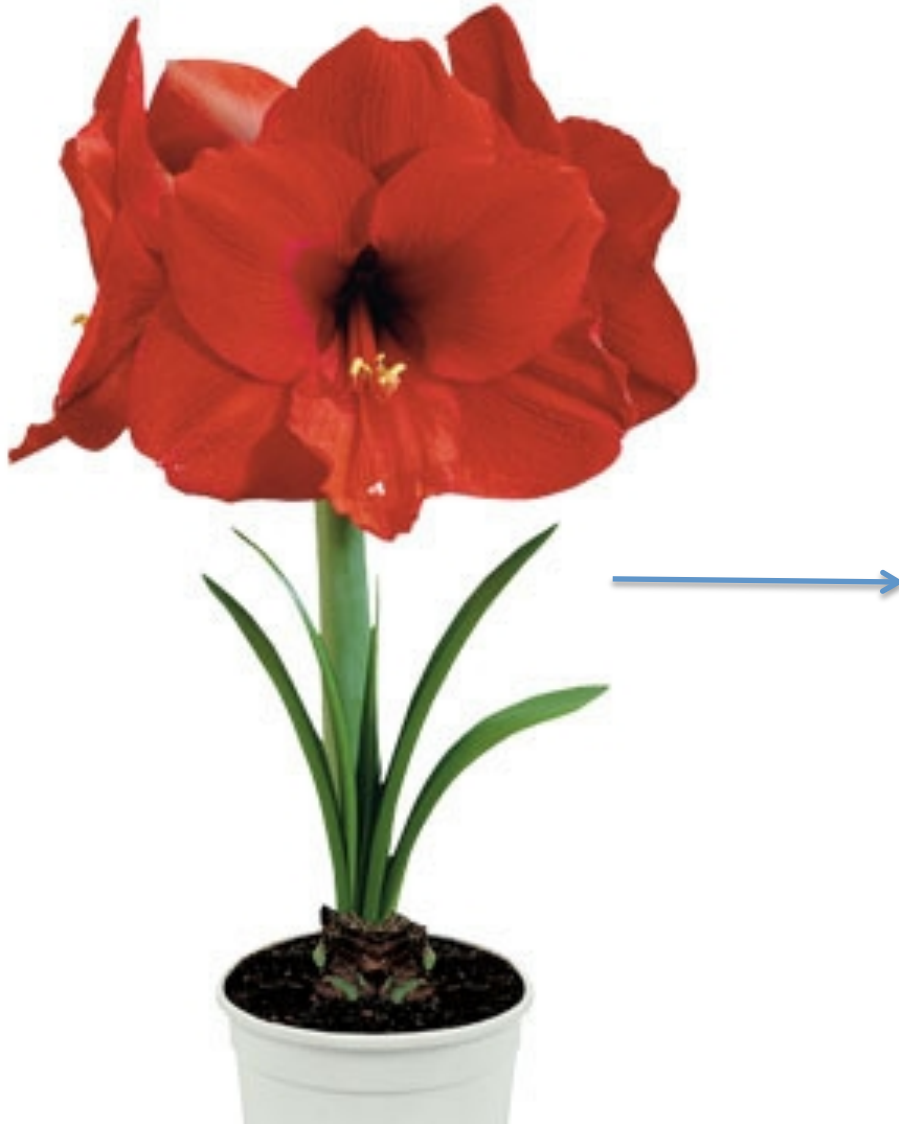
Zygote develops into the embryonic plant

A ***fruit*** protects the seeds and aids in their dispersal



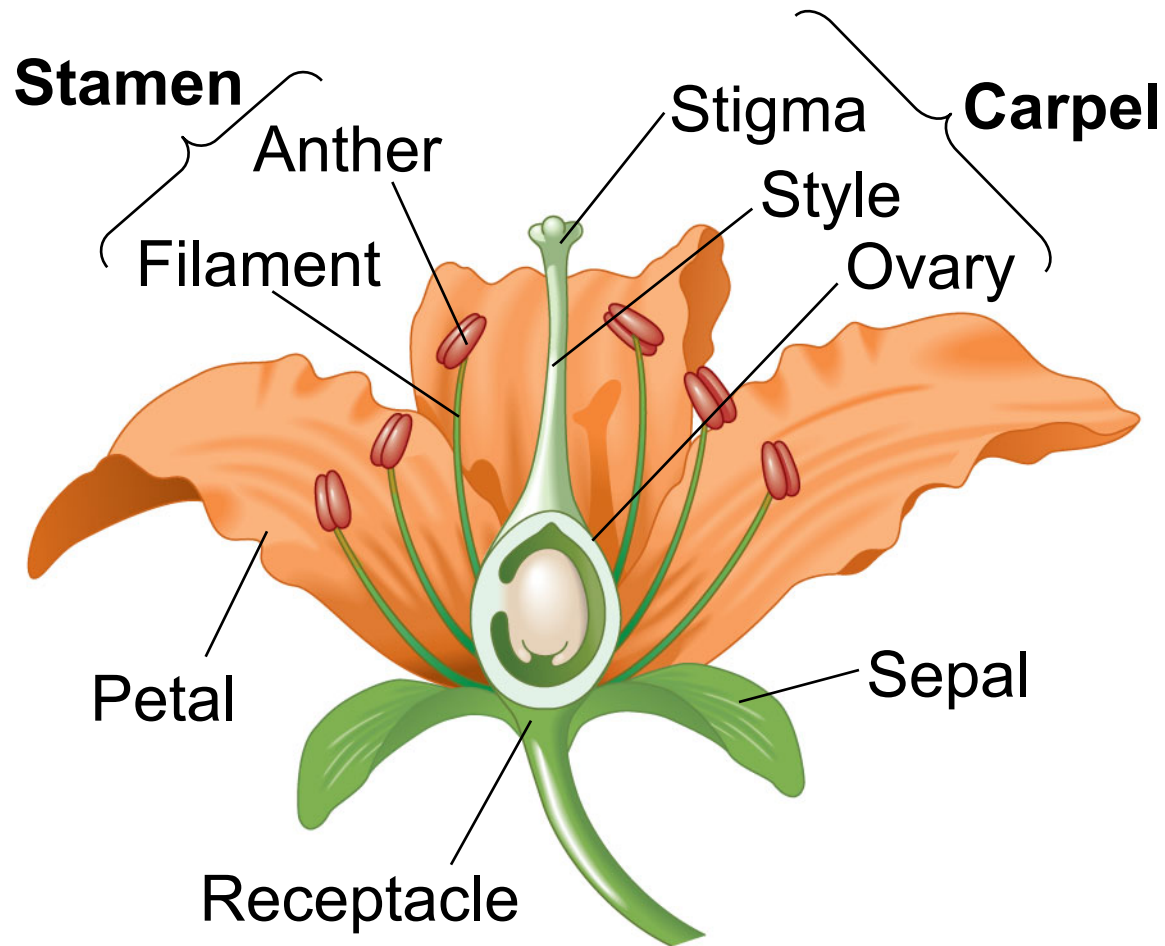
- the ***ovule*** develops into the ***seed***
- the ***ovary***, containing 1 or many ovules, ripens into the ***fruit***

Flower to fruit



Amaryllis ovaries ripening into the fruits, which contain the seeds.





© 2011 Pearson Education, Inc.

Structure of an idealized flower

[Pea flower ripening into fruit](#)

Fruit types

- 1. *Simple fruits*** are derived from the ovary of a single carpel or several fused carpels
 - **Fleshy** (e.g., tomatoes, lemons, cucumbers, cherry, apple)
 - **Dry, dehiscent** (e.g., legumes, like peanuts and soybeans)
 - **Dry, indehiscent** (e.g., sunflower “seeds,” rice, and other grains)
- 2. *Aggregate fruits*** develop from a single flower with many separate carpels
 - e.g., raspberries, strawberries
- 3. *Multiple fruits*** develop from the fusion of ovaries from many separate flowers on an inflorescence
 - e.g., figs and pineapples

Berry: a simple, fleshy fruit with a soft *pericarp*



Tomato

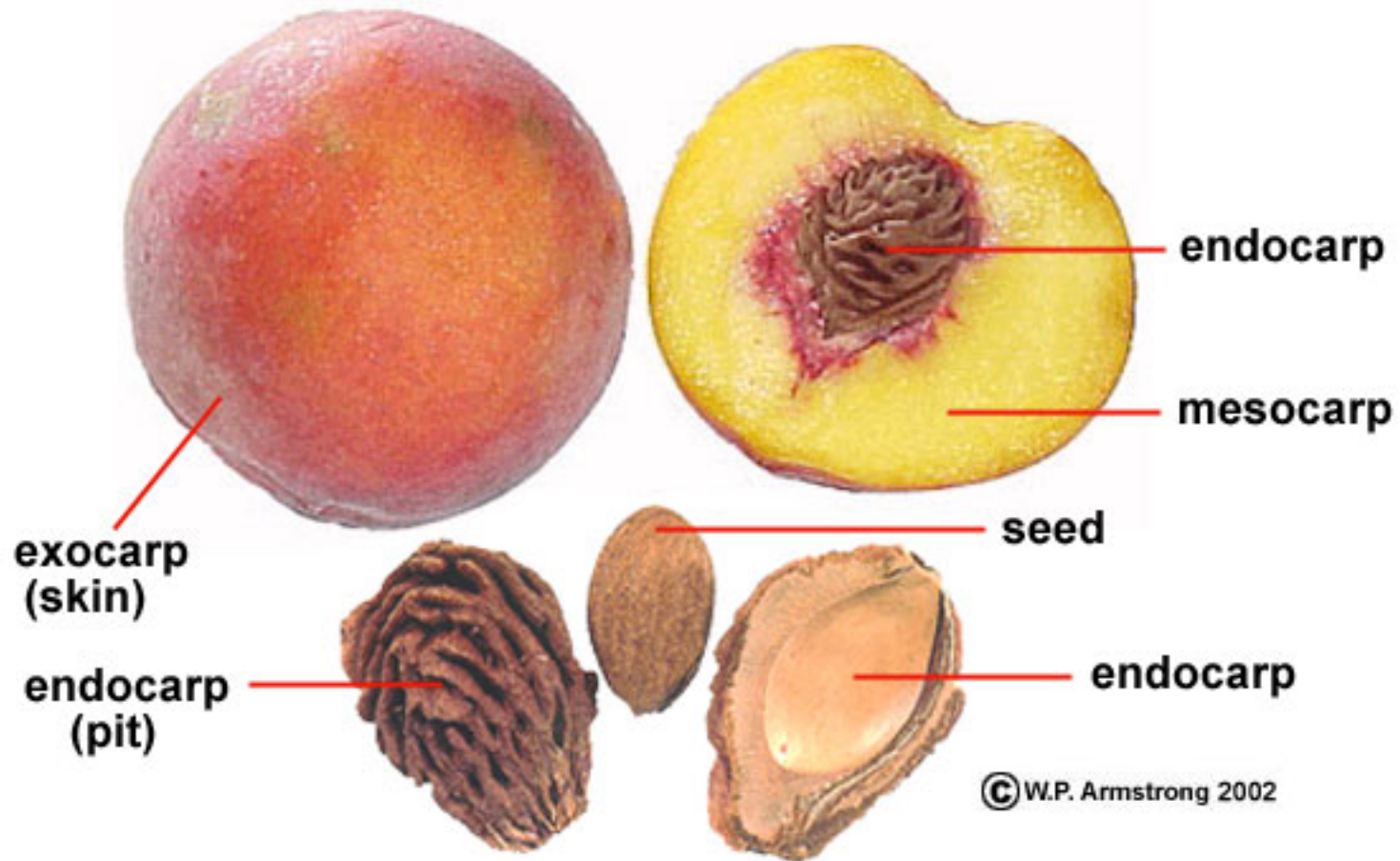


Blueberry



Kiwifruit

Drupe: A simple, fleshy fruit where the *pericarp* is divided into three layers



Drupe (fleshy fruit with a stony endocarp)

Peach, *Prunus persica*

Dry fruits have a tough/woody or thin/papery pericarp
Some dry fruits are **dehiscent**



Milkweed (*Asclepias syriaca*)
follicle



Amaryllis capsule
<http://dragonplants.blogspot.com>

Dry, dehiscent fruits

Legumes are *dry, dehiscent fruits* that are a staple of the human diet



Edamame. the soybean fruit is harvested green

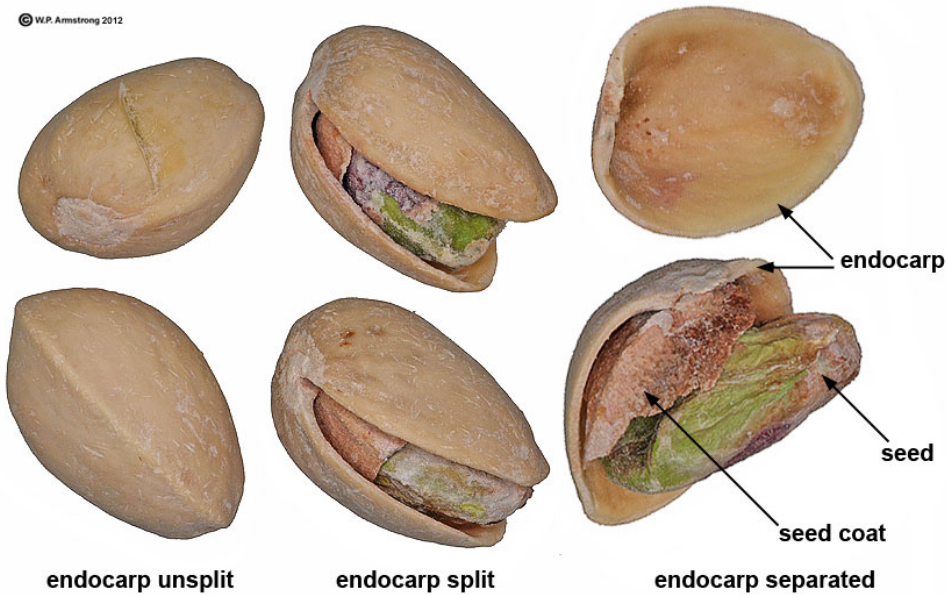


Roasted soybeans. the soybean seeds are harvested after the fruit has ripened

Pistachio fruits are *dry* and *dehiscent*



© W.P. Armstrong 2012



Dry, indehiscent fruits



Sunflower fruit is an ***achene***



Red maple flower
(*Acer rubrum*)

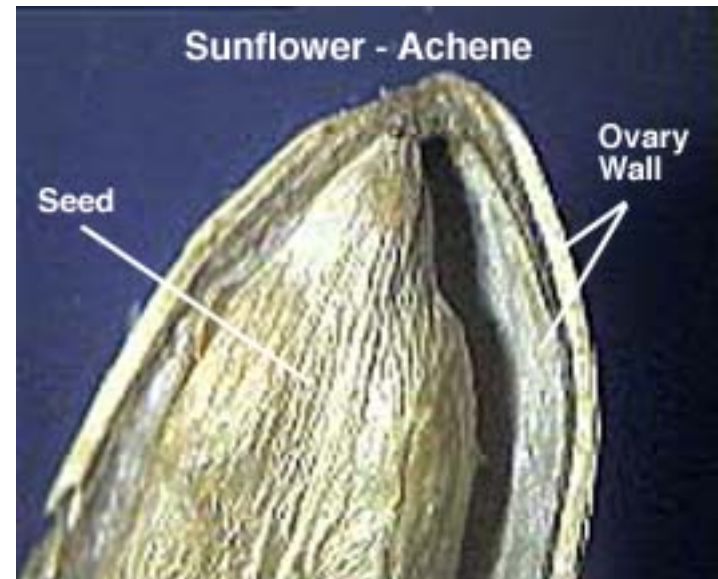


Red maple fruit is a ***samara***



Rice ***grain***, a single-seeded fruit, pericarp fused to the seed coat

Sunflower fruits are *achenes*



achene - a single seed that is attached to the wall of the ovary at only one point

Aggregate fruit



A raspberry is an *aggregate fruit*: each little “drupelet” is the product of a separate ovary. Each drupelet contains a single central seed.

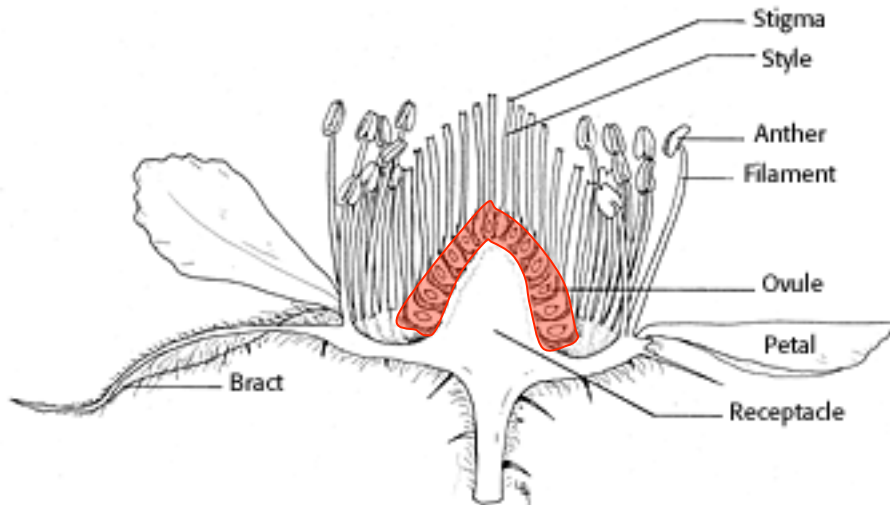
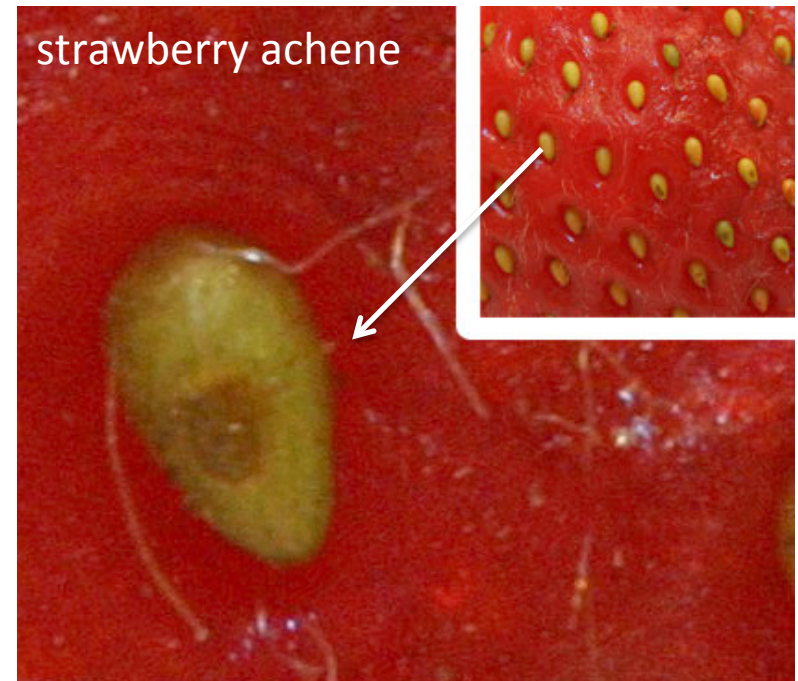
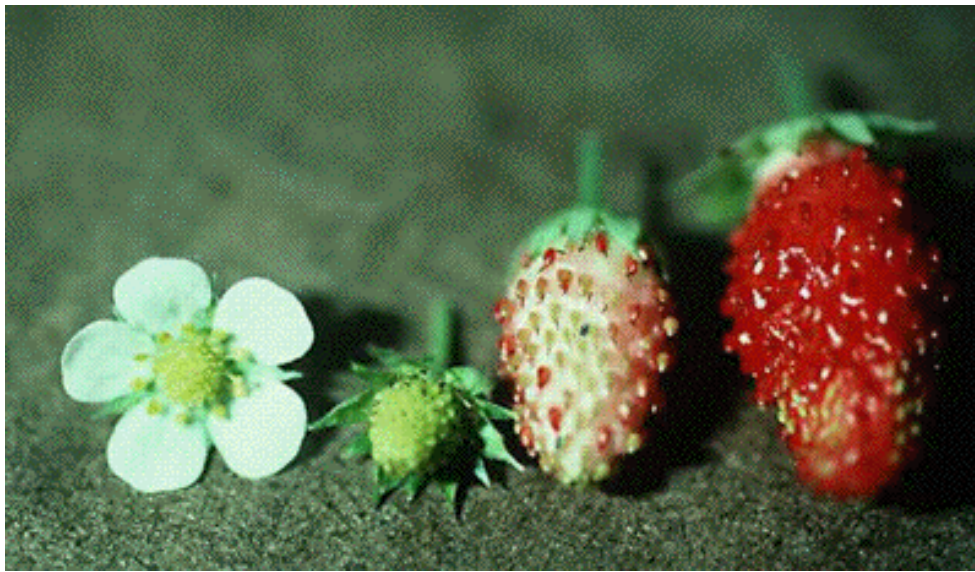
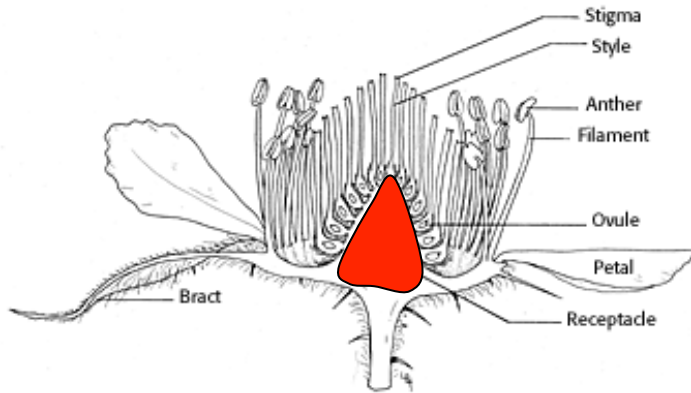


Figure 167. - Longitudinal section of 'Willamett' raspberry flower, x10.



Aggregate + *accessory* fruit



The strawberry is both an aggregate **and** an *accessory* fruit: the sweet, juicy part is receptacle, not ovary wall!
The true fruit part is the *achene*.

The apple, a simple, fleshy, *accessory* fruit

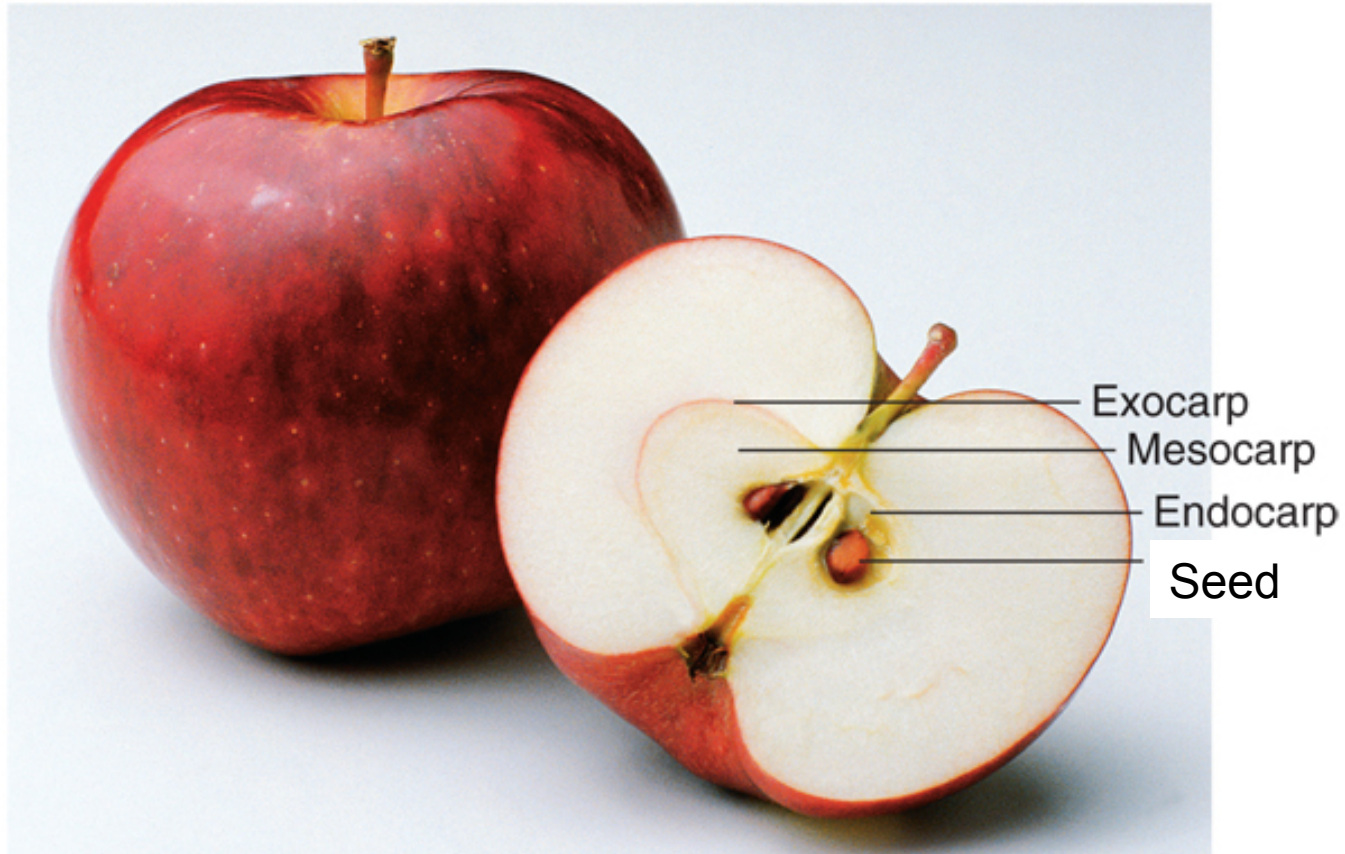


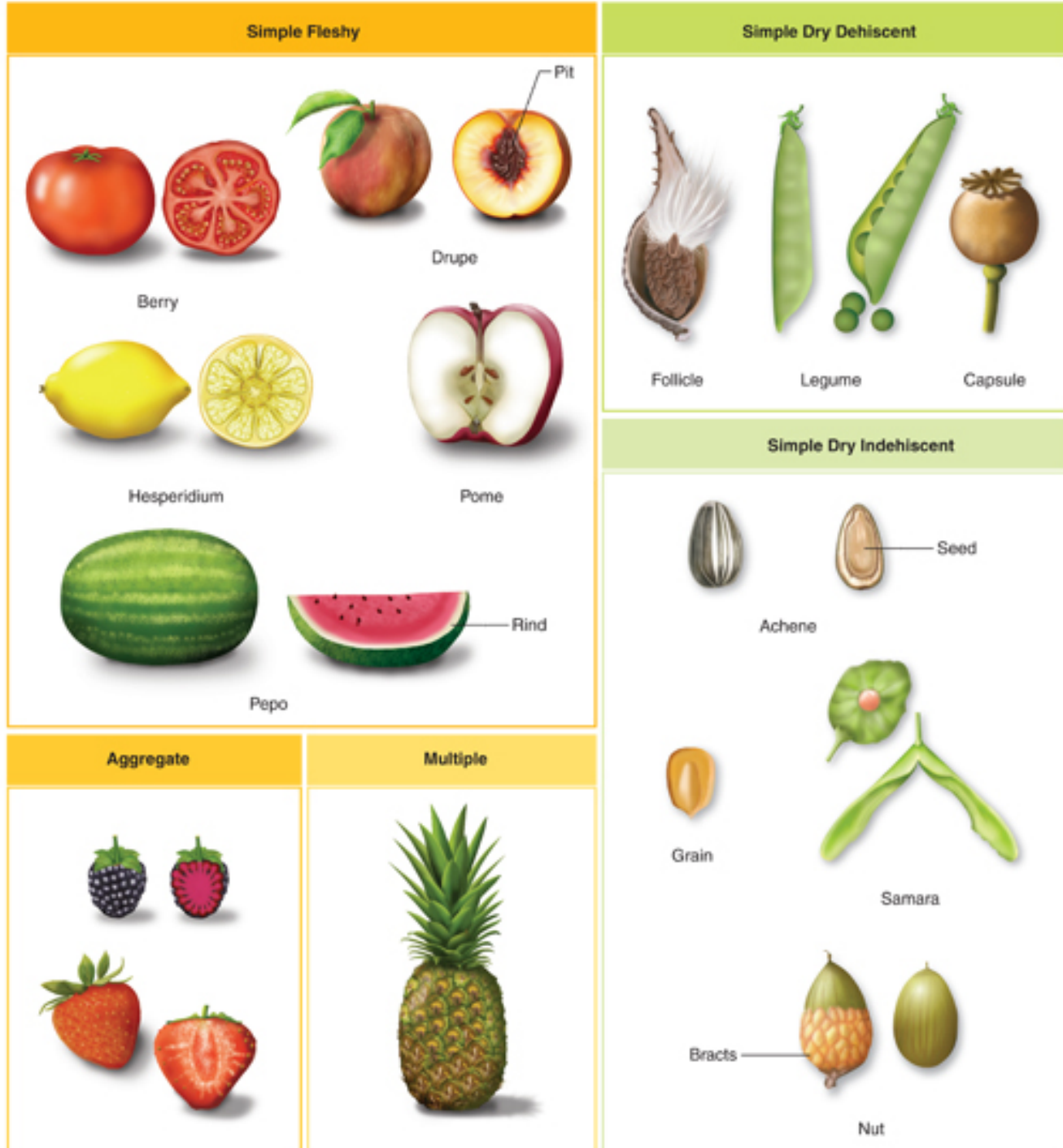
Figure 6.6 In this longitudinal section of the apple fruit, the brown line (exocarp) delineates the true ovary wall from the outer accessory tissue. The endocarp is the brown, papery material surrounding each seed, or pip.

Multiple fruits



The pineapple is an example of a *multiple* fruit: the fruit is derived from the fusion of an entire inflorescence.

Fig 6.1



Fruits are adapted to disperse and protect seeds!

(a) Wings enable maple fruits to be easily carried by the wind.



(b) Seeds within berries and other edible fruits are often dispersed in animal feces.



(c) The barbs of cockleburs facilitate seed dispersal by allowing these fruits to hitchhike on animals.

Evolutionary advantages of flowers and fruit

Flowers:

Get animal pollinators involved

Pollination less random, more successful than with wind only

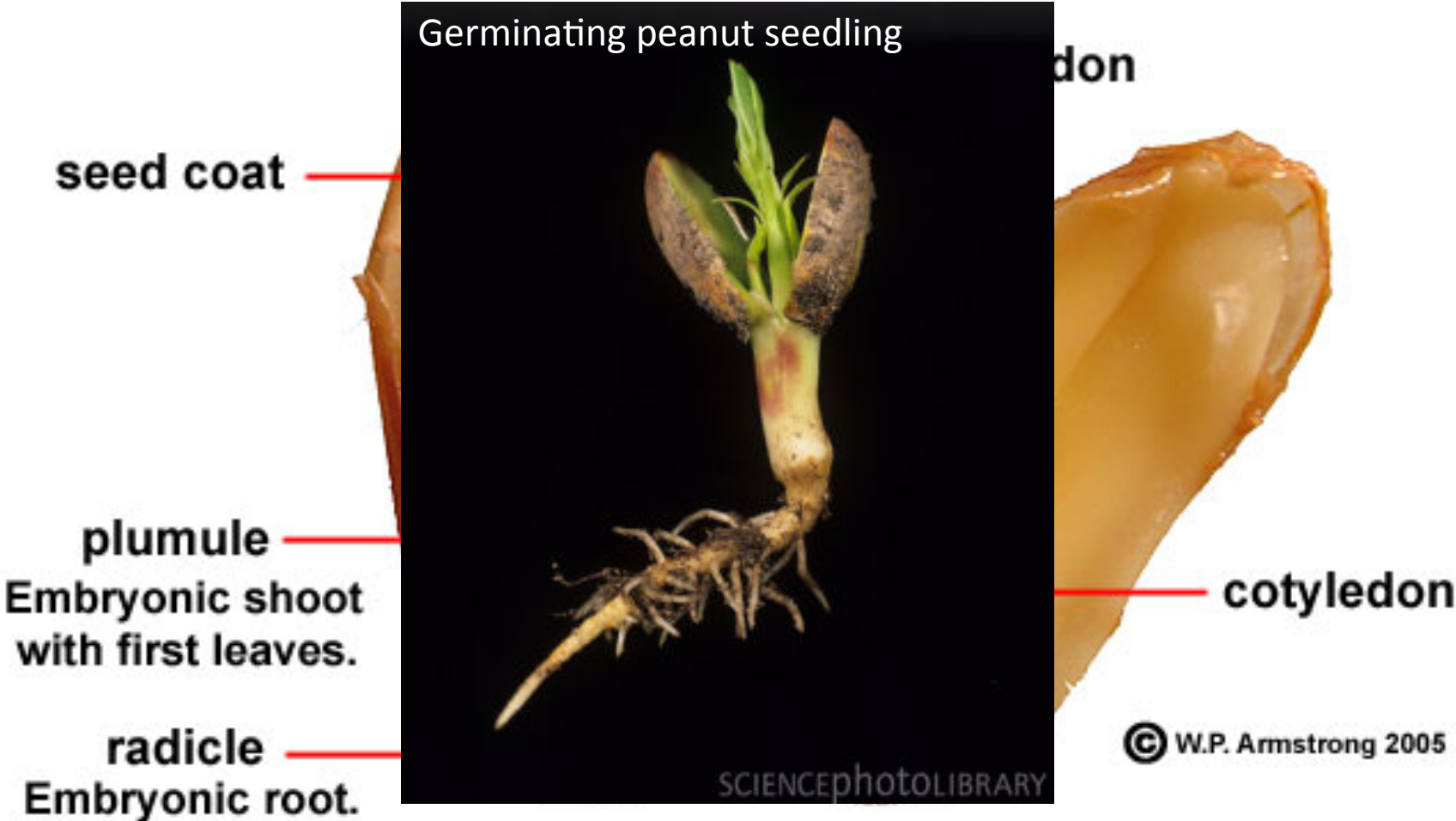
Fruit:

Protects seeds, increases range of dispersal

Often deposited with fertilizer...

Increased reproductive (evolutionary) success

Seed structure



Peanut Seed (*Arachis hypogaea*)

Foliage leaves

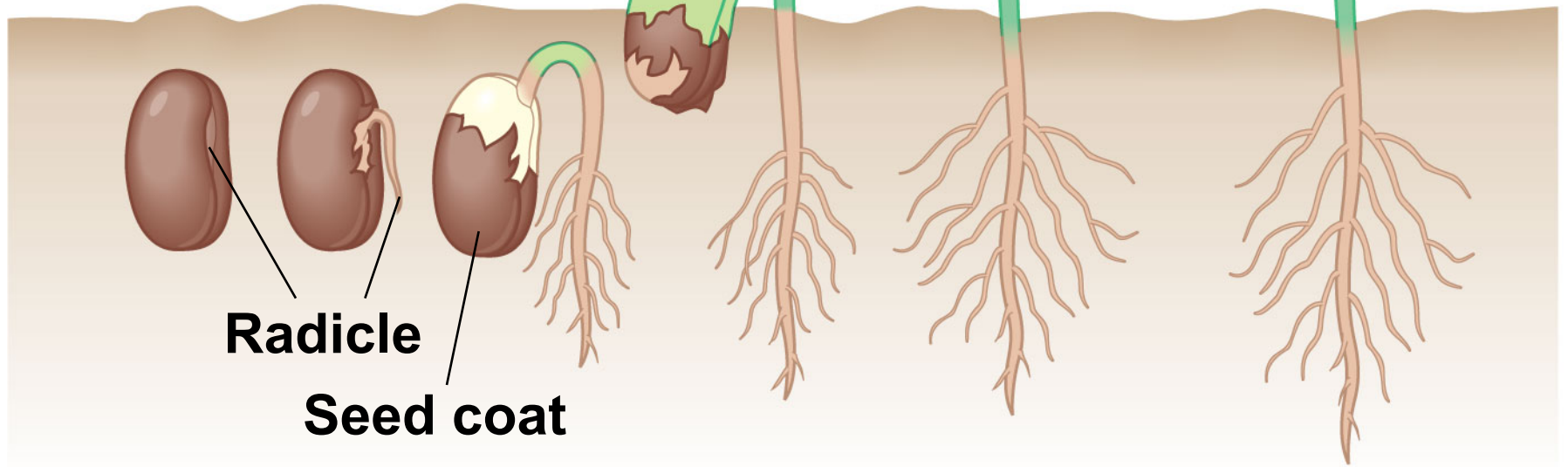
Cotyledon

Cotyledon

Cotyledon

Radicle

Seed coat



Seed germination in the common garden bean, a eudicot



**Life History of a
Flowering Plant
(*Brassica rapa*)**

1 mm

Brassica rapa seed

Lecture Review, Chapter 6

- Relate the plant life cycle, alternation of generations, to the parts of a flower. What part is the male gametophyte? What part is the female gametophyte?
- Label the components of the mature seed. Describe the function of the seed coat and endosperm.
- Compare and contrast simple fruits, aggregate fruits, and multiple fruits.
- What is the pericarp? What are the 3 layer of the pericarp formed in some fruit, like drupes?
- Contrast simple fleshy fruits with simply dry fruits. Can both kinds of fruits be dehiscent? Why or why not?
- What is an accessory fruit? Give an example.
- Describe the major steps of seed germination. What is the role of the cotyledons during germination?