Seed Basics
Botany and Biology

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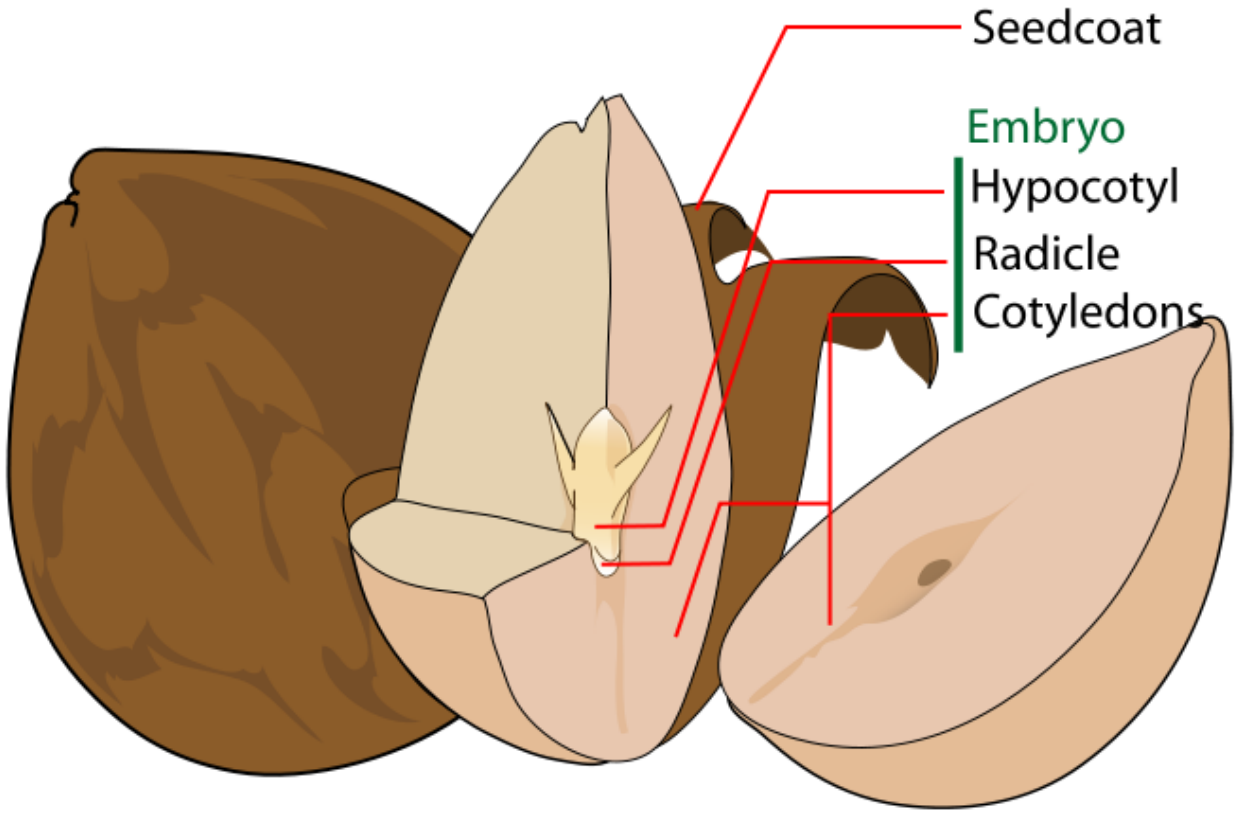
What is a Seed



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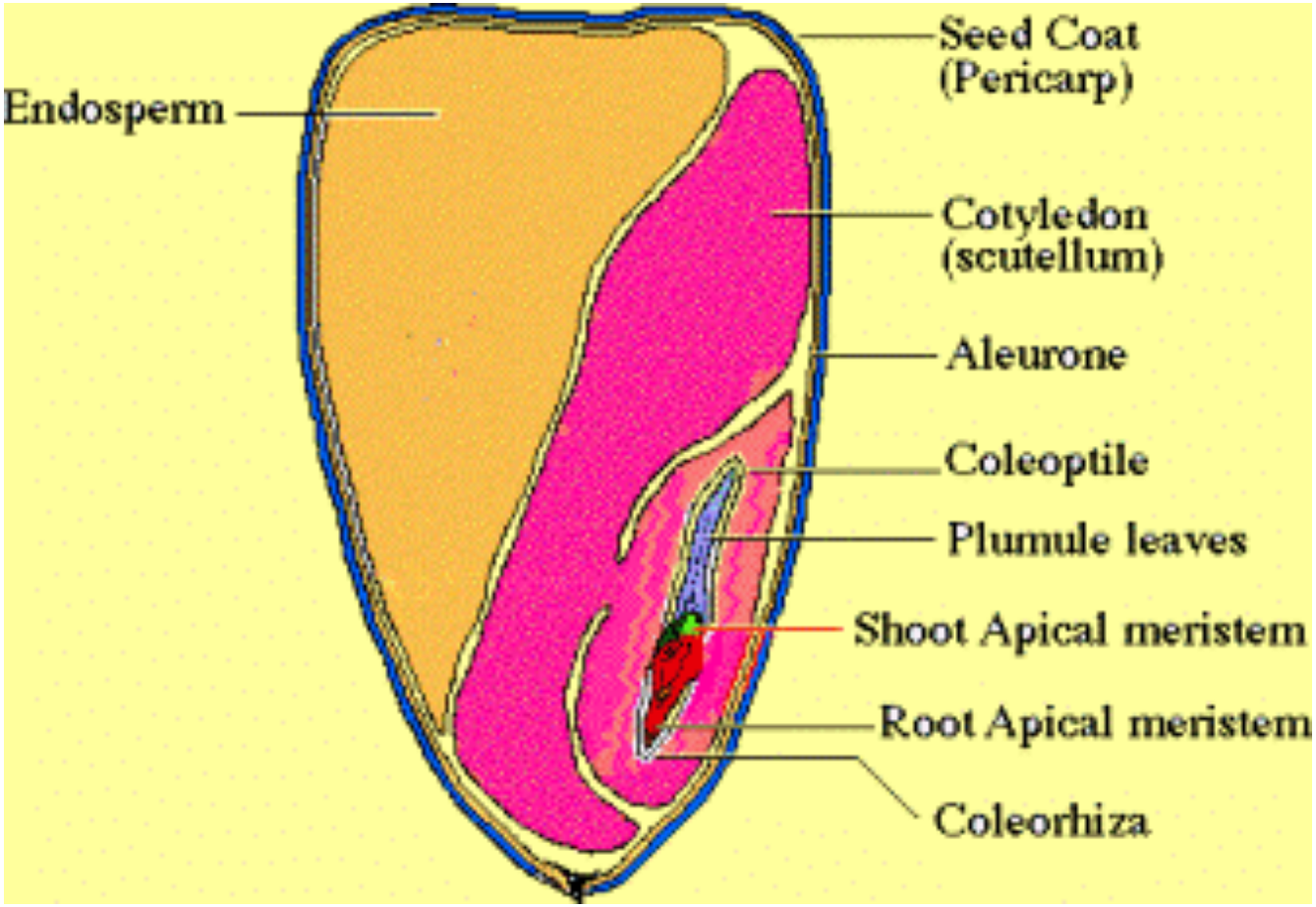
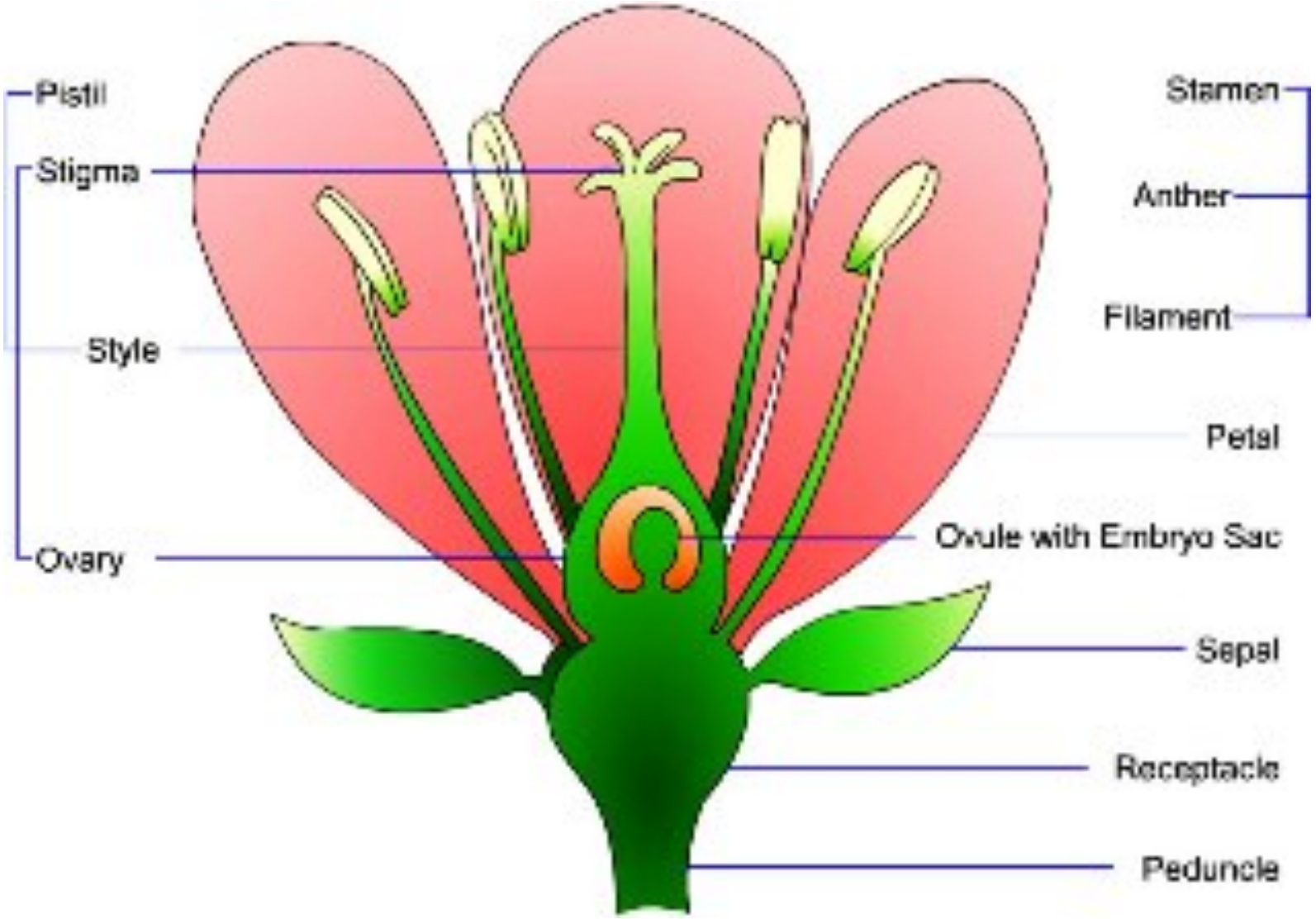

Endosperm
Seed Coat
(Pericarp)
Cotyledon
(scutellum)
Aleurone
Coleoptile
Plumule leaves
Shoot Apical meristem
Root Apical meristem
Coleorhiza



Reproductive Cycles

- Annuals
- Biennial
- Perennial

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Annuals

- Seed to Seed in One Growing Season
- Herbaceous
- Bean, pea, corn, lettuce, cucurbits

Biennials

- Require Two Growing Seasons
  - seed to seed
- Need Dormancy or Photoperiod
- cabbage, beets, carrots, collards, kale

Perennials

- Grow Many Years
- Many Seed Cycles
- Many Are Woody Plants
- coconut, avocado, etc.

Mating Preferences

- Self Pollinators
- Out Crossers
- Promiscuous
  - generally not specific
  - no incompatibility

Self Pollinators

- Self Compatible
- Floral Morphology
  - enclose reproductive structures
    - tubes
    - pollination prior to flower opening
  - flower positioned to self pollinate
- Tomato, Snap Beans, Lettuce

Out Crossers

- **Wind Pollinated**
  - **light, loose pollen**
  - **dependent on wind direction**

Out Crossers

- Wind Pollinated
- Insect Pollinated
  - availability of pollinators
    - pollinator preference
  - greenhouse production

Out Crossers

- Wind Pollinated
- Insect Pollinated
- Vertebrate Pollinated
  - birds, mammals

Out Crossers

- Wind Pollinated
- Insect Pollinated
- Vertebrate Pollinated
- Self Incompatibility

Self Incompatibility

- Chemical Recognition
- Pollen and Seed Plant Compatibility
- Cabbage, Onions, Radish

Out Crossers

- Wind Pollinated
- Insect Pollinated
- Vertebrate Pollinated
- Self Incompatibility
- Floral Structure Dependent

Floral Structure Dependent

- **Monoecious**
  - one plant with male and female flowers
- **Dioecious**
  - separate male and female flower plants
- **Receptivity**
  - pollen shed and stigma receptivity not in sink

Out Crossers

- Wind Pollinated
- Insect Pollinated
- Vertebrate Pollinated
- Self Incompatibility
- Floral Structure Dependent
- Hybrid Vigor

Out Crossers

- Wind Pollinated
- Insect Pollinated
- Vertebrate Pollinated
- Self Incompatibility
- Floral Structure Dependent
- Hybrid Vigor
- Inbreeding Depression
  - reduced plant vigor

Pollen Transfer

- **Wind**
  - **direction important in small plots**
  - **loose pollen grains**

Pollen Transfer

- Wind
- Insects and Animals
  - Sticky Pollen Grains
  - Packaged Pollen Grains
  - Bees and Wasps
  - Beetles
  - Flies
  - Butterflies and Moths

Pollen Transfer

- Wind
- Insects and Animals
- Humans
  - Lack of Natural Pollinators
  - New Character Combinations
  - Variety Purity

Path to Homozygosity

- Hybrid 50.00%
- Cycle 2 75.00%
- Cycle 3 87.50%
- Cycle 4 93.75%
- Cycle 5 96.88%
- Cycle 6 98.44%
- Cycle 7 99.22%
- Cycle 8 99.61%