



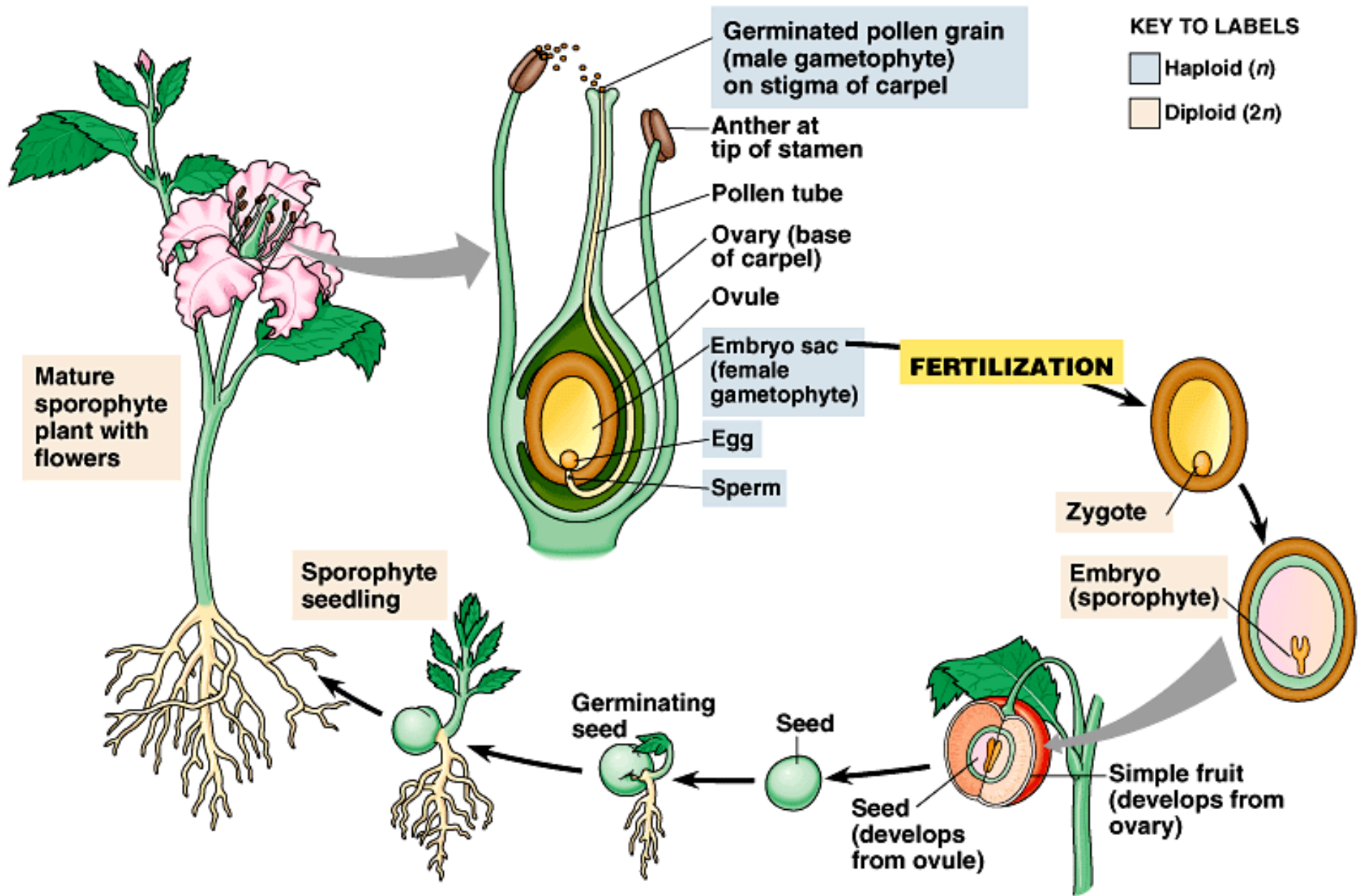
■ Chapter 38 ~  
*Plant Reproduction  
and Development*

# 5 ADAPTATIONS FOR SUCCESS OF SEED PLANTS

- Reduced gametophytes – microscopic and can be protected
- Heterospory – two types of spores (male and female)
- Ovules and egg production – ovule protects developing zygote
- Pollen and sperm production – water proof
- Seeds – multicellular, protective coating, can store energy (spores can't)

# SEXUAL REPRODUCTION

- Alternation of generations: haploid ( $n$ ) and diploid ( $2n$ ) generations take turns producing each other
- Sporophyte ( $2n$ ): produces haploid spores by meiosis; these spores divide by mitosis giving rise to male and female haploid plants called....
- Gametophytes ( $n$ ): develop and produce gametes



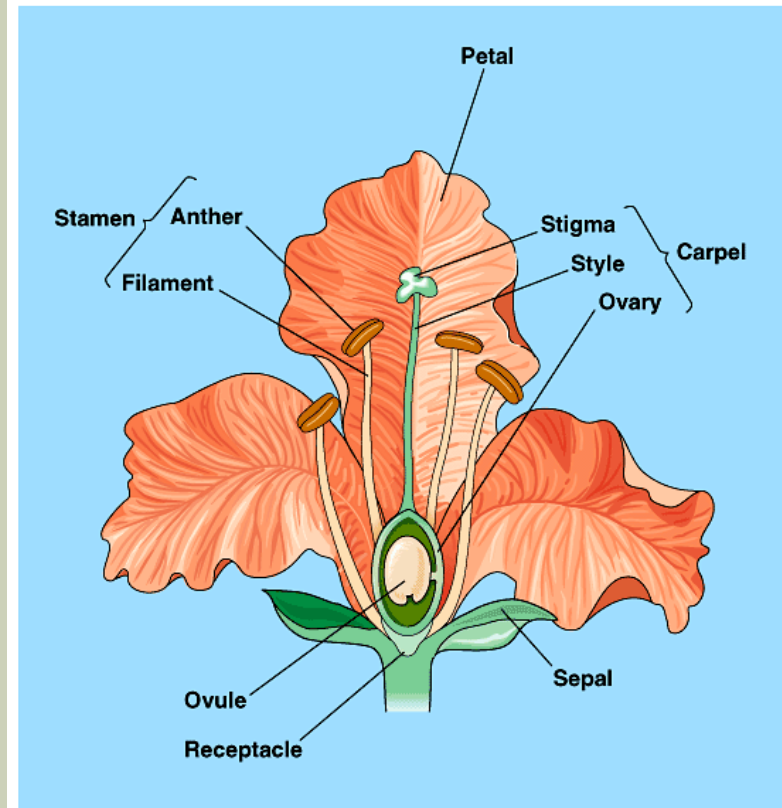
# FLORAL VARIATIONS

- Floral organs: sepals, petals, stamens (male), carpels (female)

How did Mendel cross the pea plants?

What 2 laws were developed?

What is the difference between genotype and phenotype?



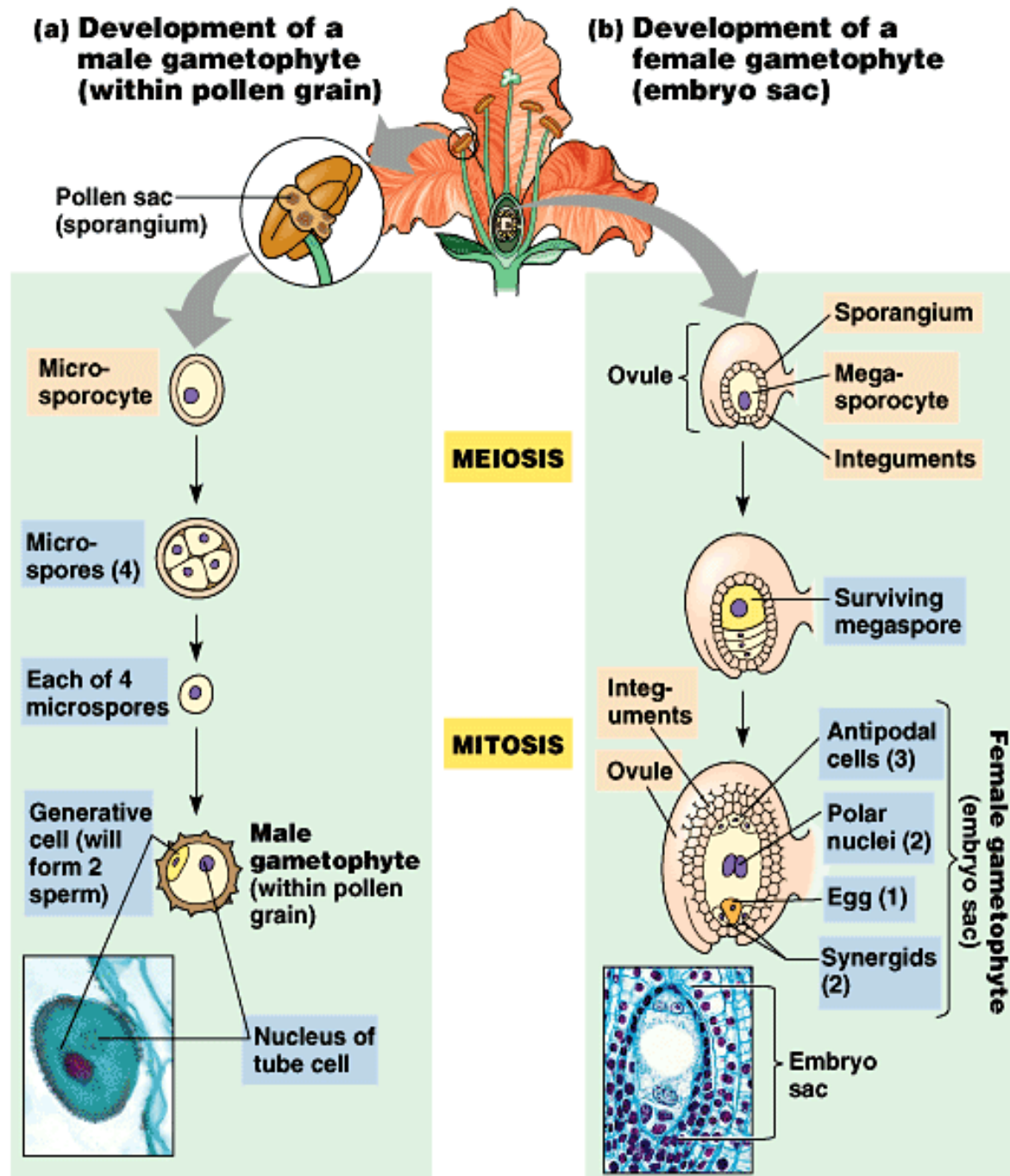
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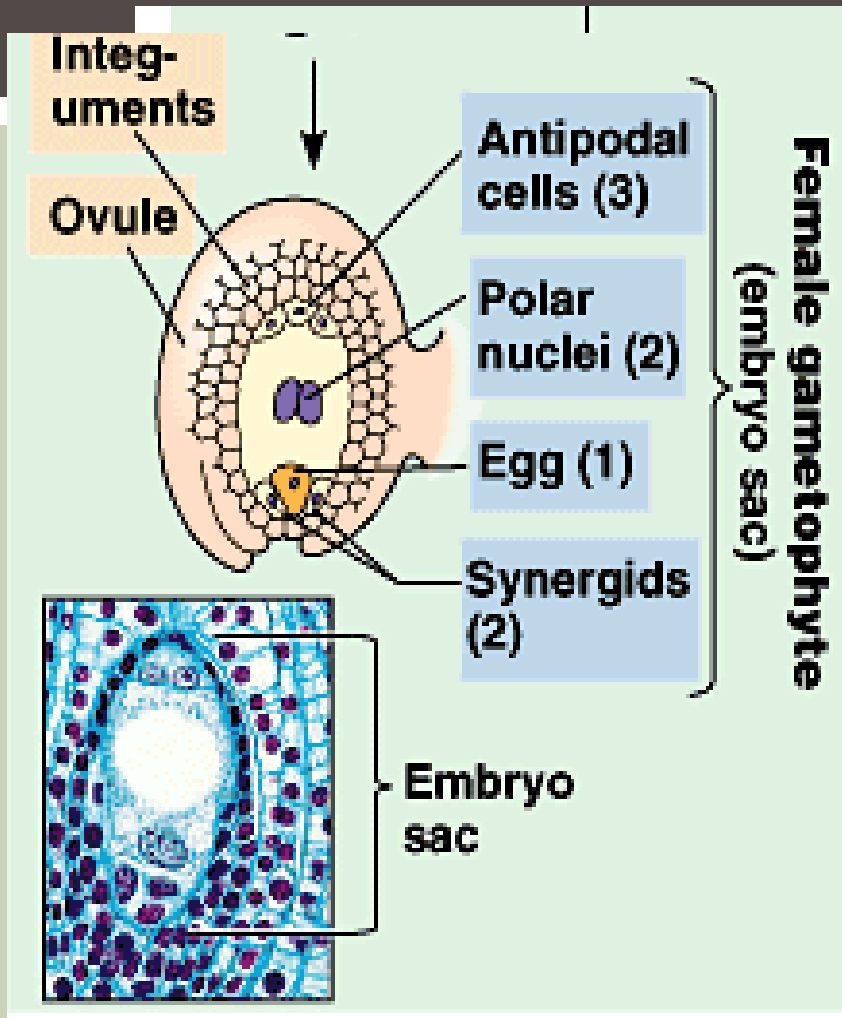
# GAMETOPHYTE DEVELOPMENT

- **Male gametophyte:** (in pollen sacs of anther)
  - Divides by meiosis into 4  $1n$  microspores
  - Mitosis produces a generative cell (sperm) and a tube cell (pollen tube)= a pollen grain
  
- **Female gametophyte:** (in ovule)
  - Divides by meiosis to 4 cells, only **1** survives to a  $1n$  megaspore
  - 3 mitotic divisions forms the embryo sac
  - Includes: **1** egg cell (female gamete) and **2** polar nuclei

**(a) Development of a male gametophyte (within pollen grain)**

**(b) Development of a female gametophyte (embryo sac)**





### KEY TO LABELS

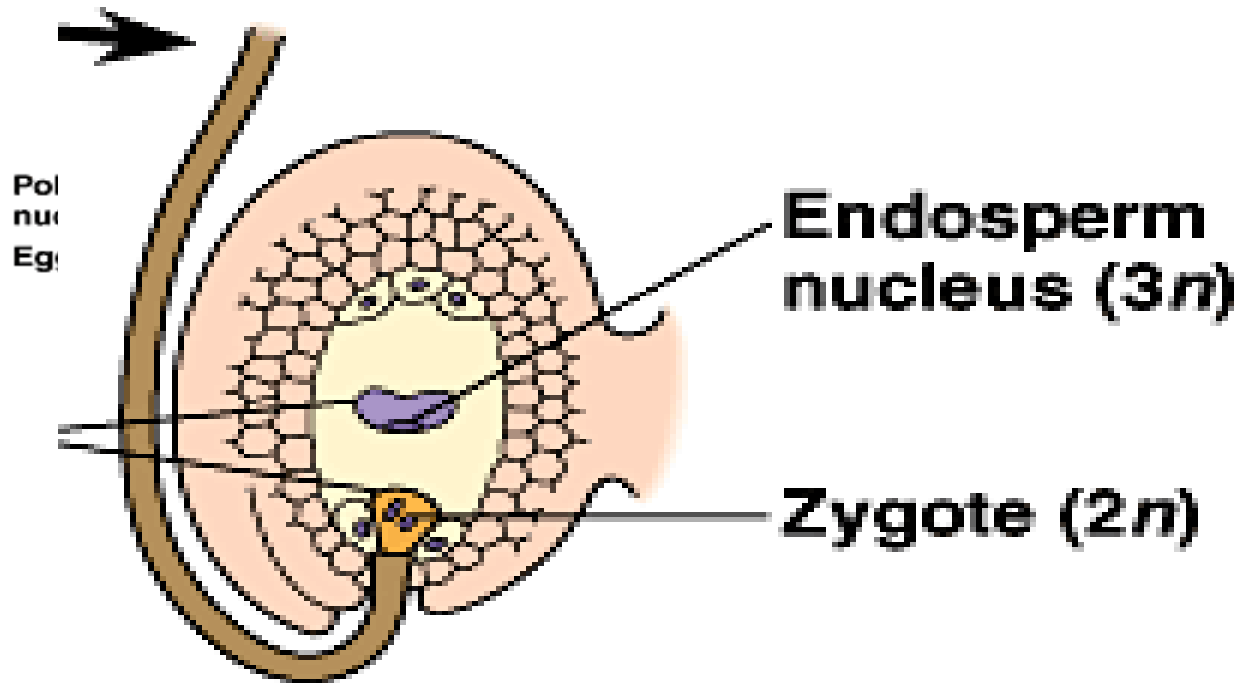
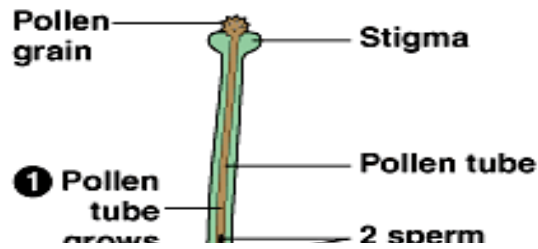
Diploid ( $2n$ )

Haploid ( $n$ )



# DOUBLE FERTILIZATION

- Pollination (pollen grain lands on a receptive stigma)
- Tube cell (pollen tube produced down the style)
- Generative cell (2 sperm by mitosis)
- Enters ovary
- 1 sperm fertilizes egg to form zygote; other sperm combines with 2 polar nuclei to form  $3n$  endosperm (food-storing tissue)



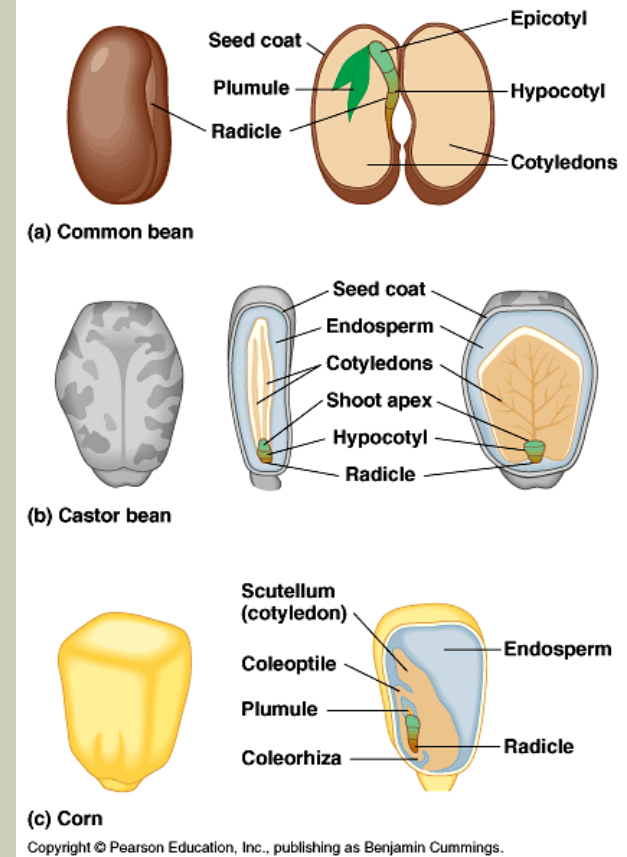
sperm  
us ( $3n$ )

occurs



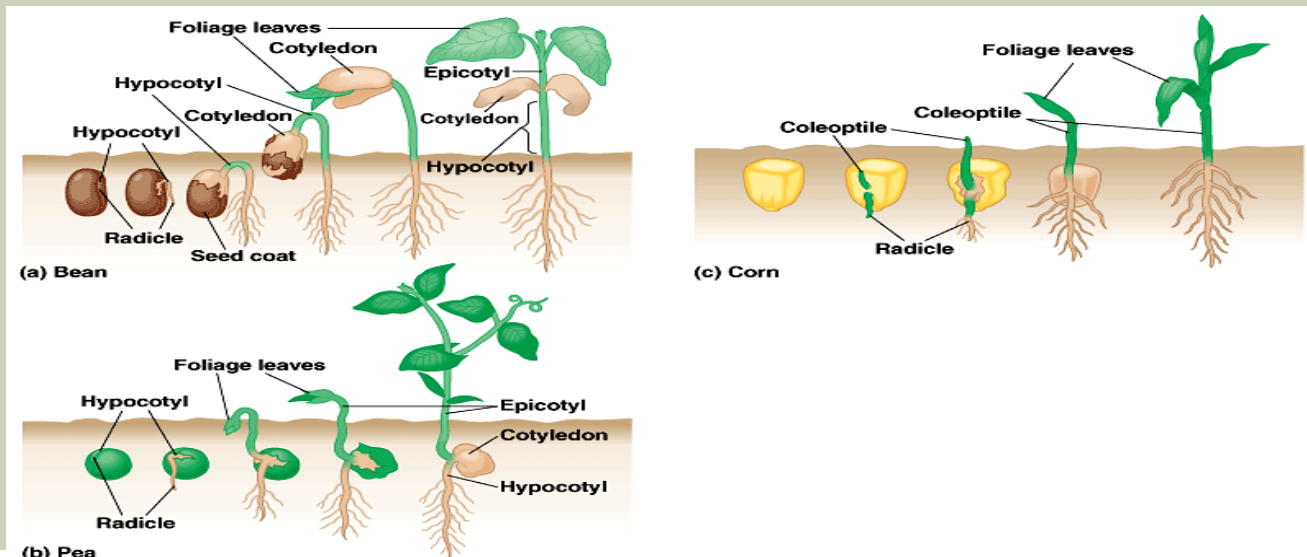
# THE SEED

- From fertilized ovule.....
- The mature seed:
  - seed coat (protection)
  - cotyledons (seed leaves)
  - embryo



# SEED GERMINATION

- Seed dormancy (low metabolic rate and growth suspension)
- Imbibition (uptake of water) – triggers metabolic changes
- Radicle first, then shoot tip; stimulated by light
- Germination



# ASEXUAL REPRODUCTION

- Produces clones
- Fragmentation
  - Pieces of parents break off to form new individuals that are exact genetic replicas
- Other examples: Cutting, test-tube cloning
- Some flowers self-fertilize and others prevent it to ensure genetic variation

# PLANTS AND GENETIC ENGINEERING

- Artificially selecting traits in plants
- Genetically modified organisms
  - Ex: corn (increase in kernels), Golden rice (increased vitamin A)
- Biofuels – decreased dependence on fossil fuels
- Concerns: fear of allergies, effects of non-target organisms