Plant Reproduction

Asexual Reproduction

- Asexual reproduction is natural “cloning.” Parts of the plant, such as leaves or stems, produce roots and become an independent plant.

Sexual Reproduction

- Sexual reproduction requires fusion of male cells in the pollen grain with female cells in the ovule.

Terms to know:

- Haploid: having a single set of chromosomes in each cell.
- Diploid: having two sets of chromosomes in each cell, one set from each parent.
- Mitosis: cell division, which produces two genetically identical diploid cells.
- Meiosis: reduction division, which produces four haploid reproductive cells.

Terms to know:

- Spore: haploid reproductive cell that leads to a gametophyte in plant alternation of generations.
- Gamete: mature haploid male or female germ cell able to unite with another of the opposite sex in sexual reproduction to form a zygote.
- Zygote: diploid, eukaryotic cell formed during fertilization event between two gametes, combining DNA of each gamete, containing the genetic information to form a new individual.

Terms to know:

- Sporophyte: diploid, multicellular stage which develops from zygote, produced when a haploid female cell is fertilized by a haploid male cell, produces haploid spores by meiosis.
- Gametophyte: haploid, multicellular stage, develops from a spore by mitosis, produces haploid gametes by mitosis.

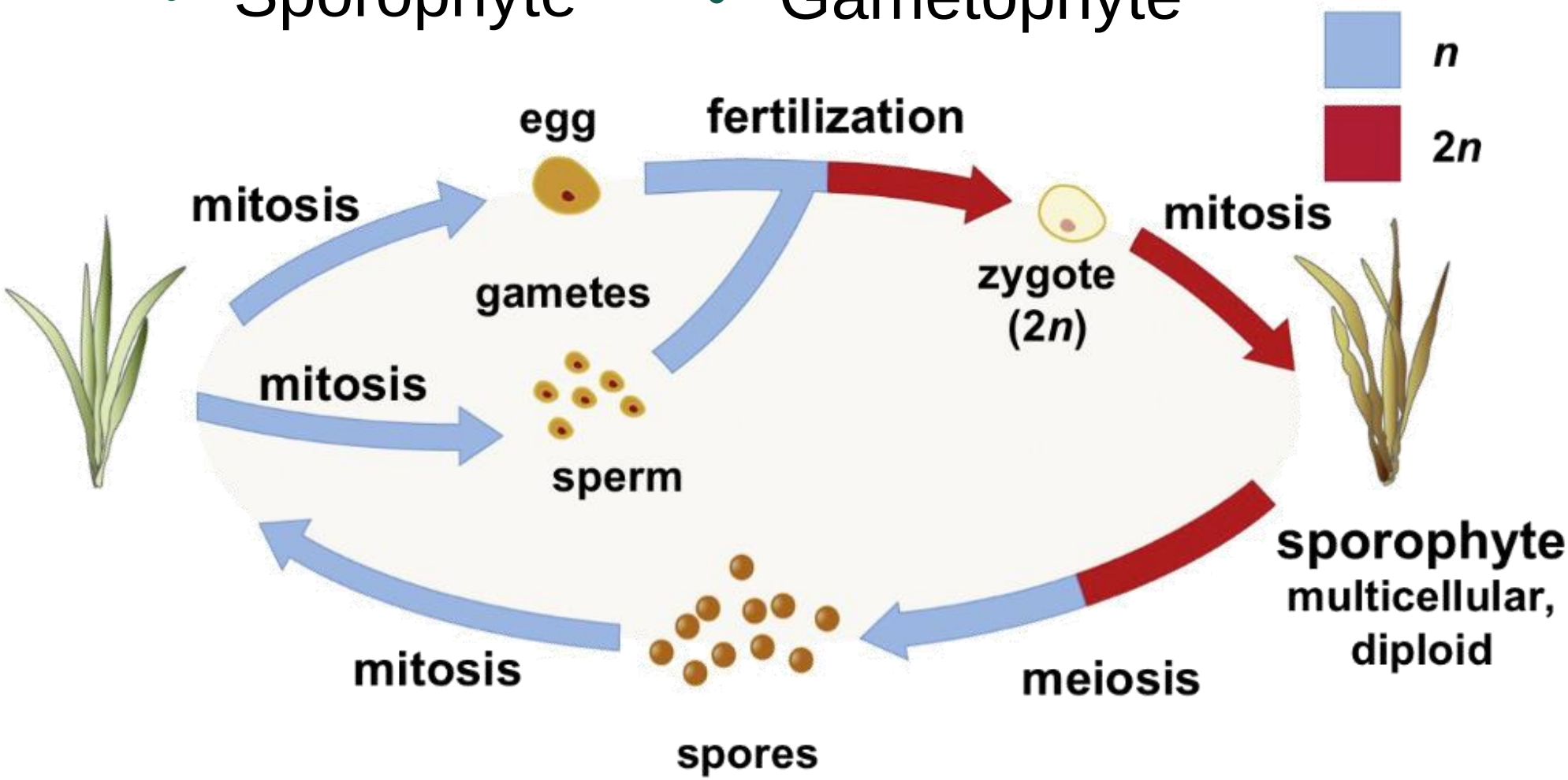
Plant Life Cycle

Animals vs. Plants

	Plant Reproduction	Animal Reproduction
Life cycle	Alternation of generations	No alternation of generations
Gametes	Haploid gametes	Haploid gametes
Spores	Haploid spores	N/A (no spores)
Gametes made by	Haploid gametophyte, by mitosis	Diploid organism, by meiosis
Spores made by	Diploid sporophyte, by meiosis	N/A (no spores)

Alternation of Generations

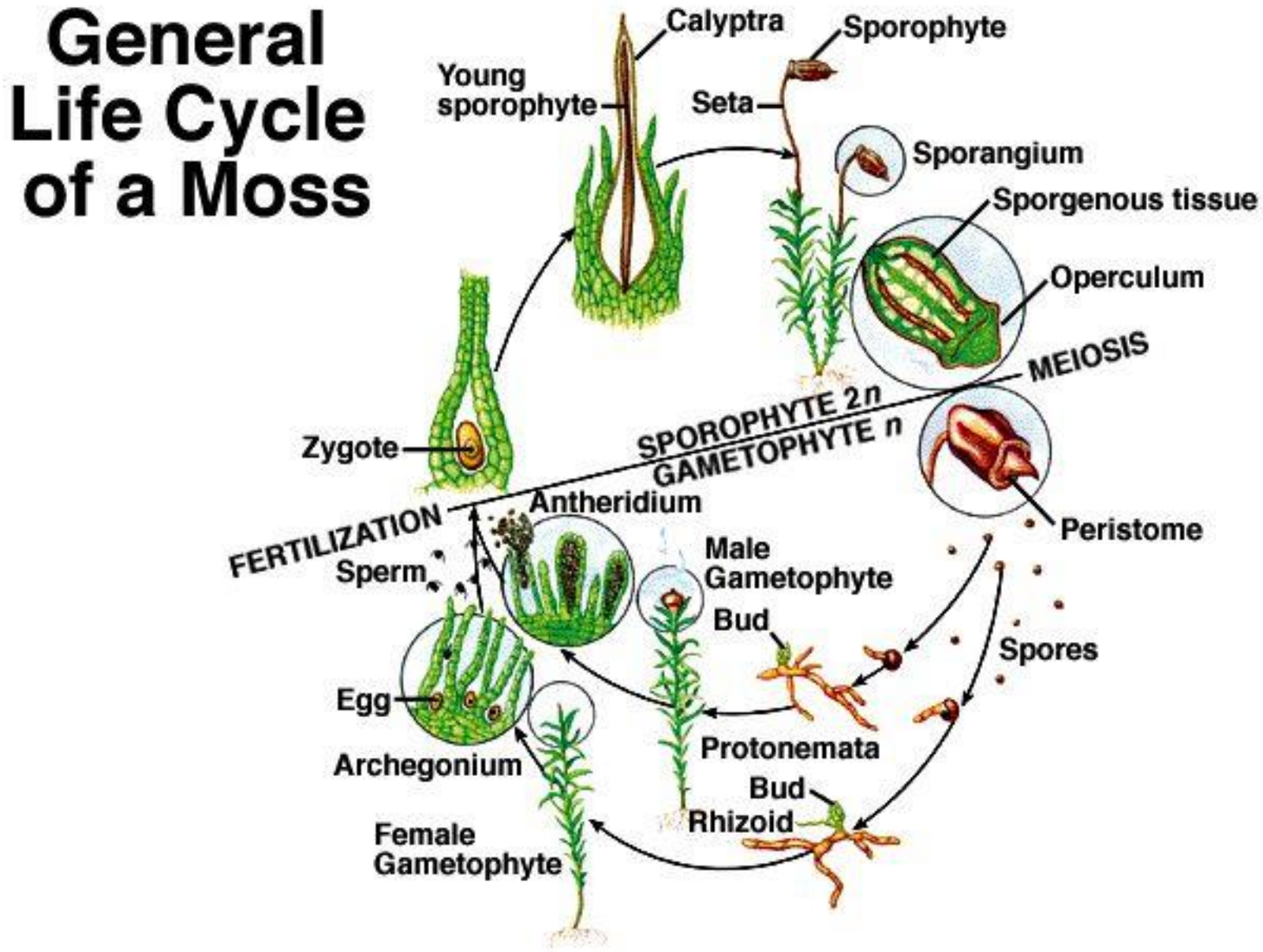
- Plants have a double life cycle with two forms:
  - Sporophyte
  - Gametophyte



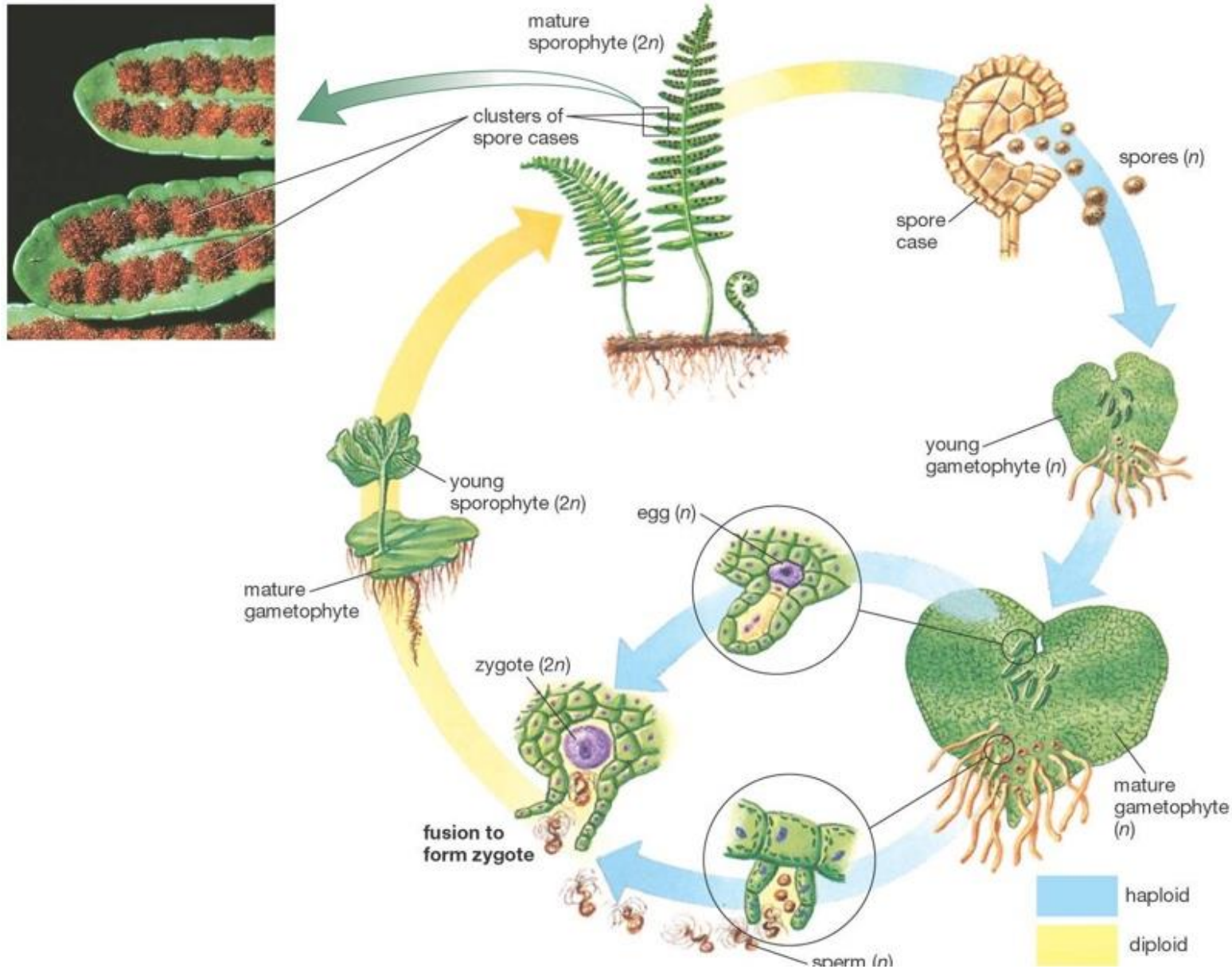
Non-flowering plants

- Mosses, ferns, and related plants have motile, swimming sperm.

Moss Life Cycle



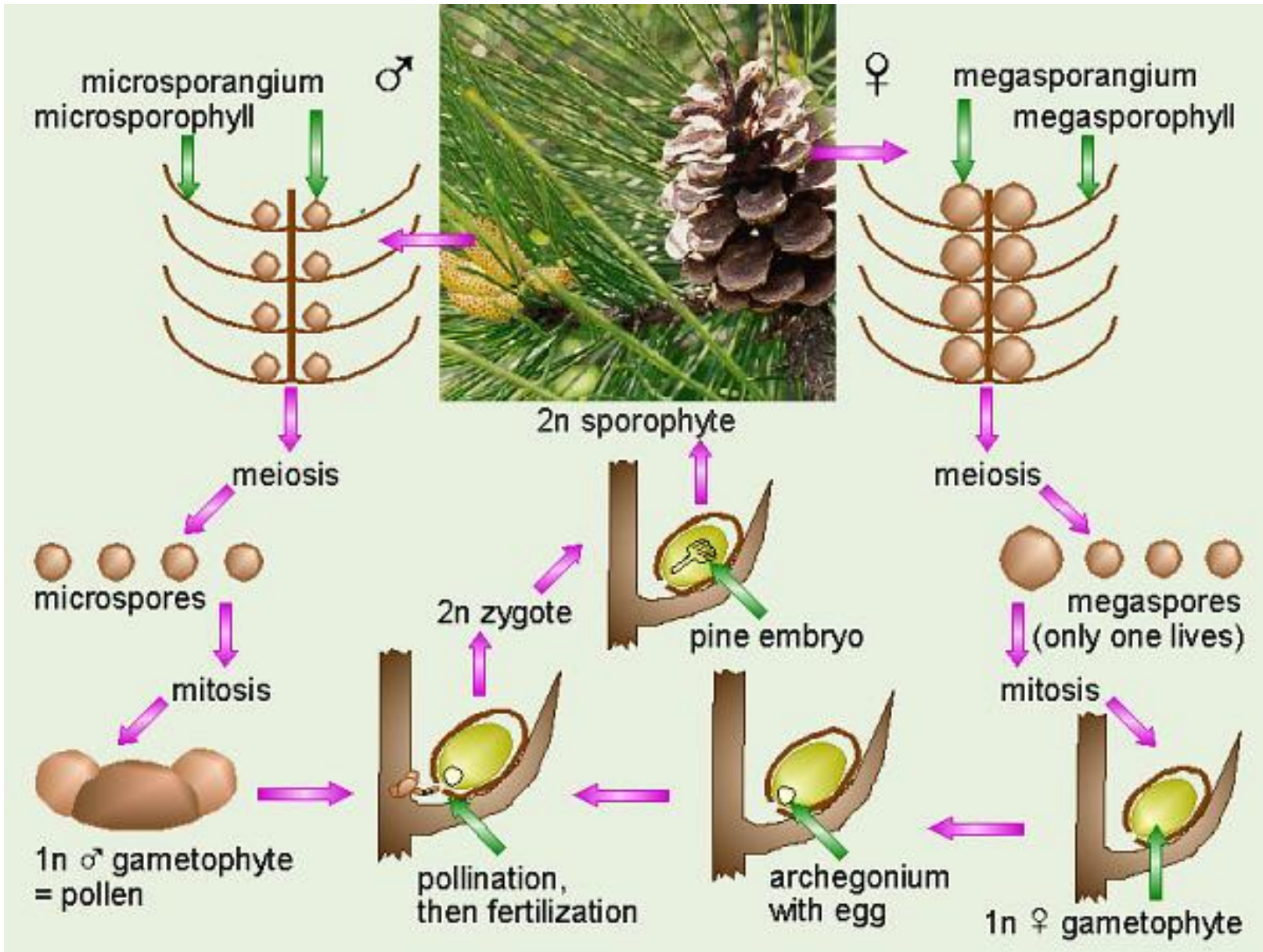
Fern Life Cycle



Conifers

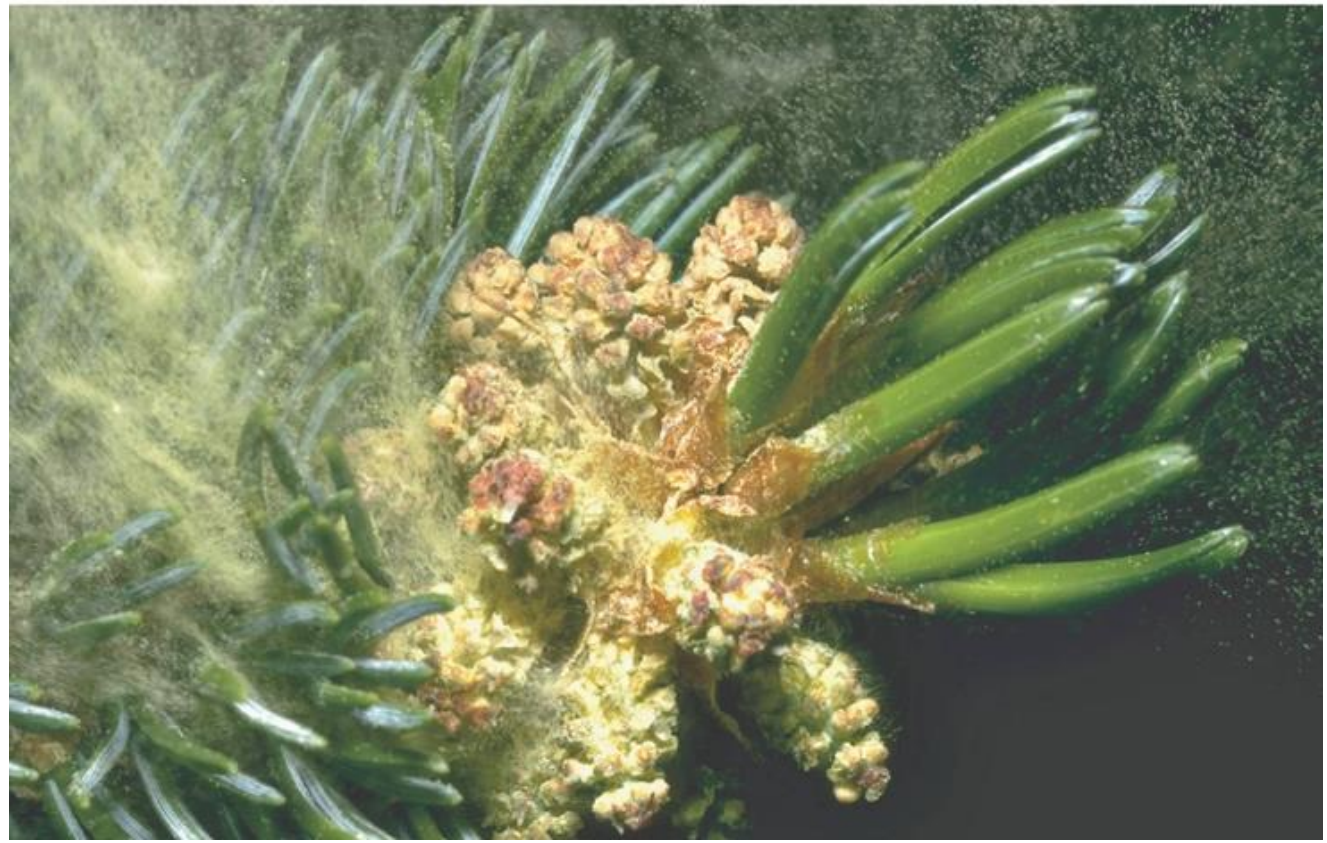
- Conifers (also non-flowering plants) have reduced gametophytes.
  - Male gametophyte is contained in a dry pollen grain.
  - Female gametophyte is a few cells inside of the structures that become the seed.

Conifer life cycle



Conifer pollination

- Conifers are wind-pollinated plants.
- Chance allows pollen to land on scales of female cones.



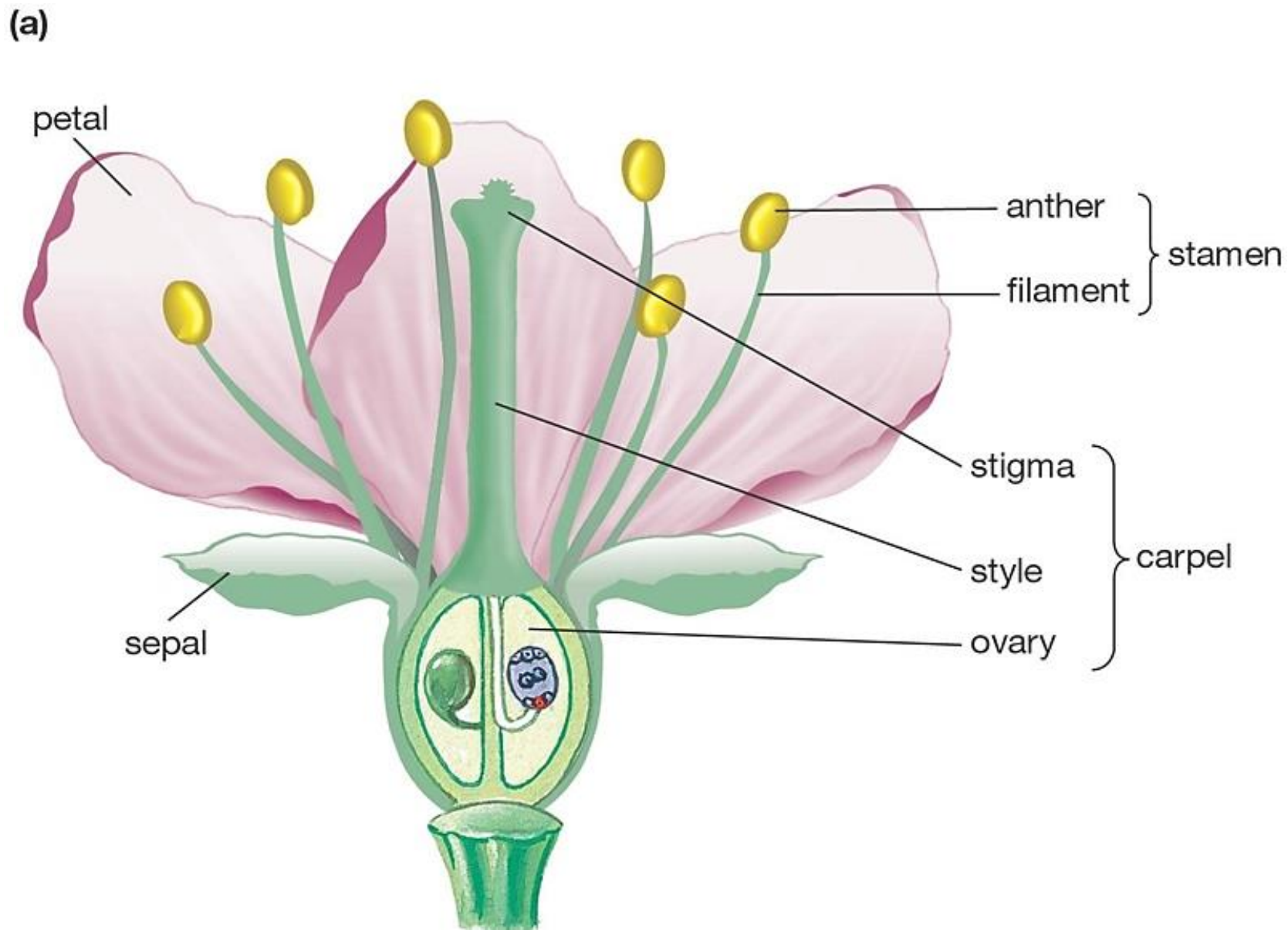
- Pollen germinates, grows a pollen tube into egg, allows sperm to fertilize egg.

Flowers

Pollen go-betweens

- Showy flowers are the result of selection for more efficient pollination strategies.
- Flower parts are modified leaves. Those that were brightly colored attracted insects in search of pollen.

Flower Parts

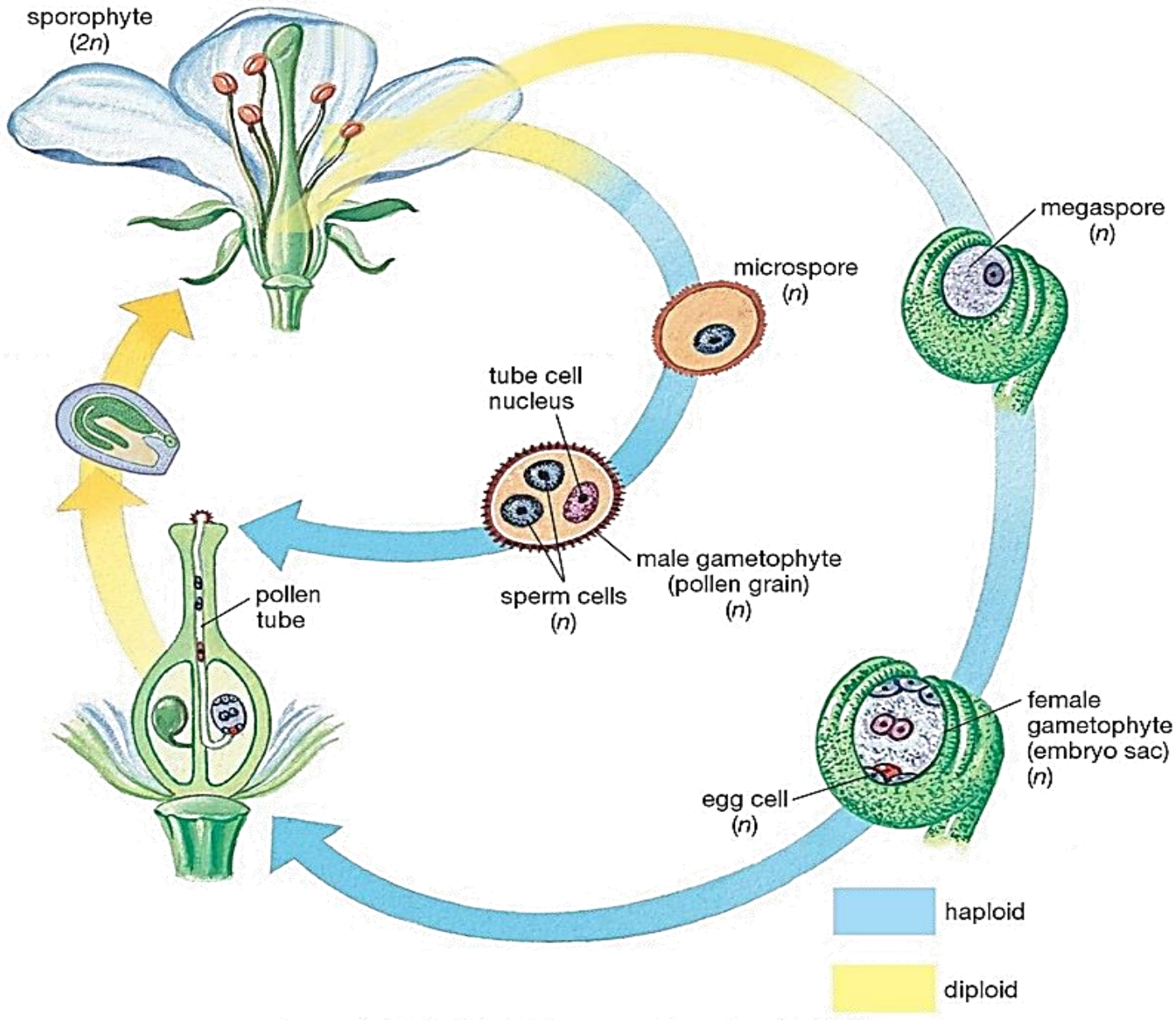


Incomplete flowers

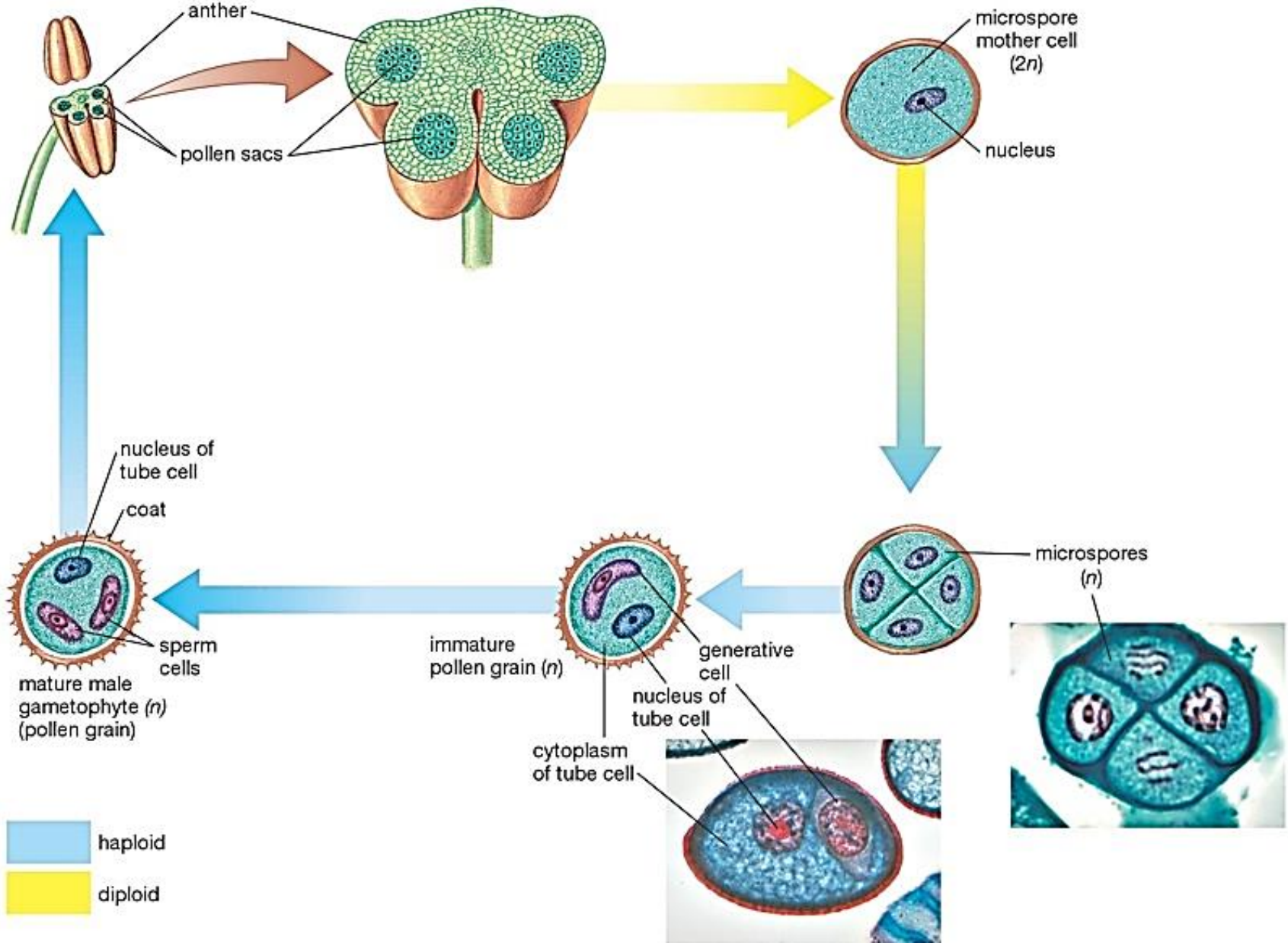
- Flowers are complete if they have all parts, and perfect if they have both male and female parts.
- Grass flowers: incomplete, usually imperfect (separate male and female flowers)
- A tulip is complete (though the sepals are the same color as the petals) and perfect.

Imperfect flowers

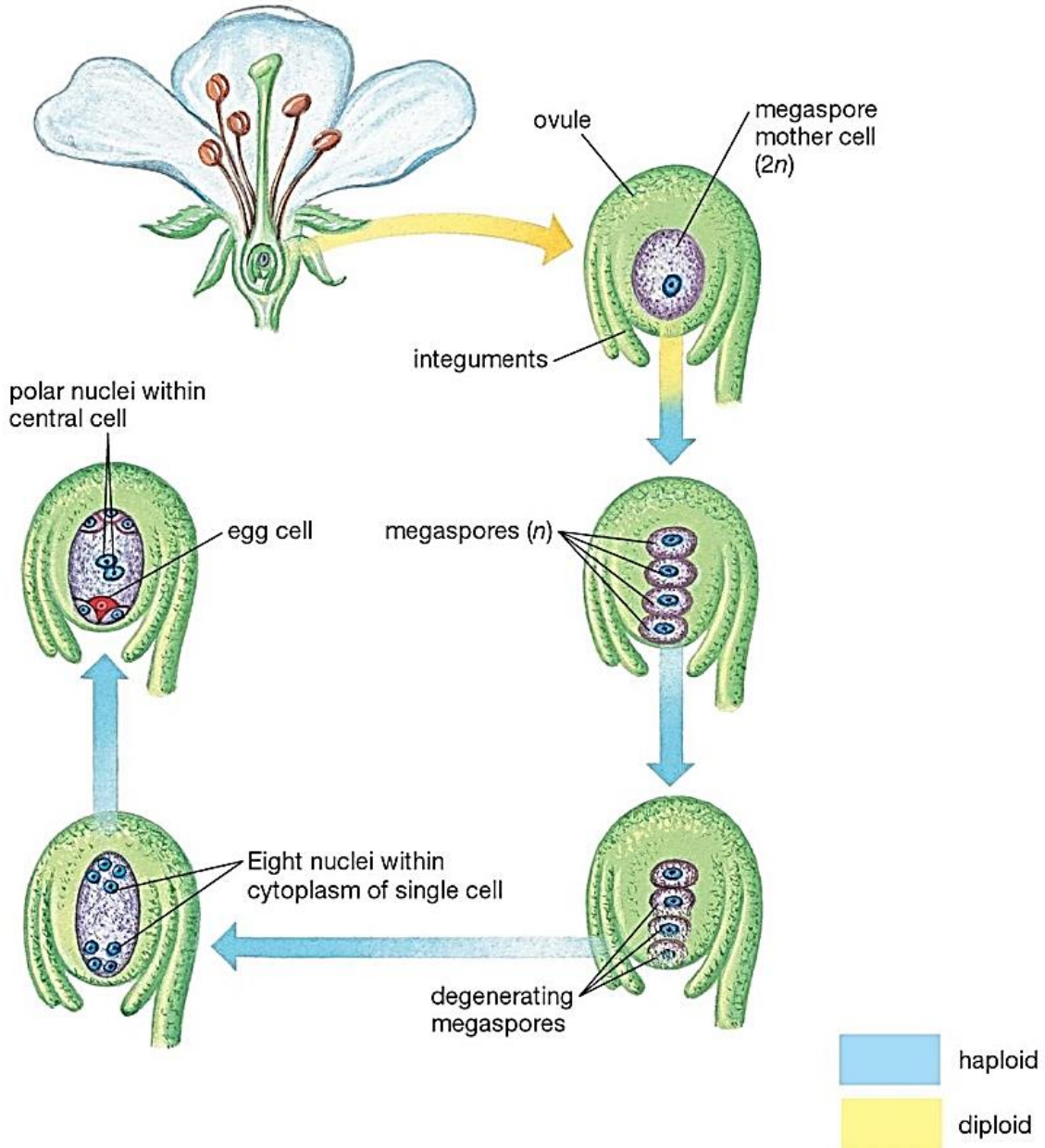
Angiosperm Life Cycle



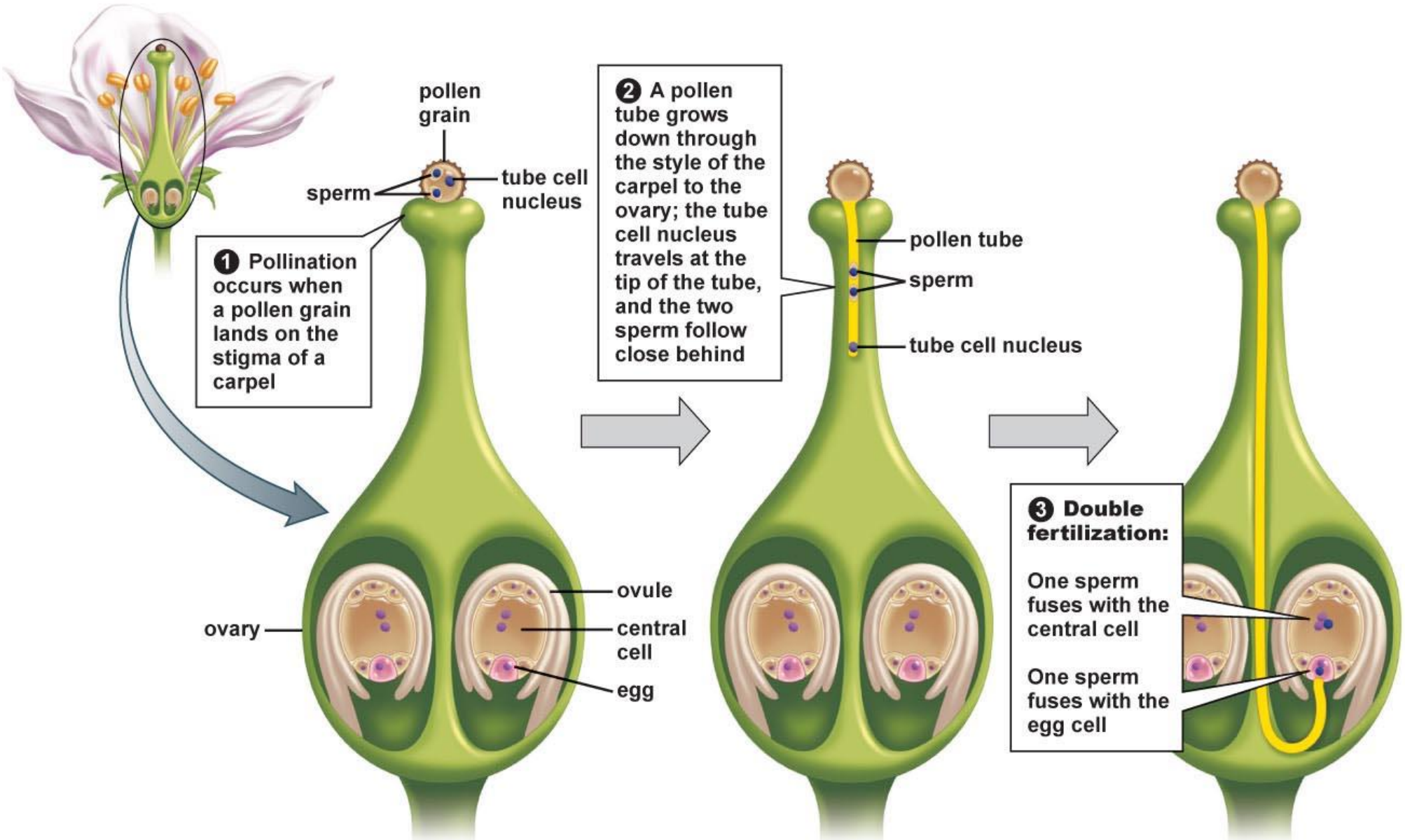
Gametogenesis: Male



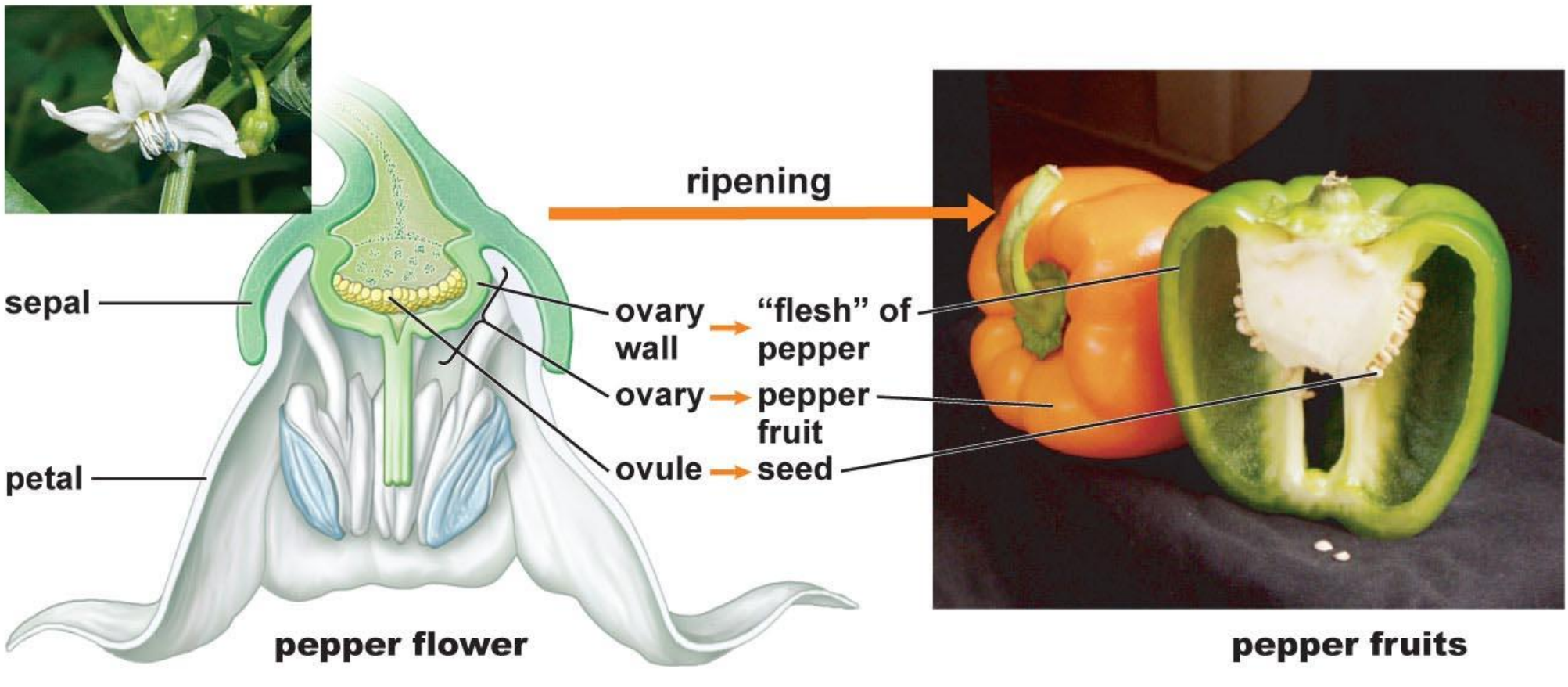
Gametogenesis: Female



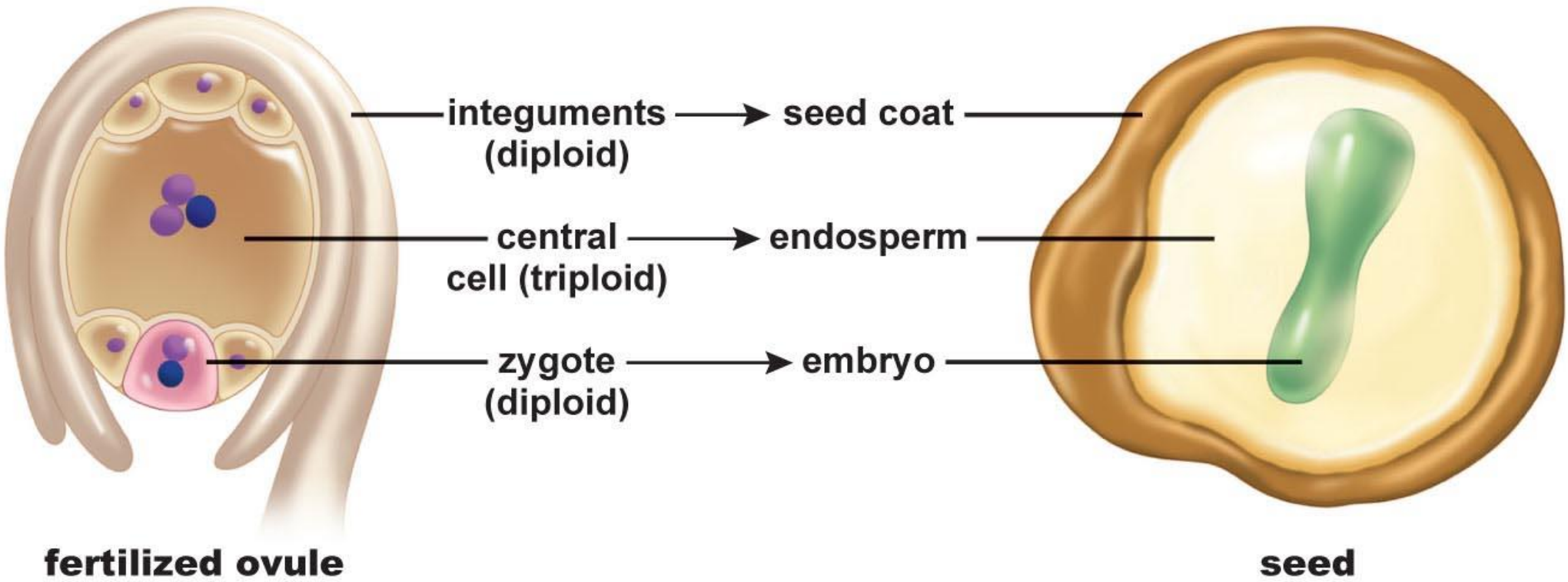
Double Fertilization



Flower to Fruit

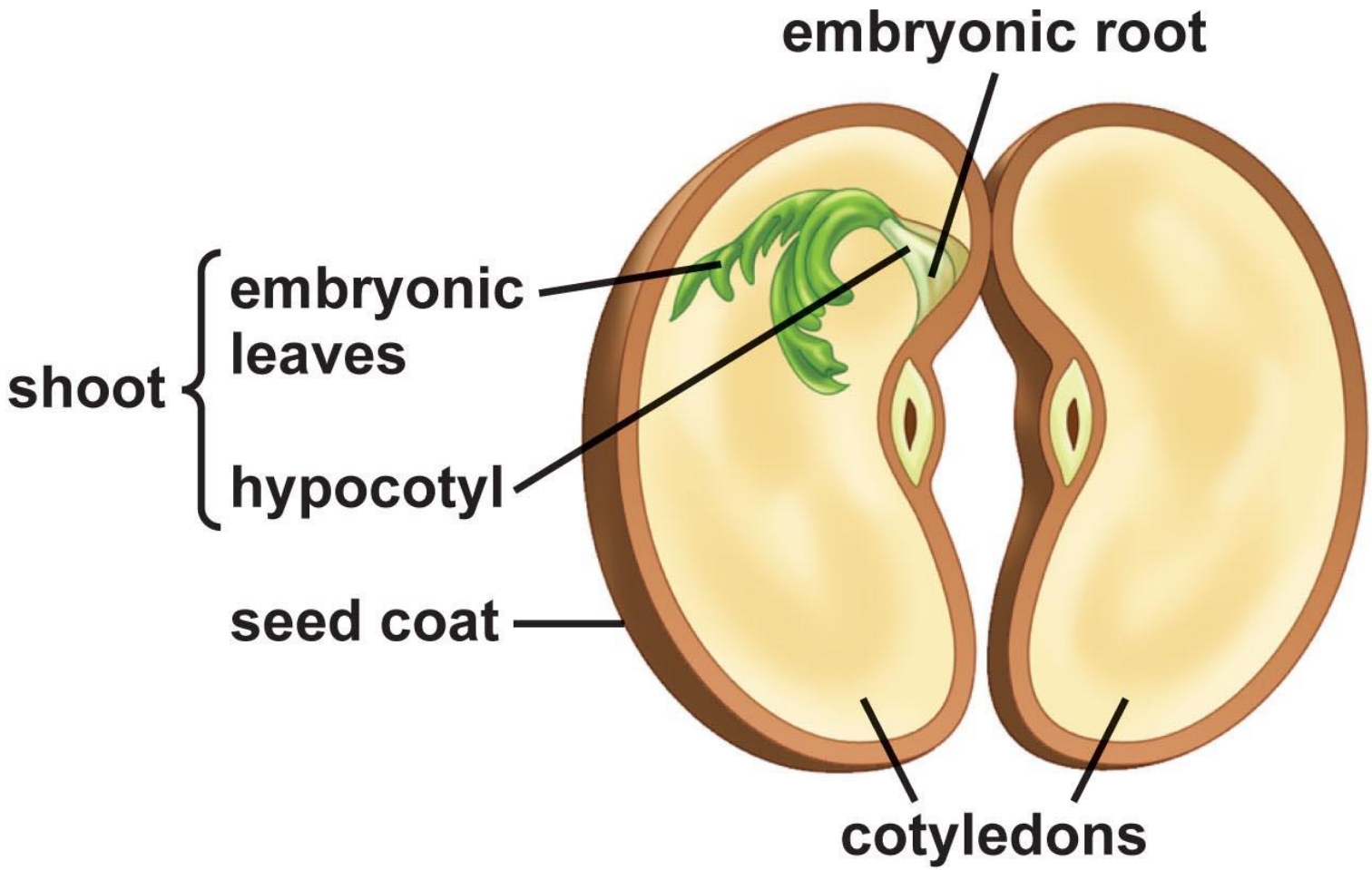


Ovule to Seed



(a) Early development of the seed

Seed Anatomy



(c) Bean seed (dicot)

Seed Germination