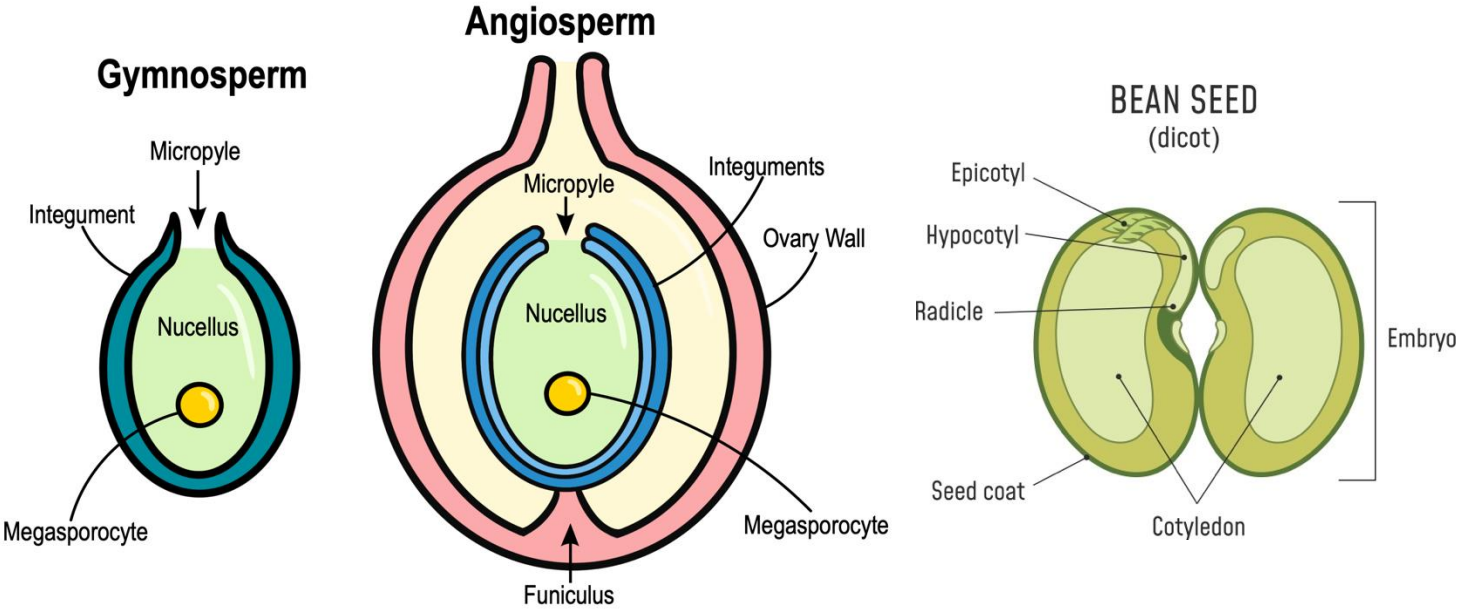
**CONCEPT:** SEED PLANTS

- Seed plants are made up of ***angiosperms*** and ***gymnosperms***, and have sporophyte-dominant life cycles
    - □ Most gametophytes are microscopic, and can develop within the sporangia
    - □ Most are heterosporous, containing microsporangia that produce pollen, and megasporangia inside ovules
    - □ Most have microsporangia (male) and megasporangia (female) on the same plant

**EXAMPLE:**

- ***Ovule*** – structure that contains the megasporangium and megaspore, develops into seed after fertilization
    - □ ***Integument*** – outer protective layer made of sporophyte tissue
        - ***Micropyle*** – opening at apex of integument
- ***Pollen grain*** – male gametophyte covered by pollen wall, produced by microspore
- ***Pollination*** – transfer of pollen to the ovule
    - □ ***Pollination syndrome*** – flower traits that have evolved in response to pollen vectors like wind, bees, and birds
- ***Seed*** – develops from fertilized ovule, contain embryonic plant surrounded by protective coat
    - □ ***Cotyledon*** – embryonic leaves contained in the seed, will germinate to form sprout
    - □ ***Endosperm*** – tissue surrounding embryo in seed that provides nutrition via starch, protein, and oil

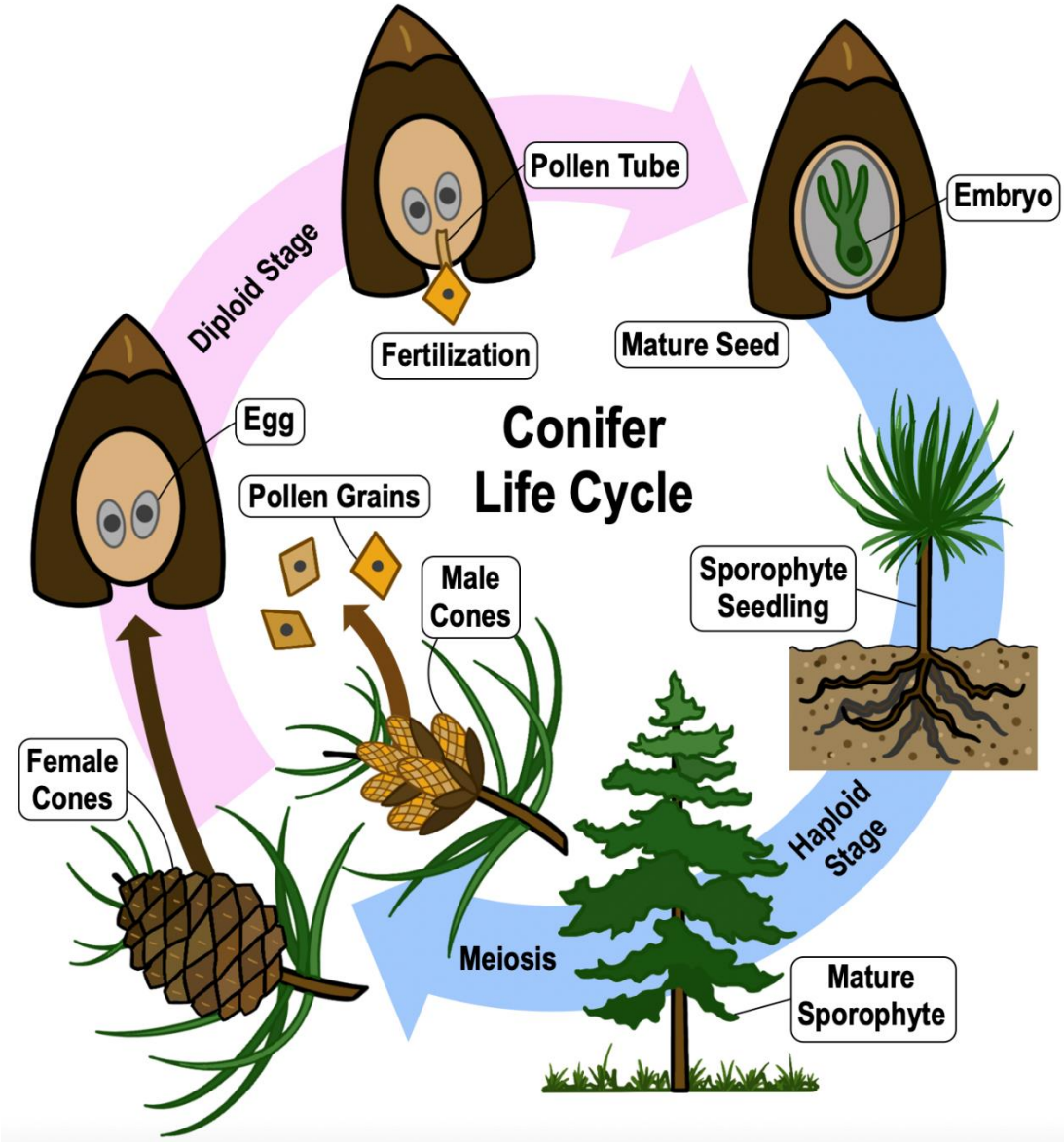
**EXAMPLE:**



**CONCEPT:** SEED PLANTS

- ***Gymnosperms*** – produce "naked seeds" that are not enclosed by an ovary, sporangia are usually packed into cones
  - ***Monoecious*** – male and female sporangia found on the same plant
  - ***Dioecious*** – male and female sporangia found on different plants
- ***Conifers*** – group of gymnosperms that have needle-like leaves and contain their sporangia in cones (strobili)
  - □ Cones are modified leaves (sporophyll) called ***strobili***
  - □ Pine needles are modified leaves with a think cuticle that helps to prevent water loss
- When a pollen grain reaches the ovule it germinates forming a pollen tube that digests through the megasporangium
- The megasporocyte undergoes meiosis, producing 4 haploid cells, one of which will become the megaspore
- The megaspore develops into a female gametophyte containing multiple eggs
- Fertilization occurs when the sperm and egg nuclei unite, and the ovule becomes a seed

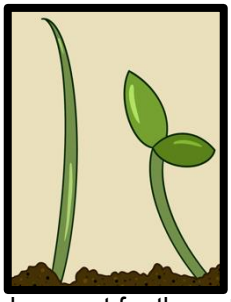
**EXAMPLE:**



**CONCEPT:** SEED PLANTS

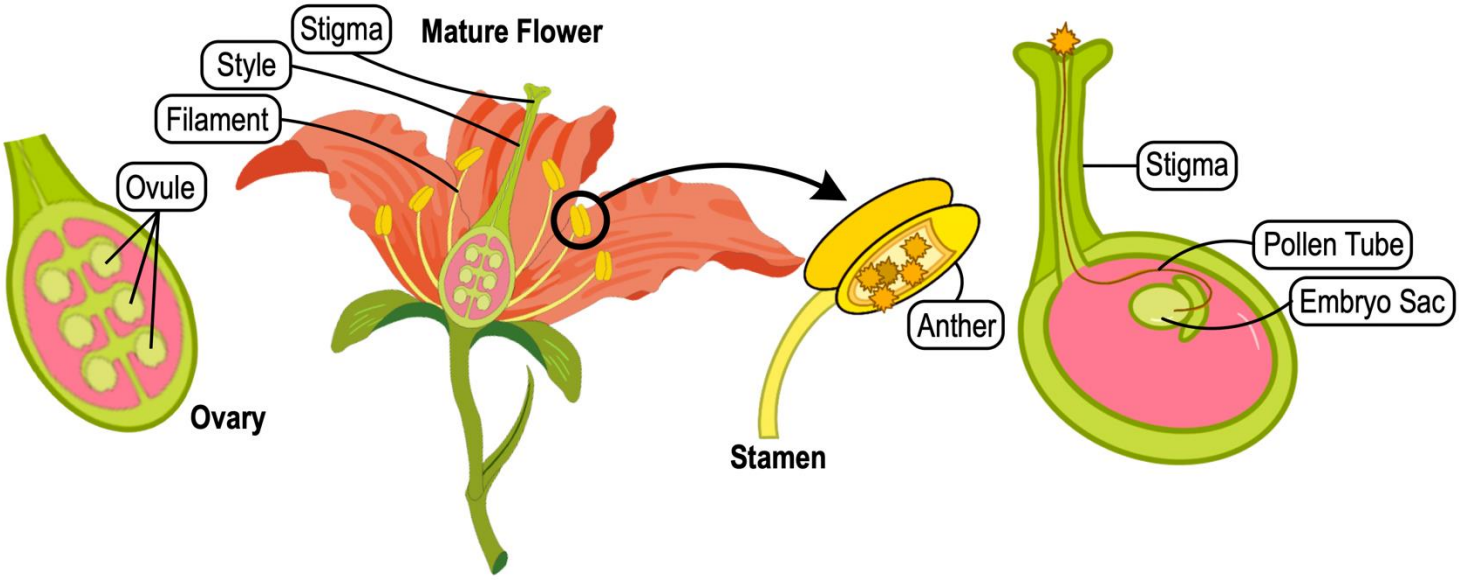
- ***Angiosperms*** – most diverse group of seed-producing land plants, contain flowers, and fruit surrounding seeds
    - □ Angiosperms are classified based on how many cotyledons their seeds have
        - ***Monocots*** have 1 cotyledon, and ***eudicots*** have 2 cotyledons
        - Basal angiosperm and magnoliids comprise the other major lineages of angiosperms

**EXAMPLE:**



- ***Sepal*** – serve as protection for the flower bud and support for the petals, usually green in appearance
- ***Petals*** – modified leaves that surround the reproductive parts of the flower, usually serve to attract pollinators
- ***Stamen*** – pollen-producing part of a flower
    - □ ***Filament*** – stalk portion of the stamen
    - □ ***Anther*** –structure in which microsporangia forms microspores
- ***Carpel*** – megaspores and female gametophytes, all the carpels taken together are referred to as the ***pistil***
    - □ ***Stigma*** – tip of the carpel that receives the pollen
    - □ ***Style*** – leads from the stigma to the ovary
    - □ ***Ovary*** – contains the ovules
        - ***Embryo sac*** – female gametophyte contained in the ovule
- ***Fruit*** – formed from ovary after fertilization

**EXAMPLE:**



**CONCEPT:** SEED PLANTS

- Complete flowers contain sepals, petals, stamen, and pistils, those missing some component are considered incomplete
  - ***Perfect flower*** – bisexual flowers, male and female structures found within the same flower
  - ***Monoecious*** – unisexual flowers, but male and female floral organs found on the same plant
  - ***Dioecious*** – unisexual flowers, male and female floral organs found on different plants
- ***Cross-pollination*** – pollen transfers from anther of one plant, to stigma of another, though some plants ***self-pollinate***
- ***Double fertilization*** – pollen tube releases 2 sperm, 1 fertilizes the egg forming the embryo, other leads to endosperm

**EXAMPLE:**