

Introduction to Plants: Evolution, Characteristics and Life Cycle

BIOL 1407

What are Plants?



- Photo Credit: Doyle Cross, El Yunque, Puerto Rico

Plants

- Multicellular
- Eukaryotes
- Autotrophs
- Oxygenic photosynthesis
- Adapted to life on land
- Photo Credit: Doyle Cross, El Yunque, Puerto Rico



Life on Land: Advantages

- Plenty of light
- Plenty of CO₂
- Space (at first)
- No predators (at first)
- Photo Credit: Mike Sykes, BIOL 1407 2004



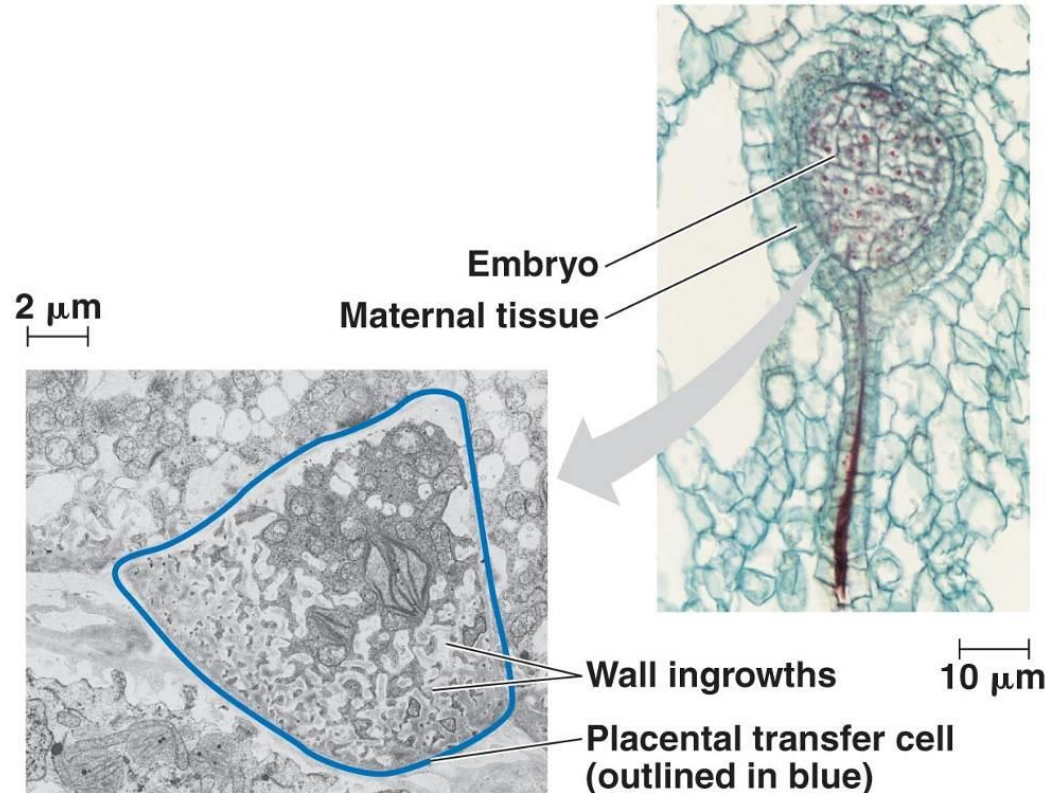
Life on Land: Challenges

- Water availability
- Dehydration
- Support
- Location of nutrients
 - Soil
 - Atmosphere
- Light
- High UV levels
- Photo Credit: UNK, Vieques Field Trip 2008



Plant Adaptations

- Embryophytes
 - Protect embryos on parent body
 - Surrounded by protective tissue
 - Nourish embryos

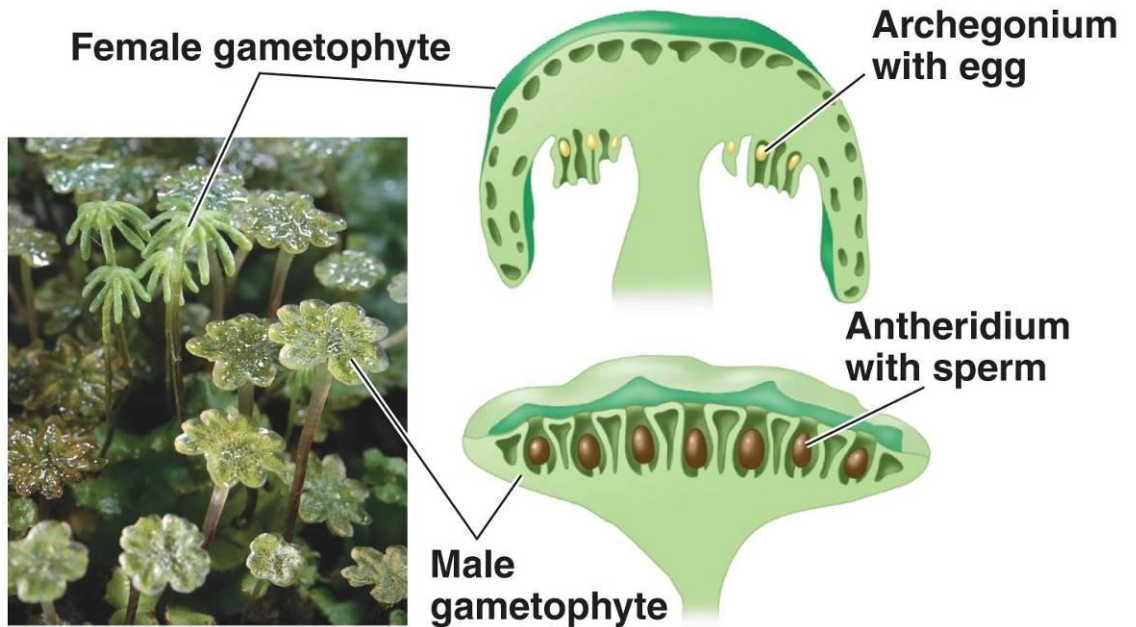


**Embryo (LM) and placental transfer cell (TEM)
of *Marchantia* (a liverwort)**

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Plant Adaptations

- Gametangia
 - Multicellular organs
 - Produce gametes
 - Two types:
 - Archegonia
→ eggs
 - Antheridia
→ sperm

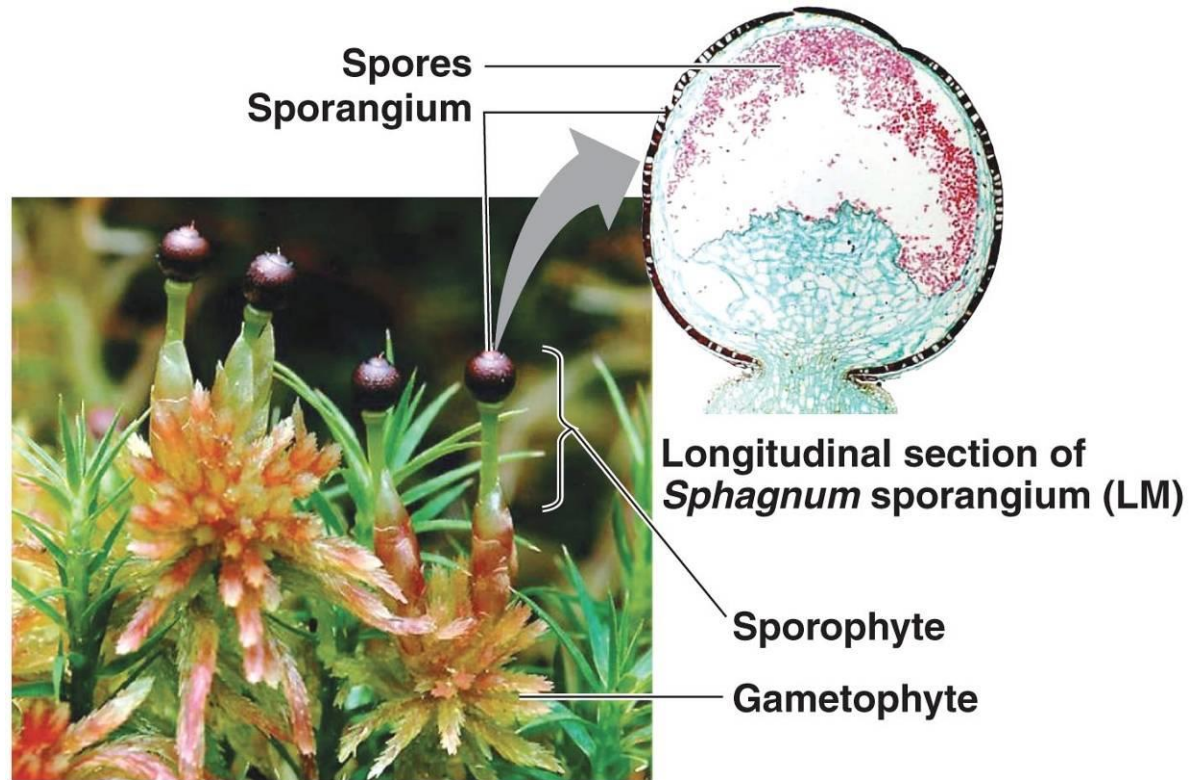


Archegonia and antheridia of *Marchantia* (a liverwort)

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Plant Adaptations

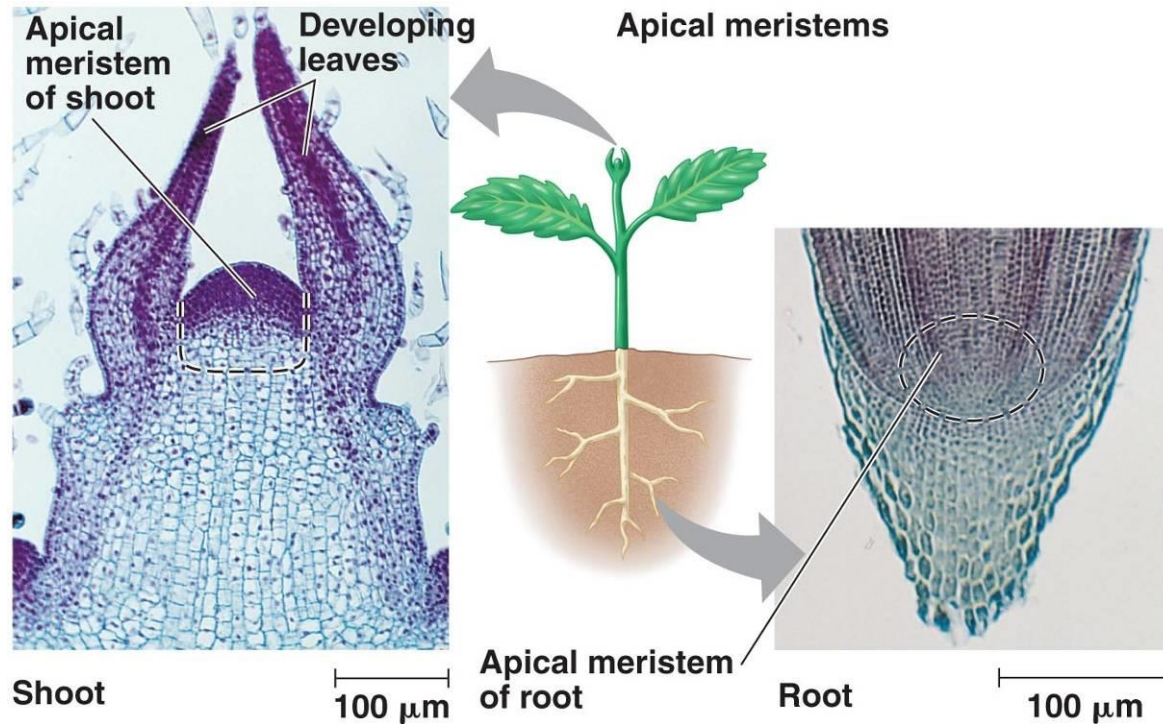
- Sporangia
 - Multicellular organs
 - Produce spores



Sporophytes and sporangia of *Sphagnum* (a moss)

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Plant Adaptations



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- Apical Meristems
 - Growing points
 - Located at tips of plant structures

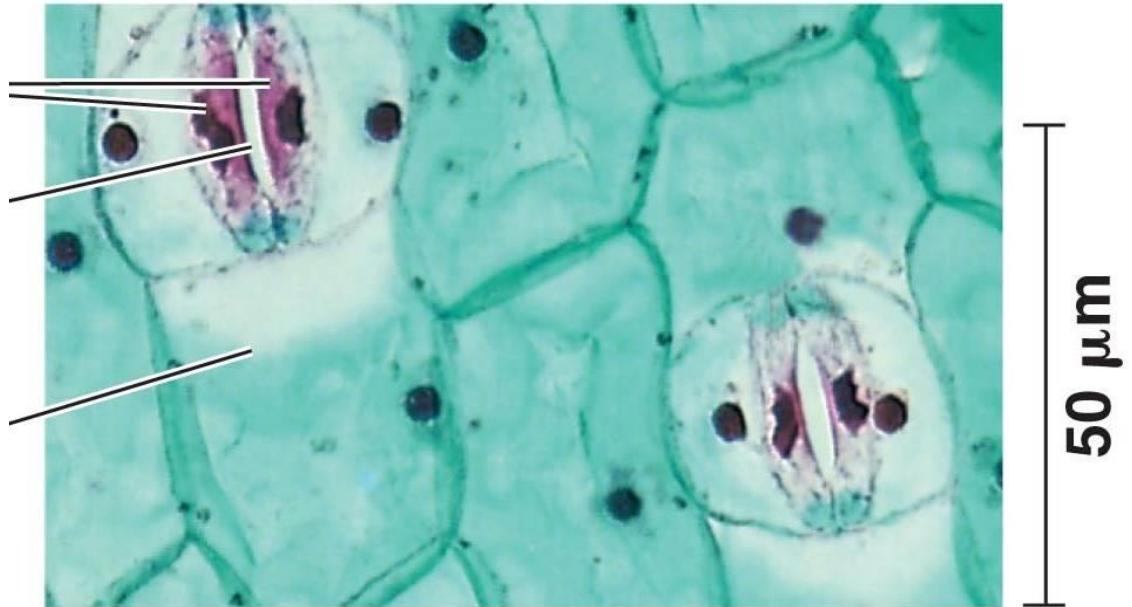
Plant Adaptations

- Cuticles
 - Waxy Coat
 - Plant surfaces above ground
- Photo Credit: BIOL 1407 student, Austin Nature Center field trip, 2006



Plant Adaptations

- Stomata
 - Pores in leaves and other photosynthetic organs
 - Gas exchange

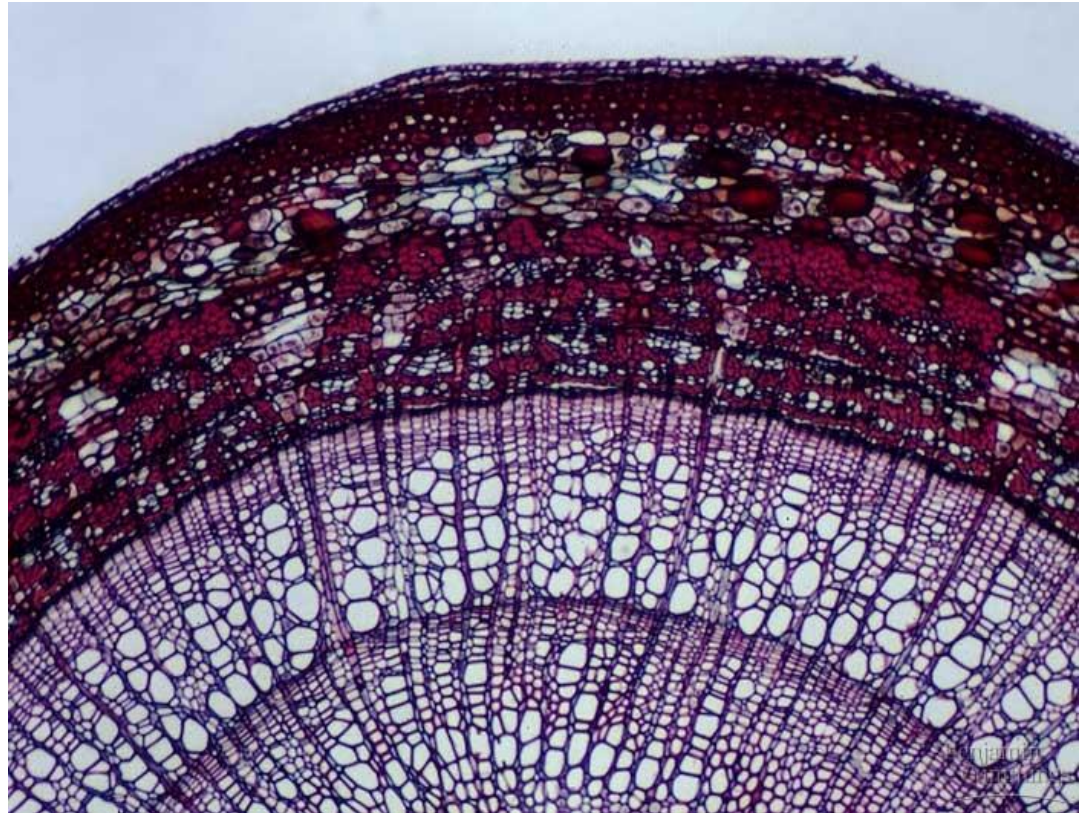


(b) Surface view of a spiderwort (*Tradescantia*) leaf (LM)

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Plant Adaptations

- Vascular Tissue
 - Support
 - Transport
 - Two Types:
 - Xylem
 - Phloem

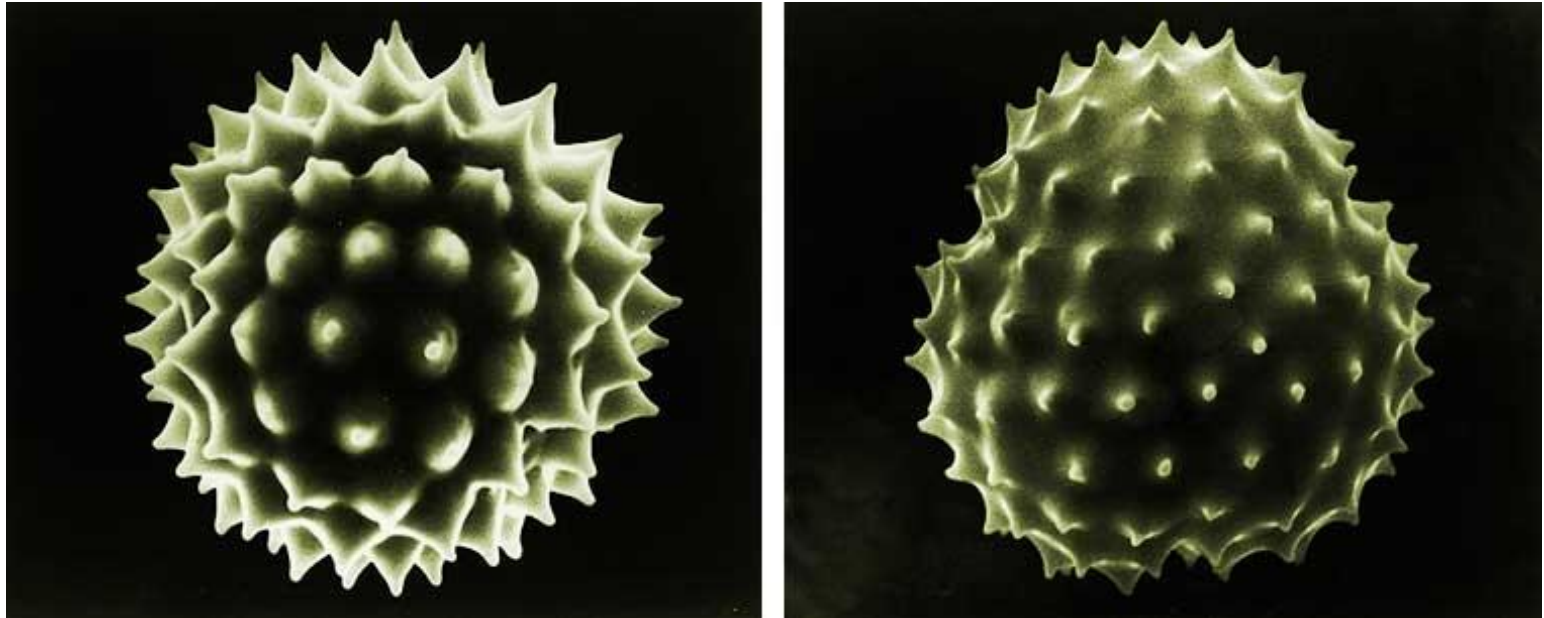


Plant Adaptations

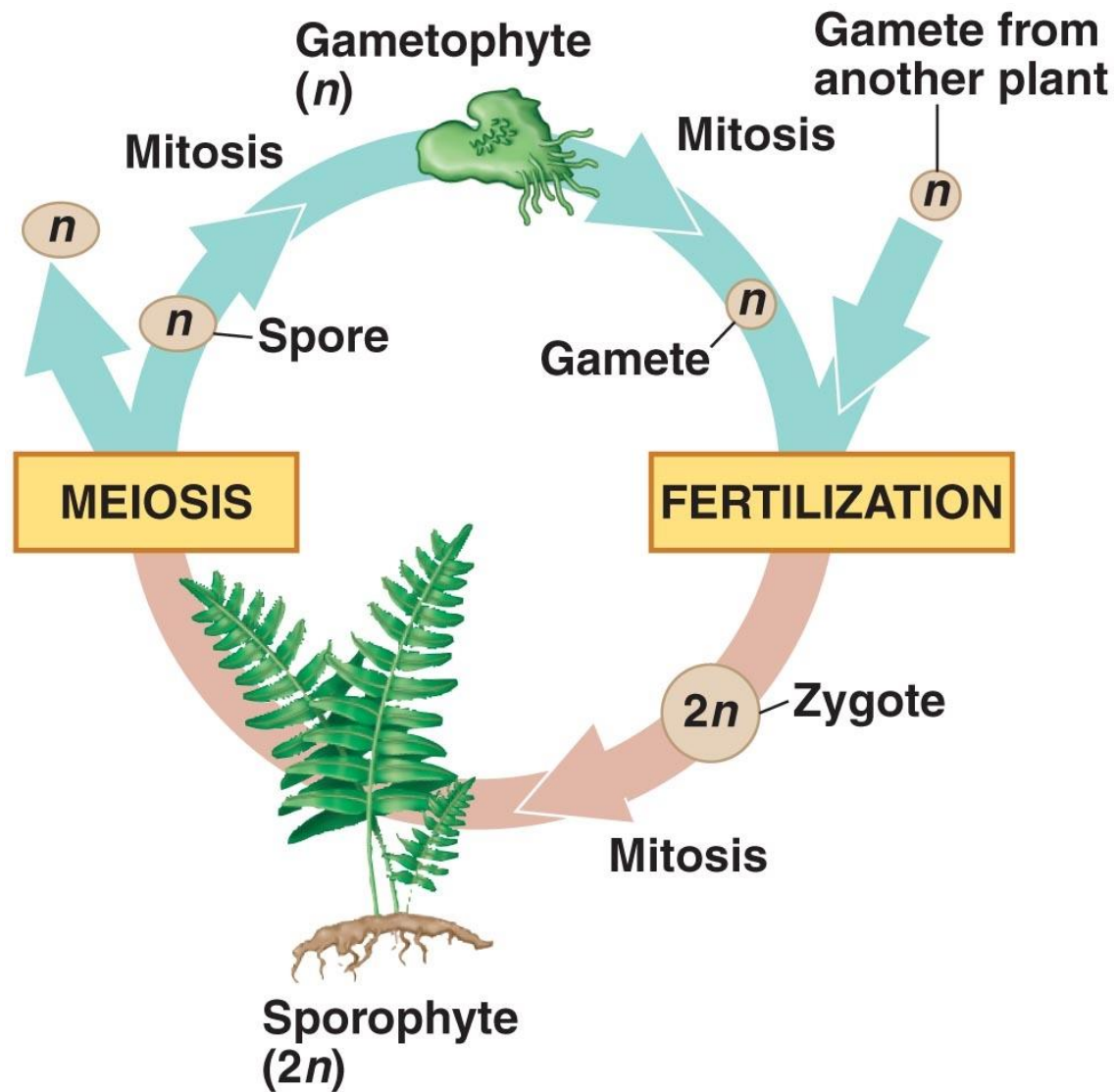
- Secondary Compounds
 - Defense
 - Toxins: Digitalis
 - Antifeedants: Tannins
 - Support
 - Lignin
 - UV Protection
 - Flavonoids



Plant Adaptations

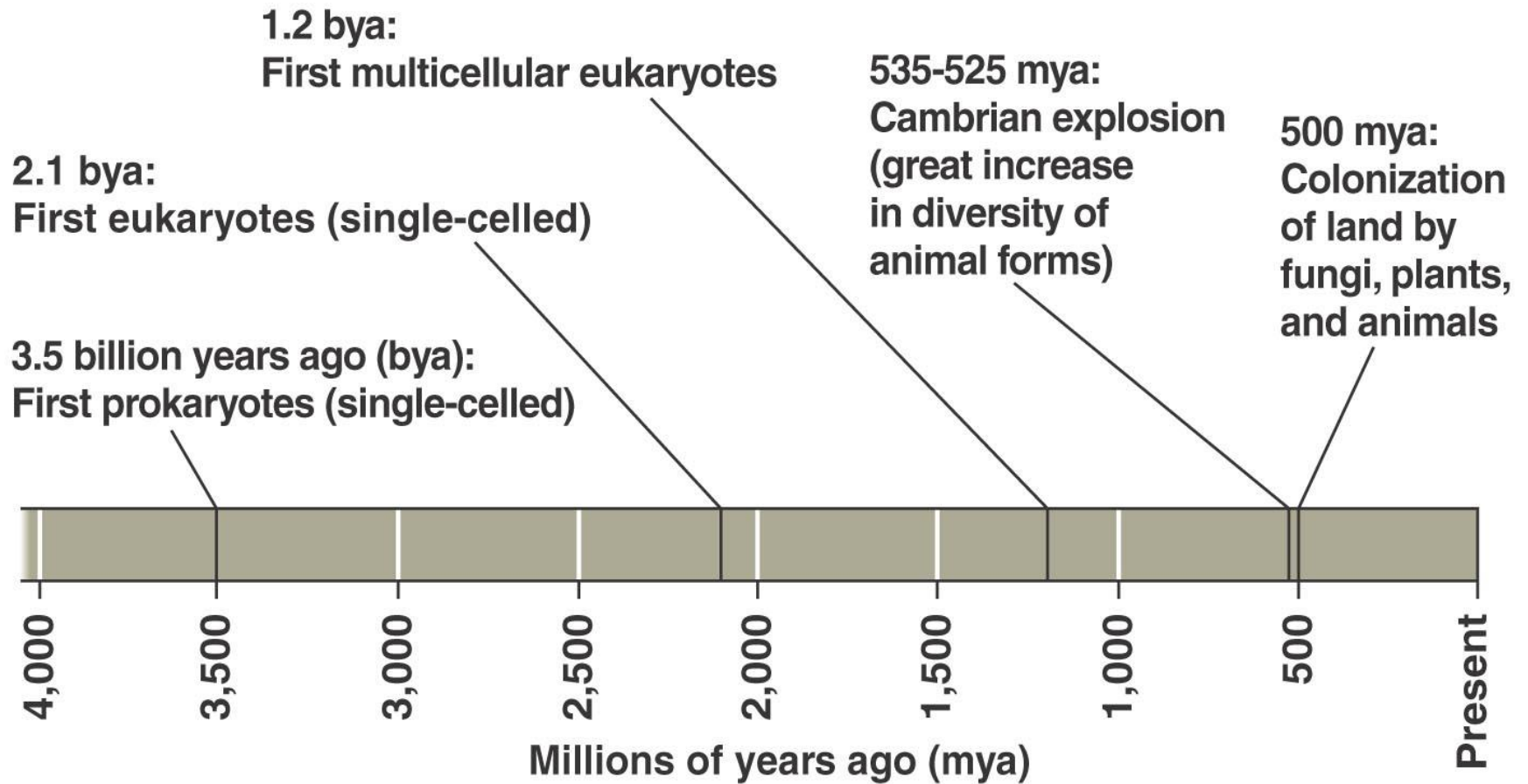


- Secondary Compounds
 - Sporopollenin
 - Spore coat
 - Pollen coat



Alternation of generations

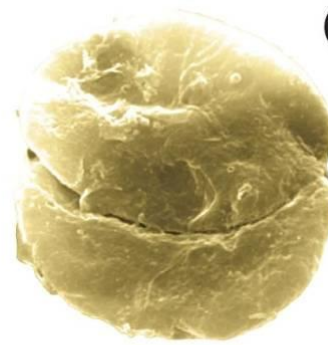
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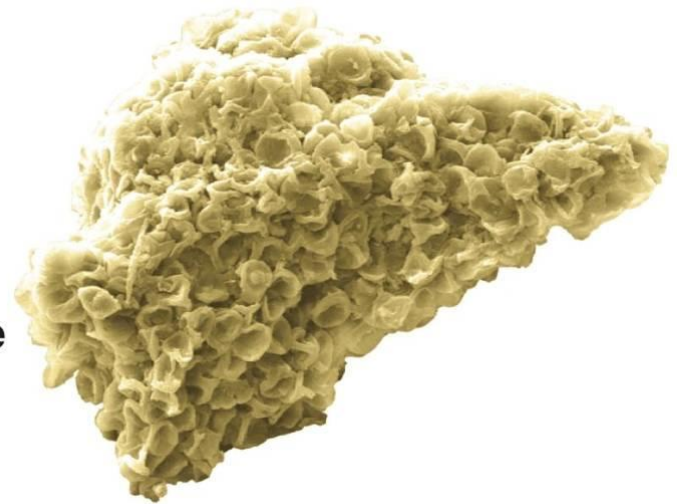
Plant Evolution

- Earliest body fossils of plants
 - 475 mya
 - Plant spores in plant sporophyte tissues

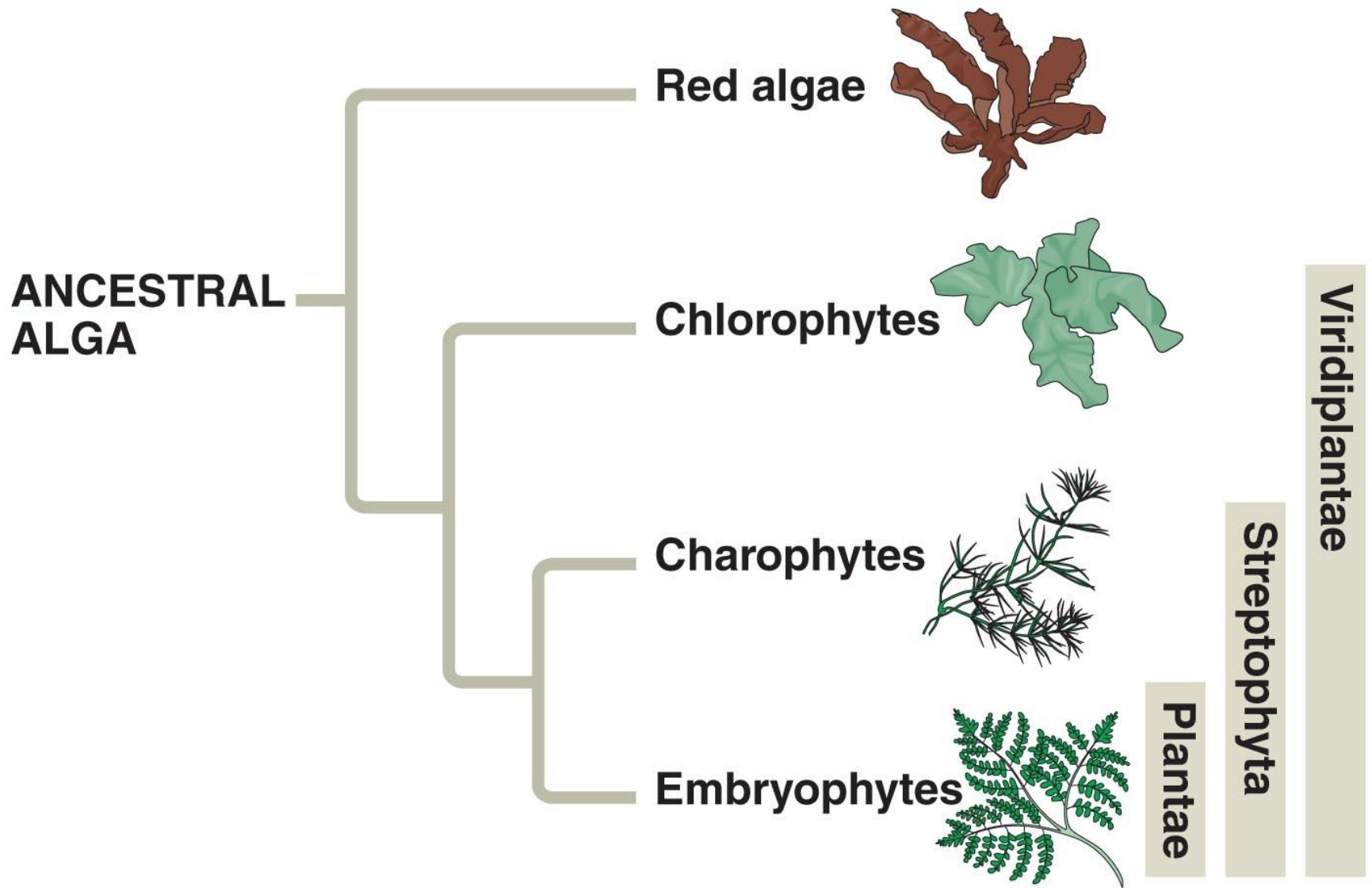


(a) Fossilized spores

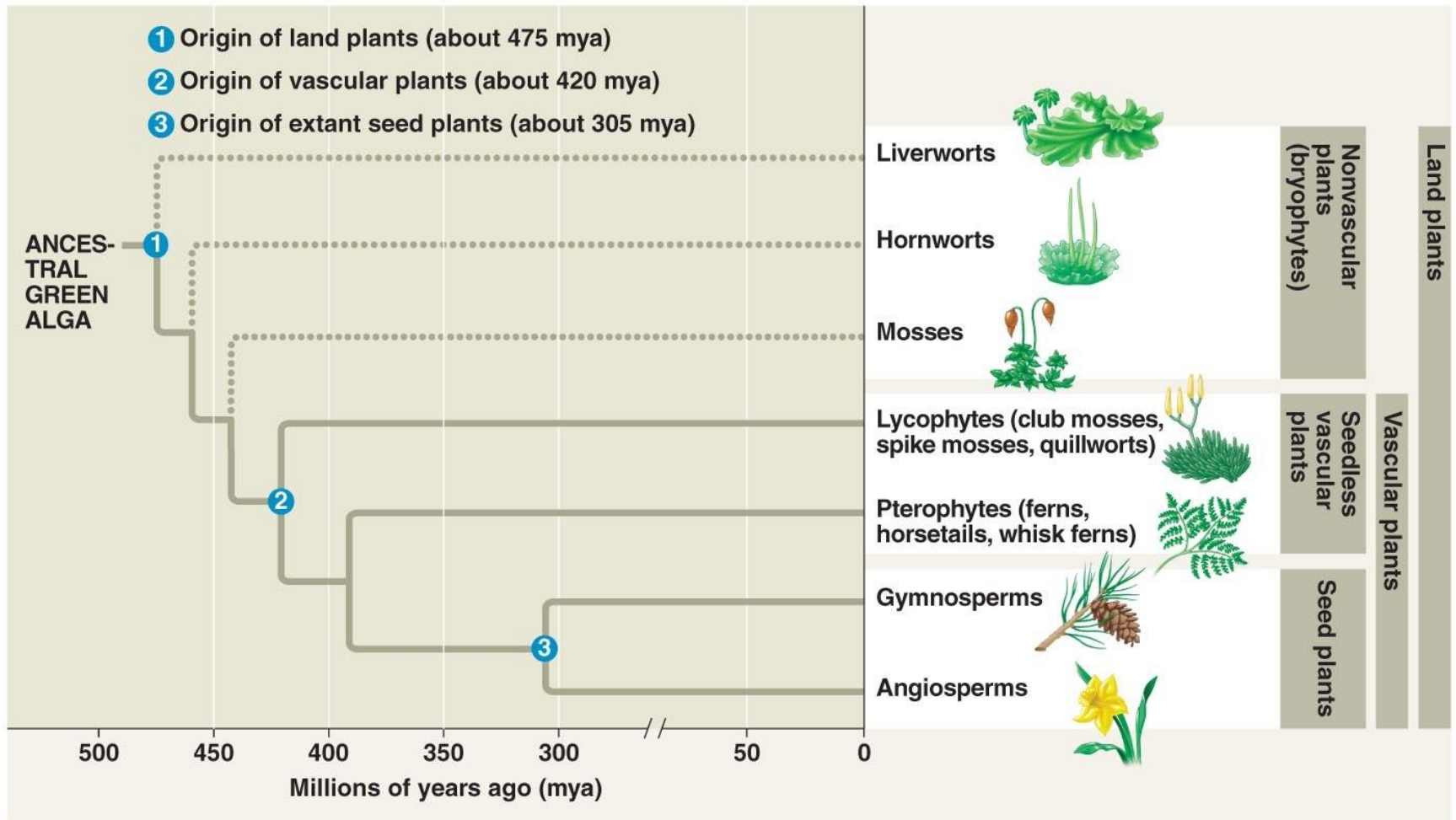
(b) Fossilized sporophyte tissue



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