

Endosymbiosis in Eukaryotic Evolution

- DNA evidence suggest eukaryotes are "combination" organisms

ENDOSYMBIOSIS

- A symbiotic relationship in which one organism lives inside the body or cell of another organism

↳ BIG IDEA

↓
An Archaeal cell engulfed a BACTERIUM
THAT WOULD LATER BECOME AN ORGANELLE

⇓
the origin of the MITOCHONDRION

ENDOSYMBIONT THEORY

- mitochondria and chloroplasts were formerly small prokaryotes

EVIDENCE !!

- ① inner membranes of the organelles have enzymes homologous to plasma membranes of extant prokaryotes
- ② Replicate like prokaryotes - have their own circular DNA
- ③ They have their own RIBOSOMES!

(4) Ribosomes of MITOCHONDRIA and PLASTIDS are more similar to prokaryotic ribosomes than eukaryotic ribosomes

SINGLE-celled Eukaryotes (PROTISTS)

- most protists are single-celled BUT, there are some colonial & multi-cellular species
- most are AQUATIC

Photosynthetic Protists → Producers → ^{Photosynthesis} PLANKTON

~ 30% of Earth's photosynthesis performed by DIATOMS, DINOFLLAGELLATES, ALGAE, and other AQUATIC PROTISTS

→ Ecological implication !!!

Symbiotic PROTISTS

- ↳ Acanthamoeba, coral polyps
- ↳ protists in GUT of termites to DIGEST wood
- ↳ PARASITIC protists -
 - P. infestans → potato blight
 - P. ramorum → sudden oak death

Human Health Effects (from PROTISTS)

- Trypanosoma → sleeping sickness
["switches" its surface proteins to evade immune systems]

Apicomplexans

- group of protists that cause human DISEASE → PARASITES
- complex Life cycles involving 2 or more HOST species

Plasmodium → malaria → mosquitoes & humans

FIGURE 25-26
Life Cycle of Plasmodium

!!!
0 0 0

CH 26 Plants

- ① - multicellular, eukaryotic, photosynthetic AUTOTROPHS
- ② - cell walls of cellulose
- ③ chlorophyll a and b

just like ALGAE

in particular
Green Algae
CHAROPHYTES

ADAPTATIONS for LAND

(4)

SPOROPOLLENIN

↳ polymer in charophytes that prevents "drying out"

↳ same polymer encases spores in plants

enable life out of water

- more CO_2
- more sunlight
- more NUTRIENTS

Pros

BUT

- AVAILABILITY of WATER
- NEED for support

Cons

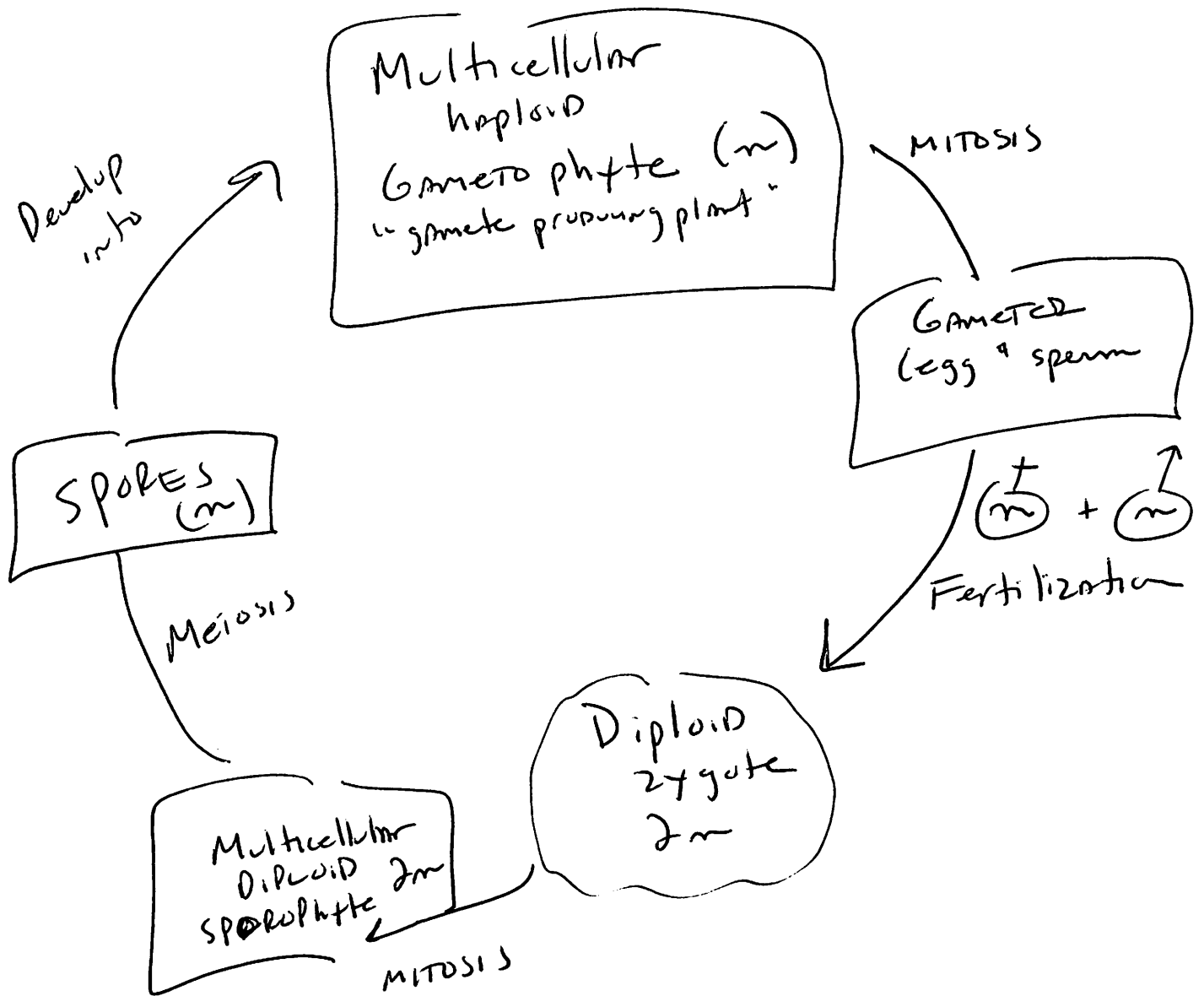
DERIVED TRAITs of PLANTS

- (1) Alternation of Generation
- (2) Walled spores produced in sporangia
↳ resistance to dry harsh environment
- (3) Apical meristems
↳ enhanced cell division for growing ROOTS & SHOOTS
- (4) CUTICLE - wax covering on leaves
- (5) STOMATA - pores - open/close
- need to let in CO_2 but minimize evaporation.

ALTERNATION of GENERATIONS

2 generations of Distinct!!
multicellular organisms

✱ includes both multicellular
haploid organisms AND multicellular
diploid organisms



Plant Evolution

- by 400 mya, they were DISTINCT from ALGAE, DIVERSIFIED, and had ADAPTED to LAND

⇒ land ADAPTATIONS are about not drying out, gaining exposure to sunlight and nutrients, and DISPERSAL of spores & seeds