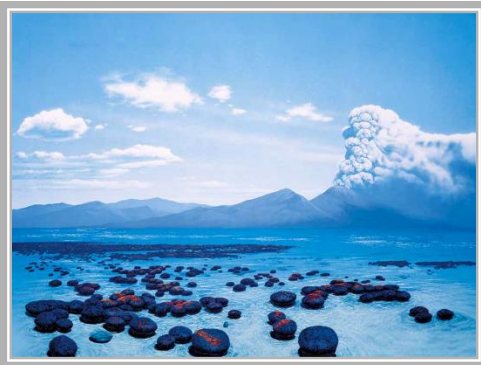


**HETEROTROPHIC
HOST CELL**

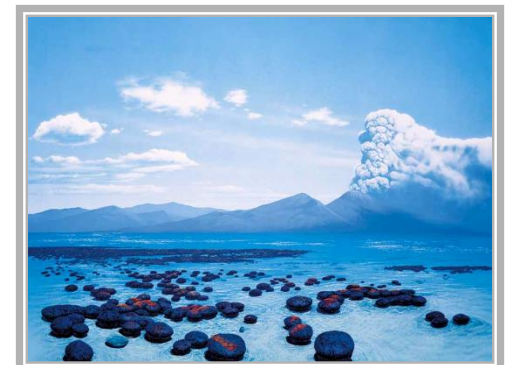
**CONSUMES OTHER ORGANISMS
CONSUMES AUTOTROPH
VIA ENDOCYTOSIS**



**AUTOTROPHIC
PROKARYOTE**

PHOTOSYNTHESIS

GLUCOSE



HETEROTROPH CONSUMES AUTOTROPH

E

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

**AUTOTROPHIC
PROKARYOTE**

CHL A&B + CAROTENOIDS

GRANA PRESENT

ENDOCYTOSIS



ENDOCYTOSIS



ENDOCYTOSIS

**MEMBRANE
ENGULFMENT
INTO HOST CELL**

ENDOCYTOSIS

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

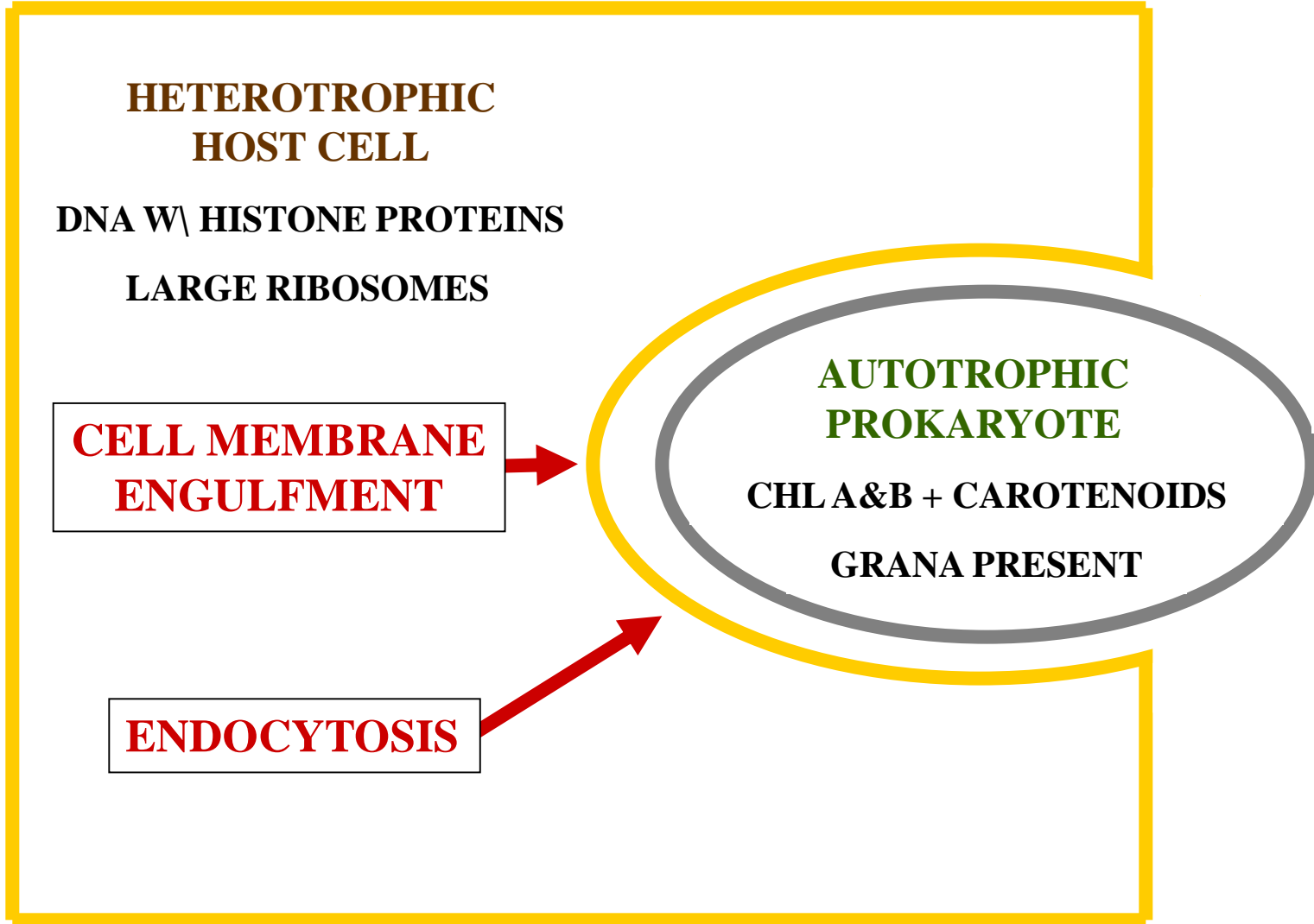
**CELL MEMBRANE
ENGULFMENT**

ENDOCYTOSIS

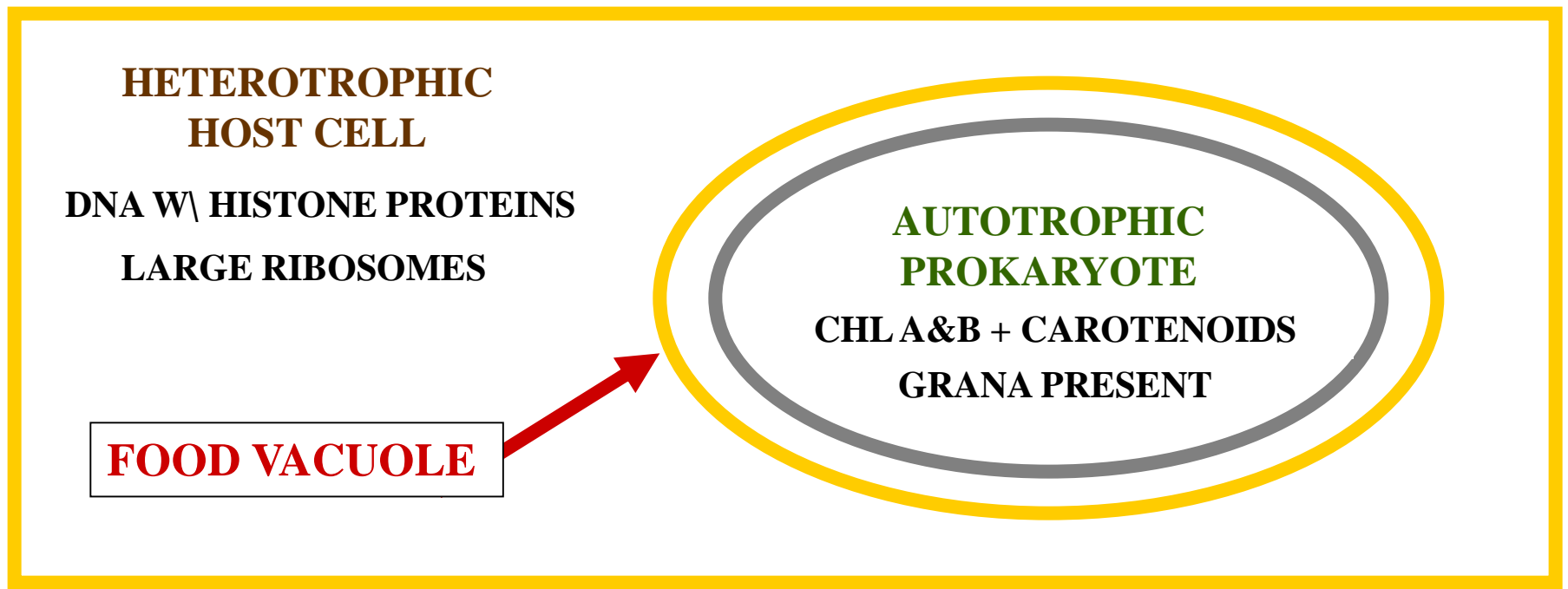
**AUTOTROPHIC
PROKARYOTE**

CHL A&B + CAROTENOIDS

GRANA PRESENT

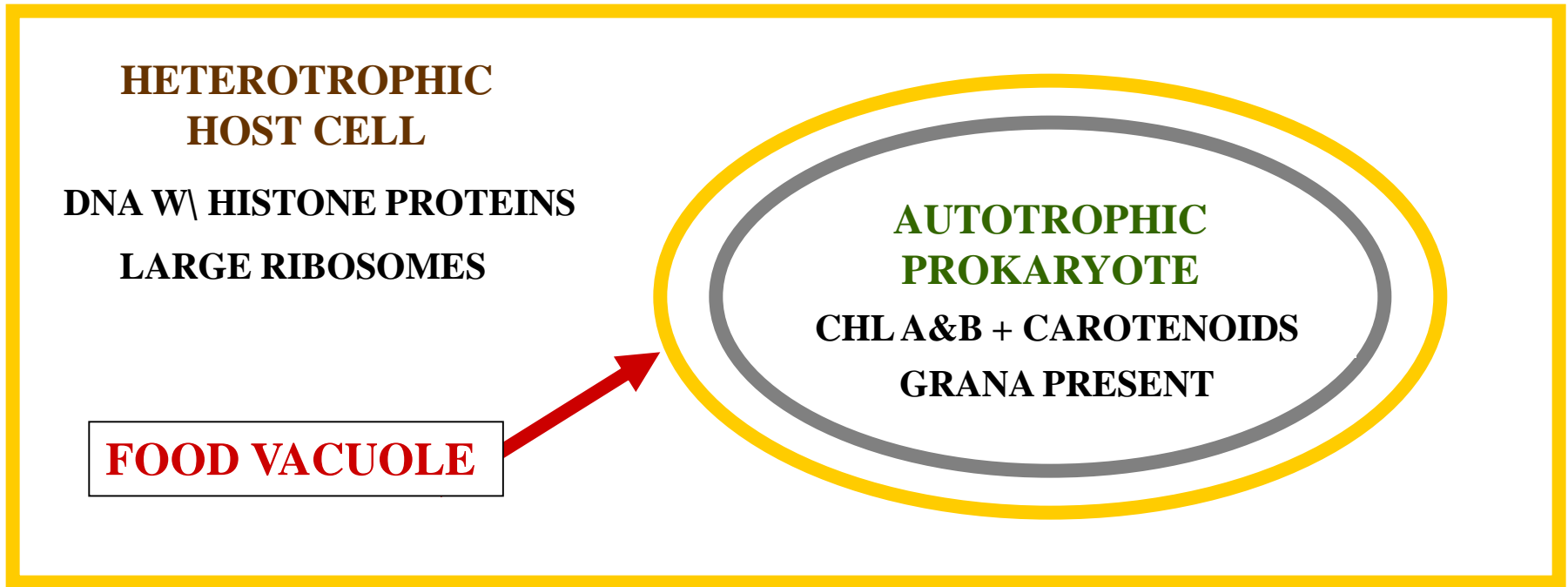


AUTOTROPH WITHIN HETEROTROPH FOOD VACUOLE

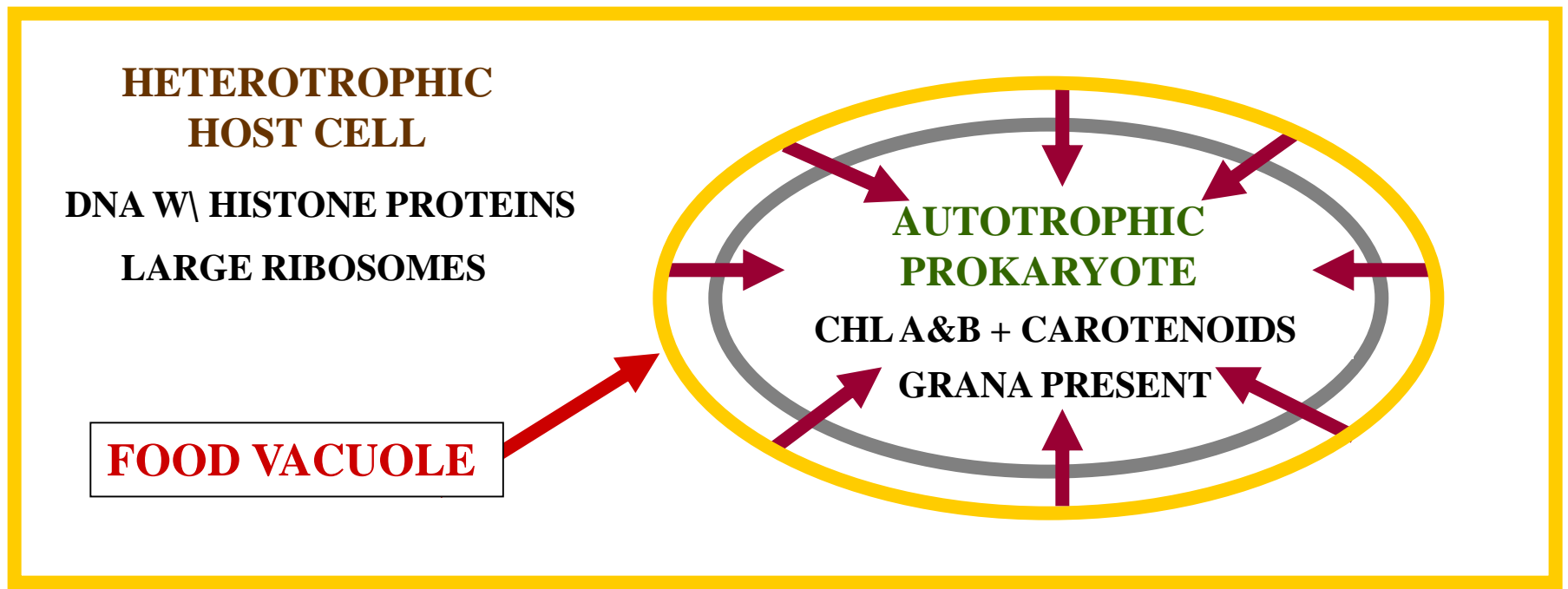




INITIALLY HETEROTROPH DIGESTS AUTOTROPH

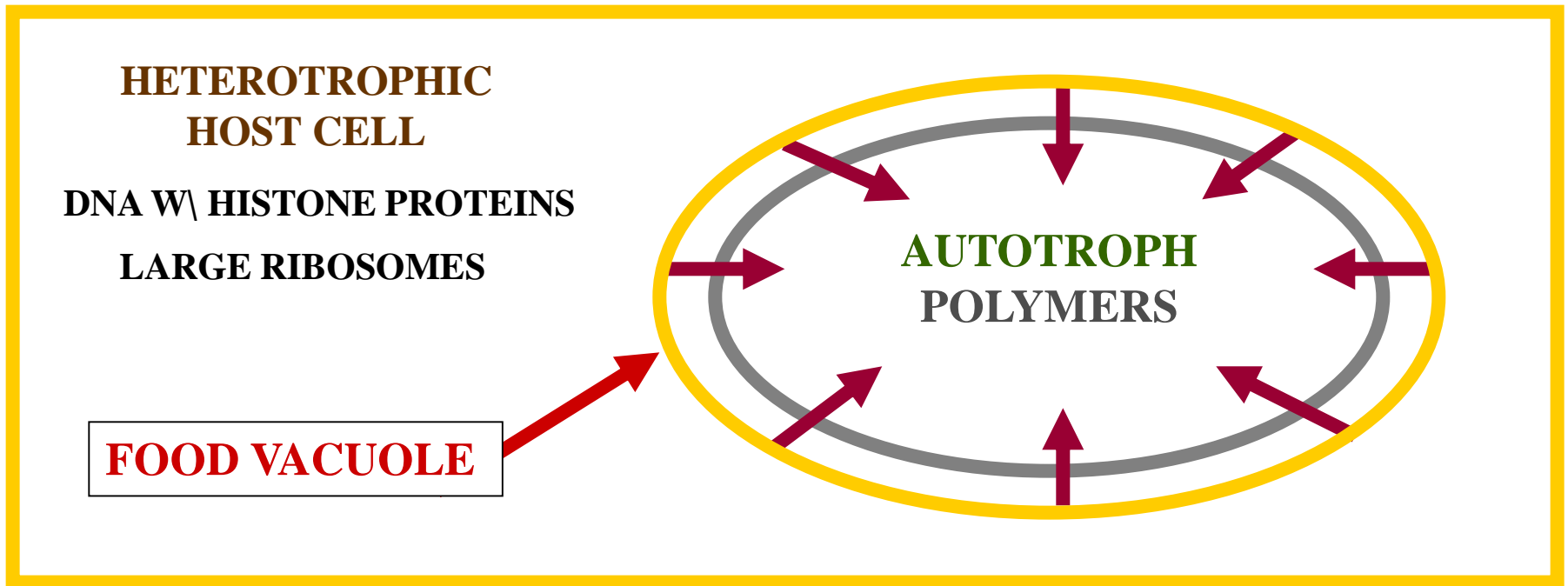


INITIALLY HETEROTROPH DIGESTS AUTOTROPH



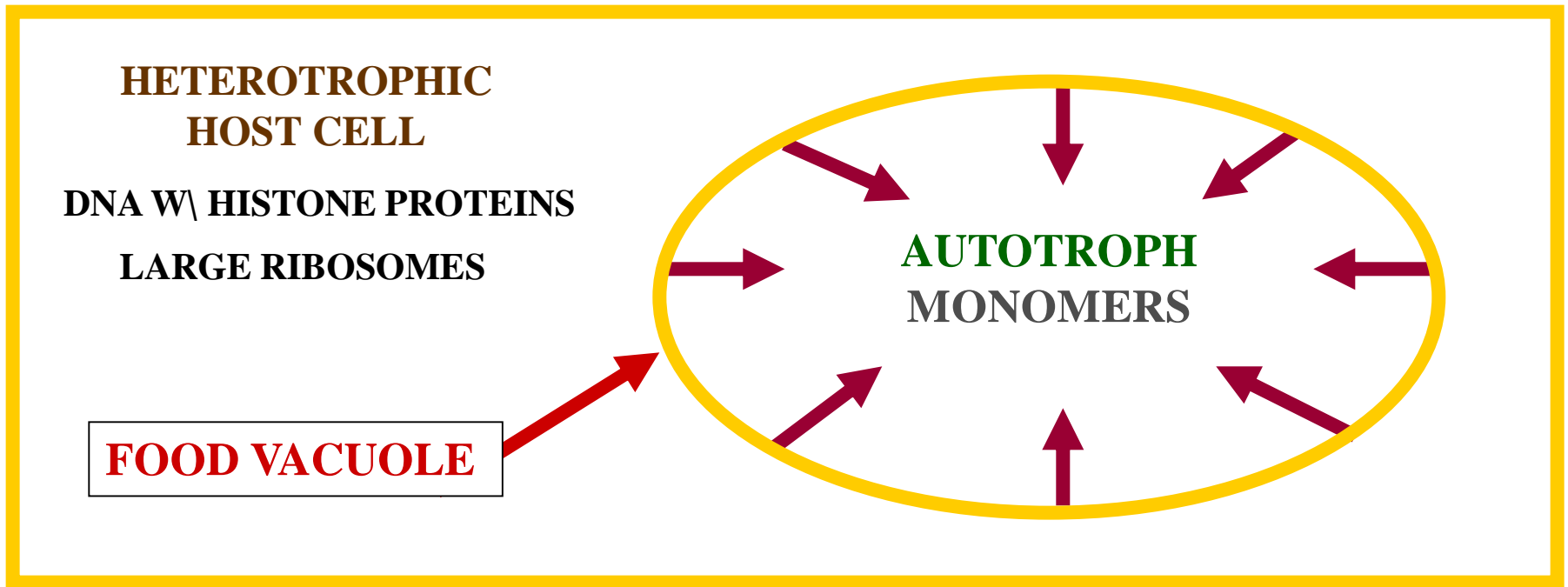
➡ = ENZYMES

INITIALLY HETEROTROPH DIGESTS AUTOTROPH



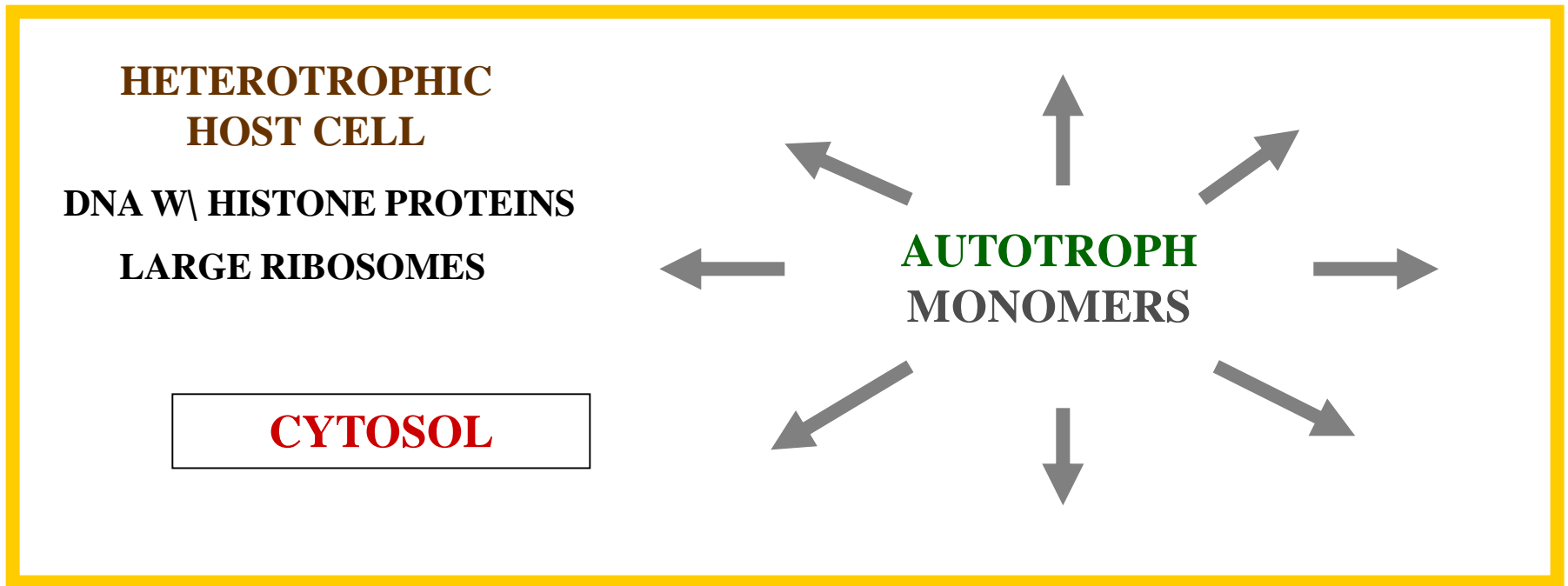
→ = ENZYMES

INITIALLY HETEROTROPH DIGESTS AUTOTROPH

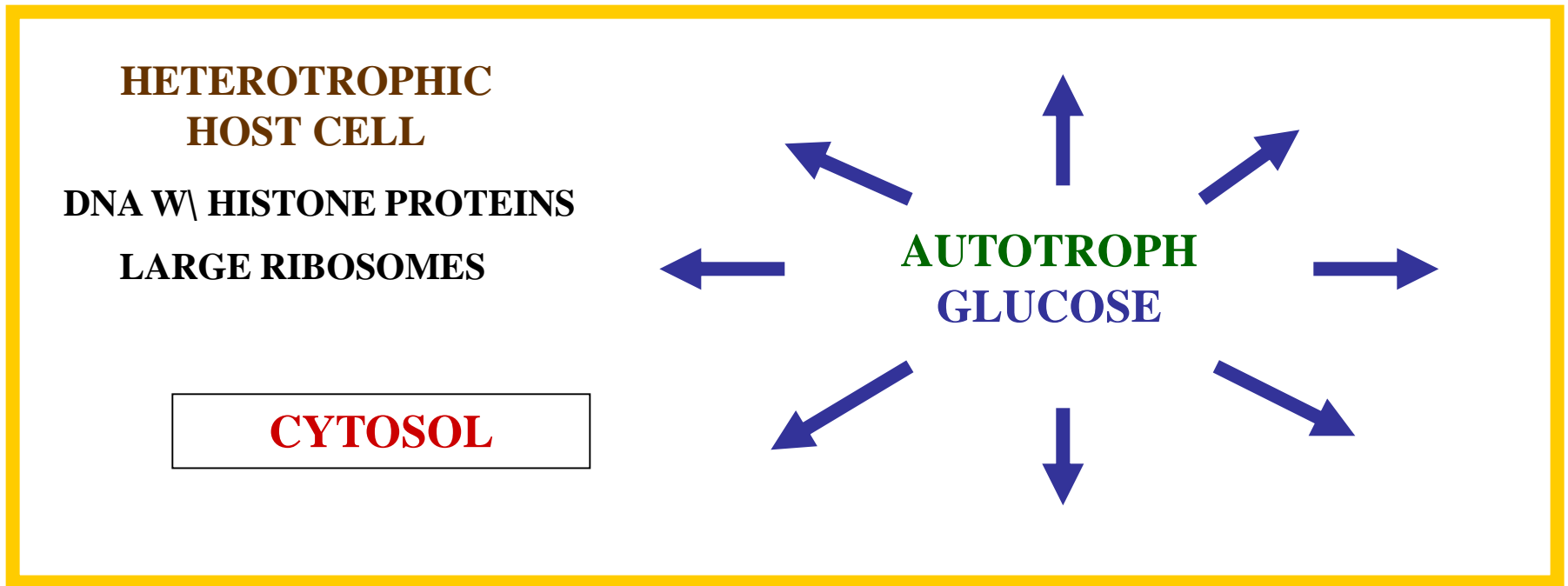


➡ = ENZYMES

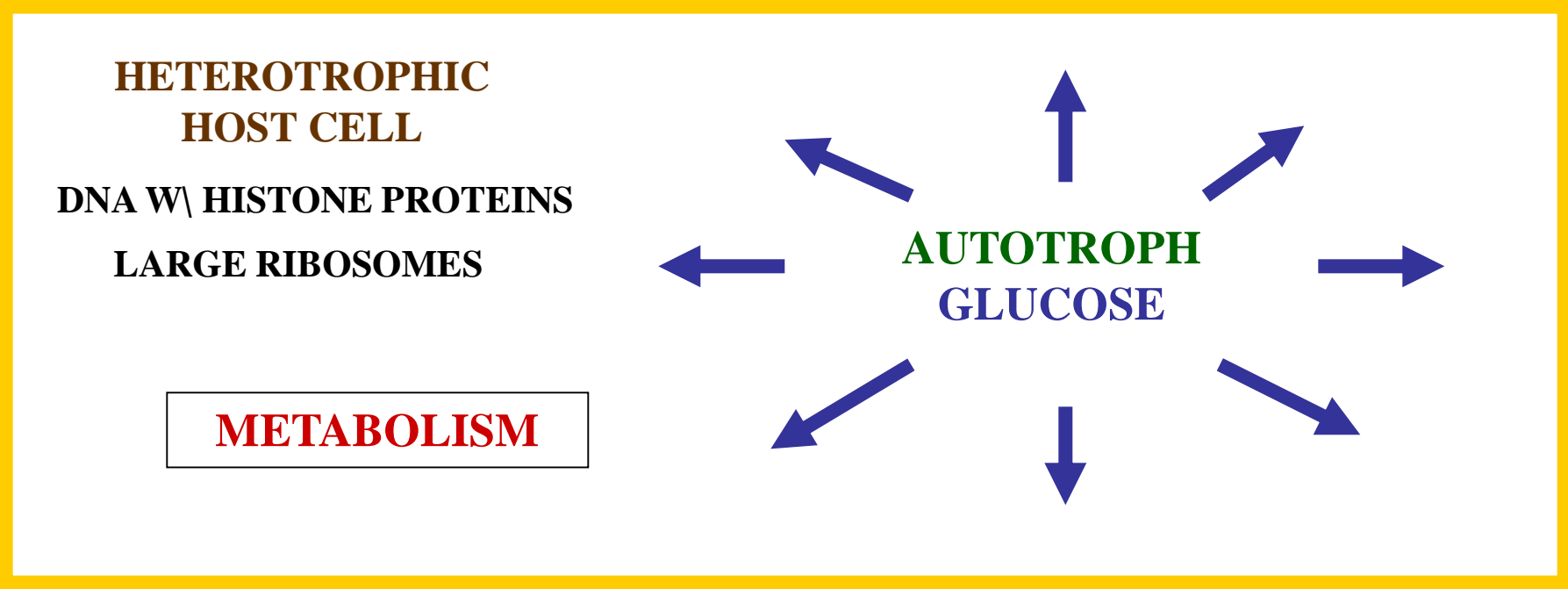
INITIALLY HETEROTROPH DIGESTS AUTOTROPH



INITIALLY HETEROTROPH DIGESTS AUTOTROPH



INITIALLY HETEROTROPH DIGESTS AUTOTROPH



EVENTUALLY “DAWNS ON HETEROTROPH”

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

**AUTOTROPHIC
PROKARYOTE**

CHL A&B + CAROTENOIDS

GRANA PRESENT

EVENTUALLY “DAWNS ON HETEROTROPH”

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

**AUTOTROPHIC
PROKARYOTE**

PHOTOSYNTHESIS

EVENTUALLY “DAWNS ON HETEROTROPH”

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

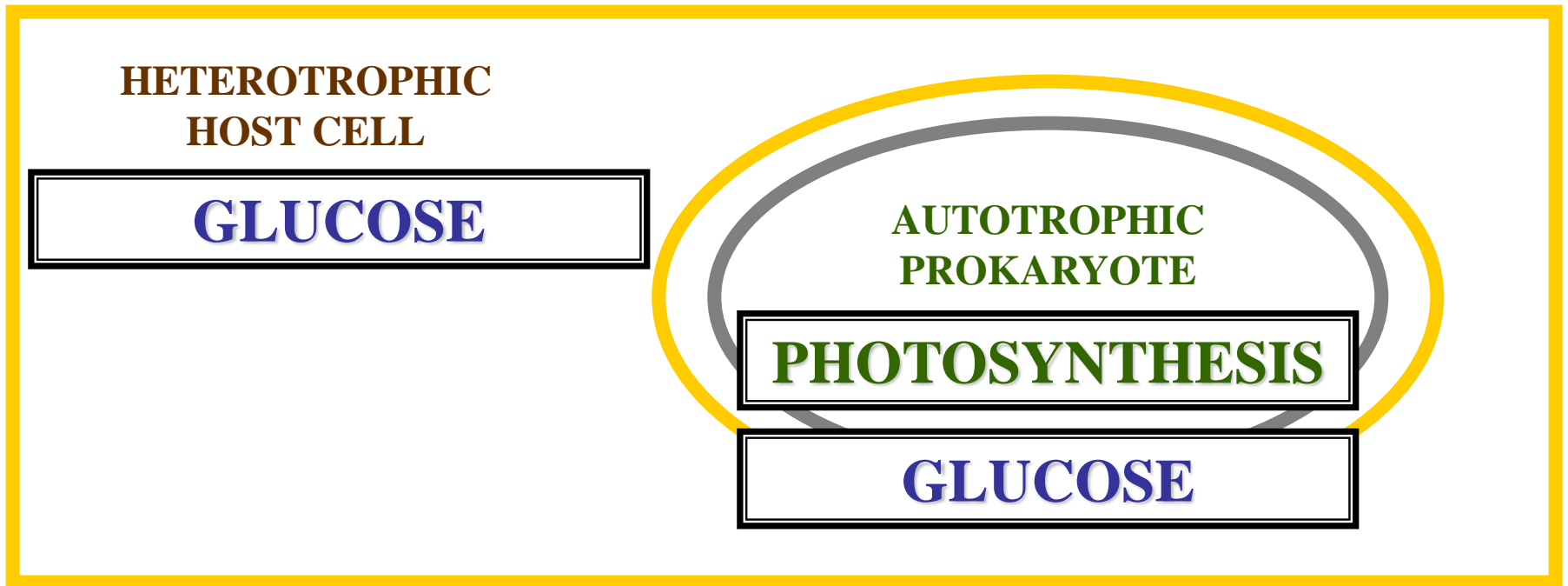
LARGE RIBOSOMES

**AUTOTROPHIC
PROKARYOTE**

PHOTOSYNTHESIS

GLUCOSE

EVENTUALLY “DAWNS ON HETEROTROPH”



AUTOTROPH LIVING WITHIN HETEROTROPH

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

**AUTOTROPHIC
PROKARYOTE**

CHL A&B + CAROTENOIDS

GRANA PRESENT

**2 SPECIES LIVING
INTRICATE ASSOCIATION**

SYMBIOSIS

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

**AUTOTROPHIC
PROKARYOTE**

CHL A&B + CAROTENOIDS

GRANA PRESENT



SYMBIOSIS

ENDOSYMBIOSIS

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

**AUTOTROPHIC
PROKARYOTE**

CHL A&B + CAROTENOIDS

GRANA PRESENT

SYMBIOSIS

ENDOSYMBIOSIS

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

**AUTOTROPHIC
PROKARYOTE**

CHL A&B + CAROTENOIDS

GRANA PRESENT

**AUTOTROPH PROVIDES
HETEROTROPH WITH?**

SYMBIOSIS

ENDOSYMBIOSIS

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

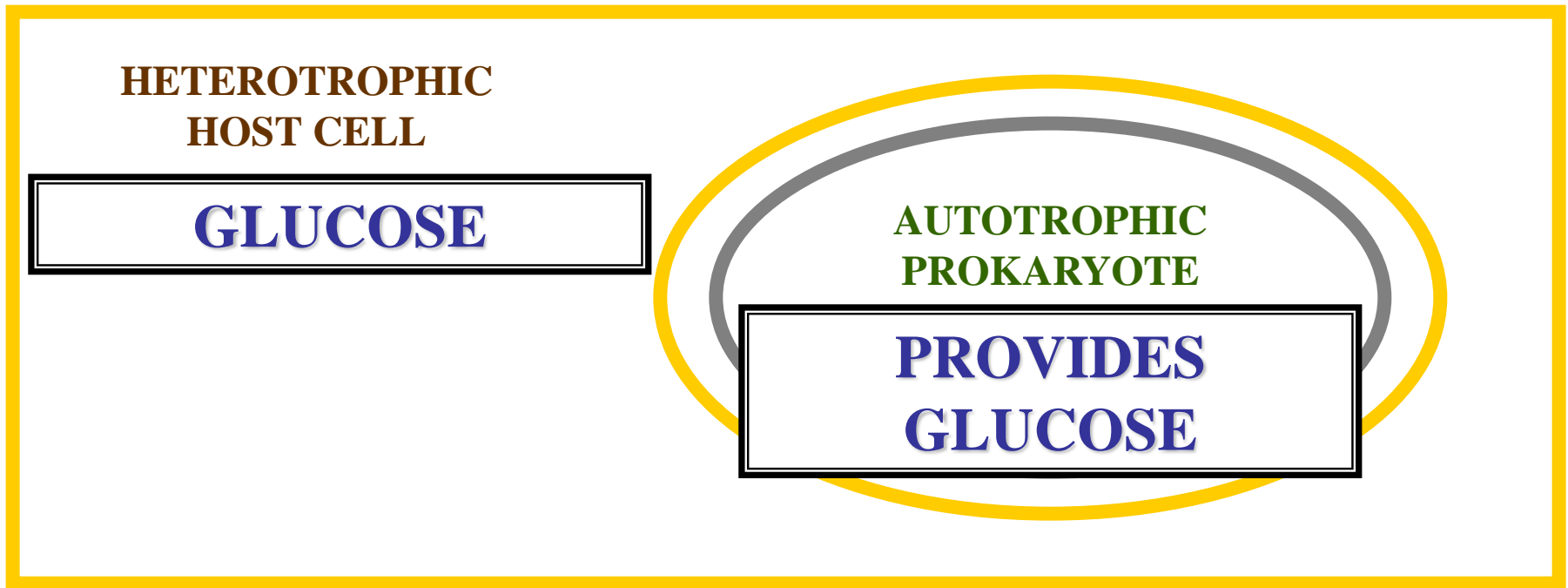
**AUTOTROPHIC
PROKARYOTE**

PHOTOSYNTHESIS

**AUTOTROPH PROVIDES
HETEROTROPH WITH?**

SYMBIOSIS

ENDOSYMBIOSIS



**AUTOTROPH PROVIDES
GLUCOSE**

SYMBIOSIS

ENDOSYMBIOSIS

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

**AUTOTROPHIC
PROKARYOTE**

CHL A&B + CAROTENOIDS

GRANA PRESENT

**HETEROTROPH PROVIDES
AUTOTROPH WITH?**



SYMBIOSIS

ENDOSYMBIOSIS

**HETEROTROPHIC
HOST CELL**

**PROVIDES
SECURITY**

**AUTOTROPHIC
PROKARYOTE**

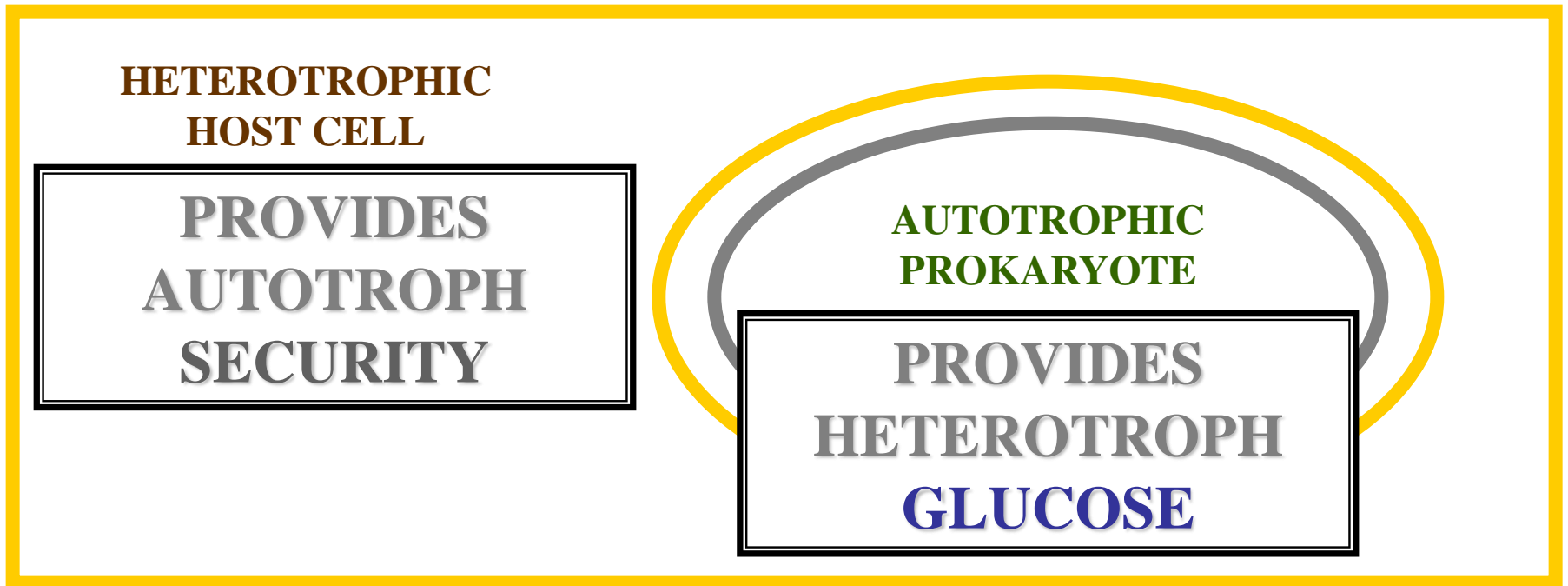
CHL A&B + CAROTENOIDS

SECURITY

**HETEROTROPH PROVIDES
SECURITY**

SYMBIOSIS

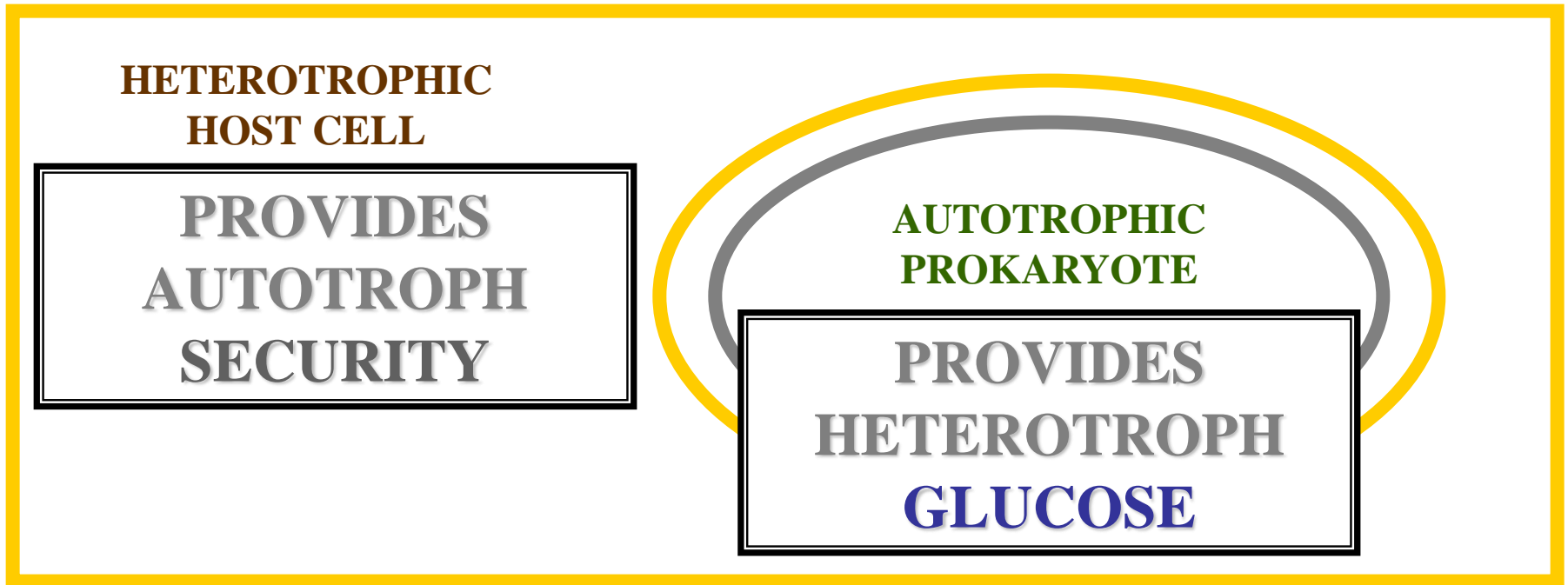
ENDOSYMBIOSIS



**BOTH SYMBIONTS
BENEFIT**

SYMBIOSIS

ENDOSYMBIOSIS



MUTUALISTIC

ENDOSYMBIOSIS

MUTUALISTIC ENDOSYMBIOSIS

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

**AUTOTROPHIC
PROKARYOTE**

CHL A&B + CAROTENOIDS

GRANA PRESENT

GIVEN LONG TIME PERIOD



OBLIGATE DEPENDENT RELATIONSHIP EVOLVES



**SYMBIONTS CANNOT
EXIST INDEPENDENTLY**

AUTOTROPHIC PROKARYOTE

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

**AUTOTROPHIC
BECOMES?**

CHL A&B + CAROTENOIDS

GRANA PRESENT

AUTOTROPHIC ORGANELLE

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

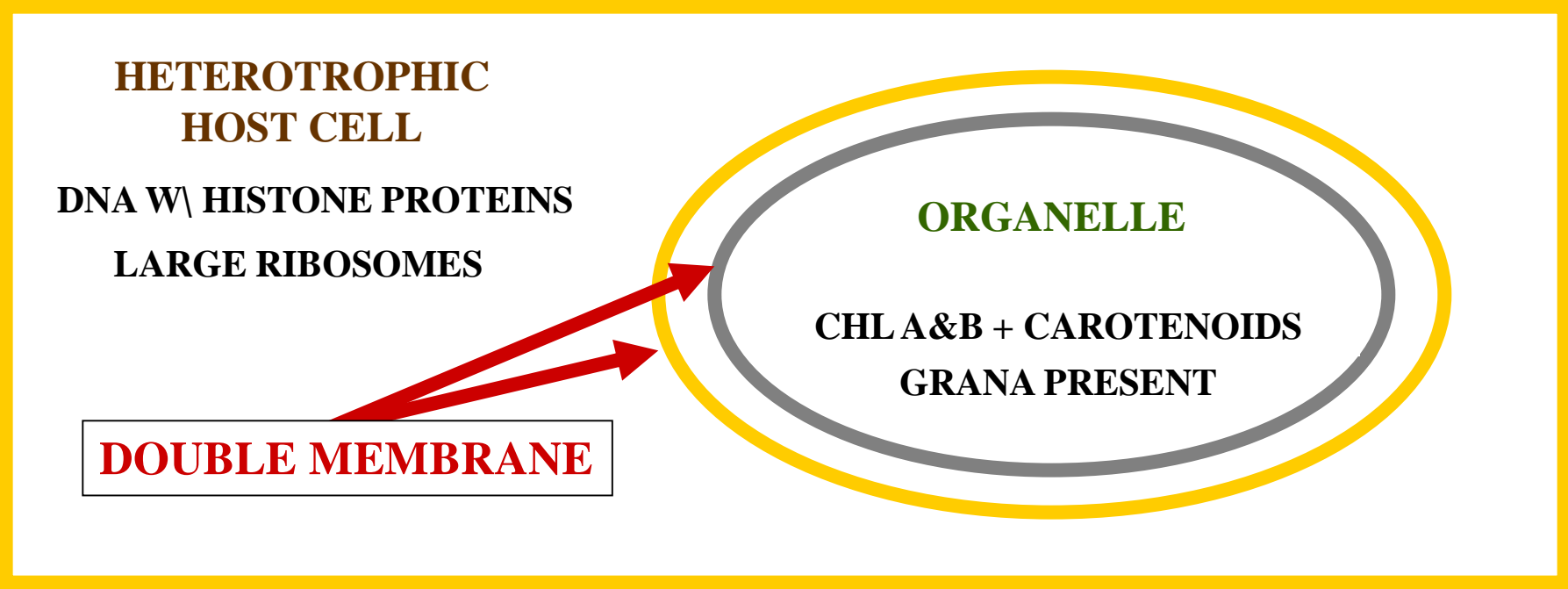
LARGE RIBOSOMES

ORGANELLE

CHL A&B + CAROTENOIDS

GRANA PRESENT

AUTOTROPHIC ORGANELLE



**HETEROTROPHIC
HOST CELL**

**DNA W\ HISTONE PROTEINS
LARGE RIBOSOMES**

DOUBLE MEMBRANE

ORGANELLE

**CHL A&B + CAROTENOIDS
GRANA PRESENT**

AUTOTROPHIC ORGANELLE

**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

DOUBLE MEMBRANE

ORGANELLE
PHOTOSYNTHESIS
CHL A&B + CAROTENOIDS
GRANA PRESENT

AUTOTROPHIC ORGANELLE

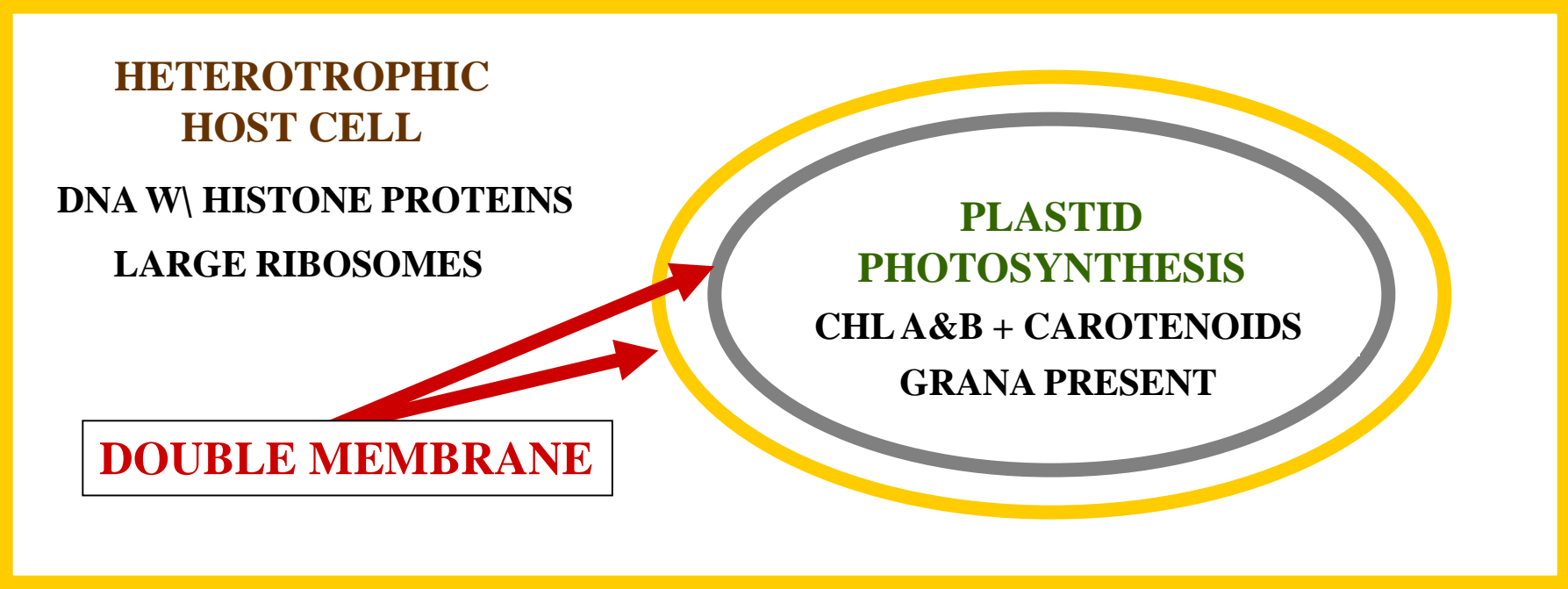
**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

DOUBLE MEMBRANE

PLASTID
PHOTOSYNTHESIS
CHL A&B + CAROTENOIDS
GRANA PRESENT



AUTOTROPHIC ORGANELLE



**HETEROTROPHIC
HOST CELL**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

DOUBLE MEMBRANE

**PLASTID
CHLOROPLAST**

CHL A&B + CAROTENOIDS

GRANA PRESENT



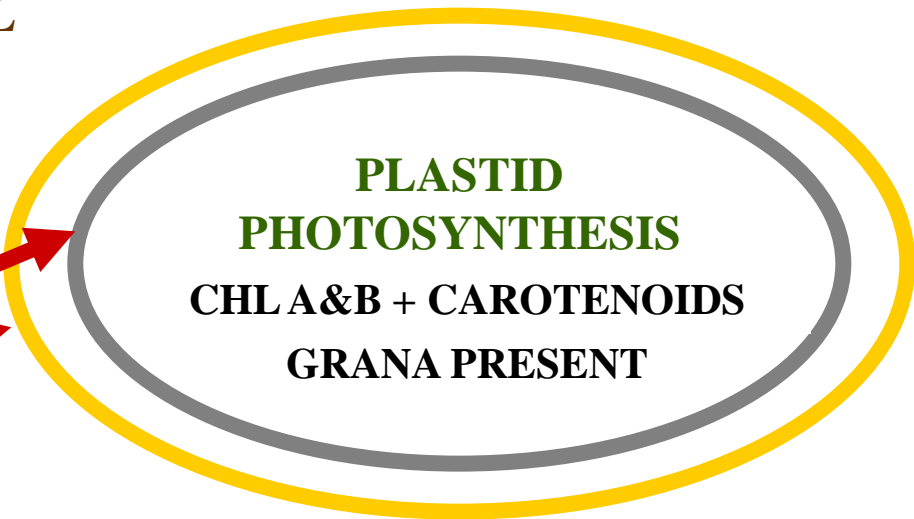
HETEROTROPHIC HOST CELL

**HETEROTROPHIC HOST CELL
BECOMES?**

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

DOUBLE MEMBRANE



PLASTID
PHOTOSYNTHESIS
CHL A&B + CAROTENOIDS
GRANA PRESENT

AUTOTROPHIC ORGANISM

AUTOTROPHIC ORGANISM

DNA W\ HISTONE PROTEINS

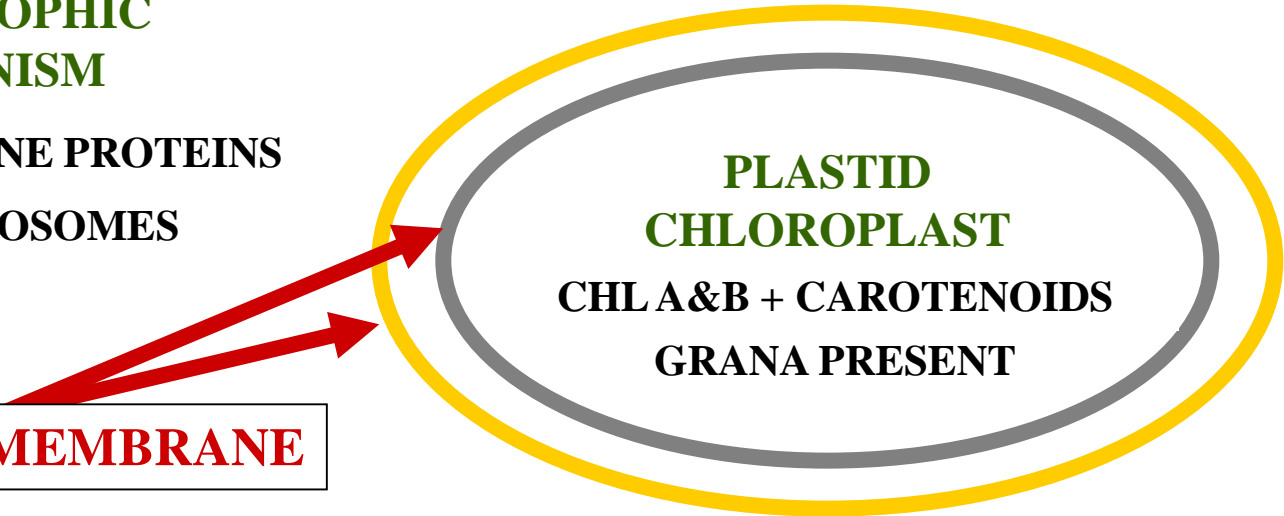
LARGE RIBOSOMES

DOUBLE MEMBRANE

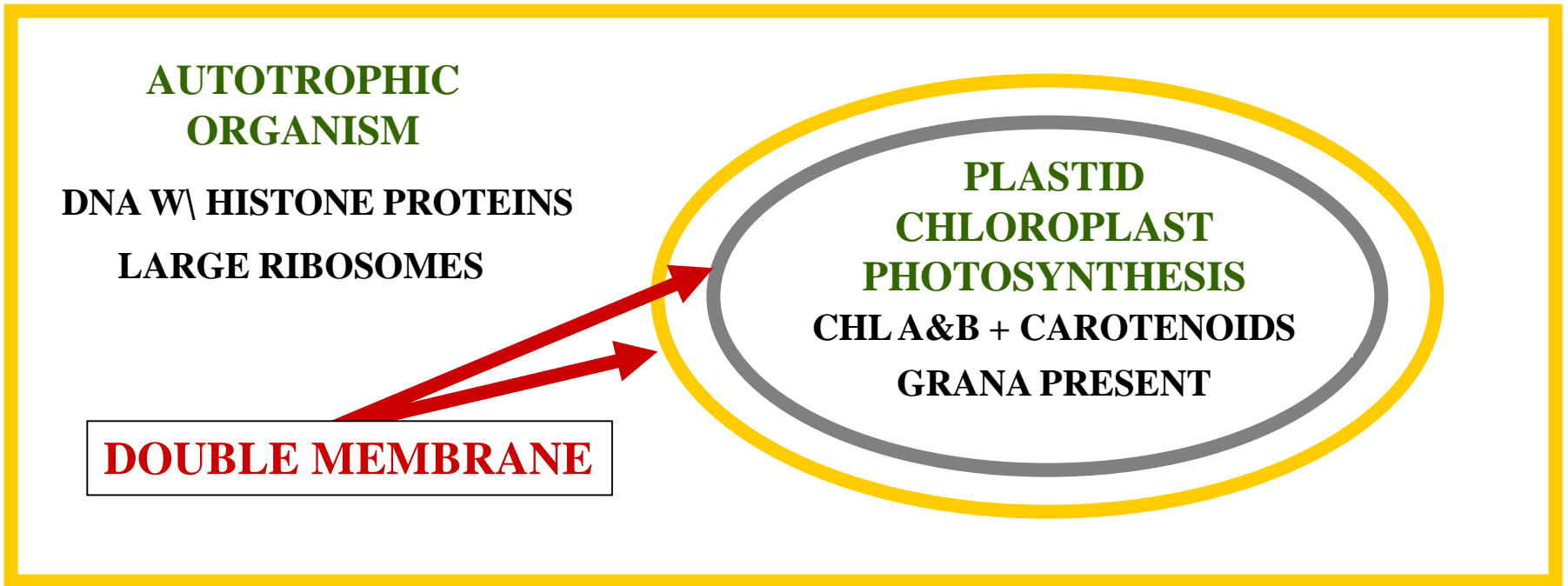
PLASTID CHLOROPLAST

CHL A&B + CAROTENOIDS

GRANA PRESENT



AUTOTROPHIC ORGANISM



AUTOTROPHIC ORGANISM

DNA W\ HISTONE PROTEINS

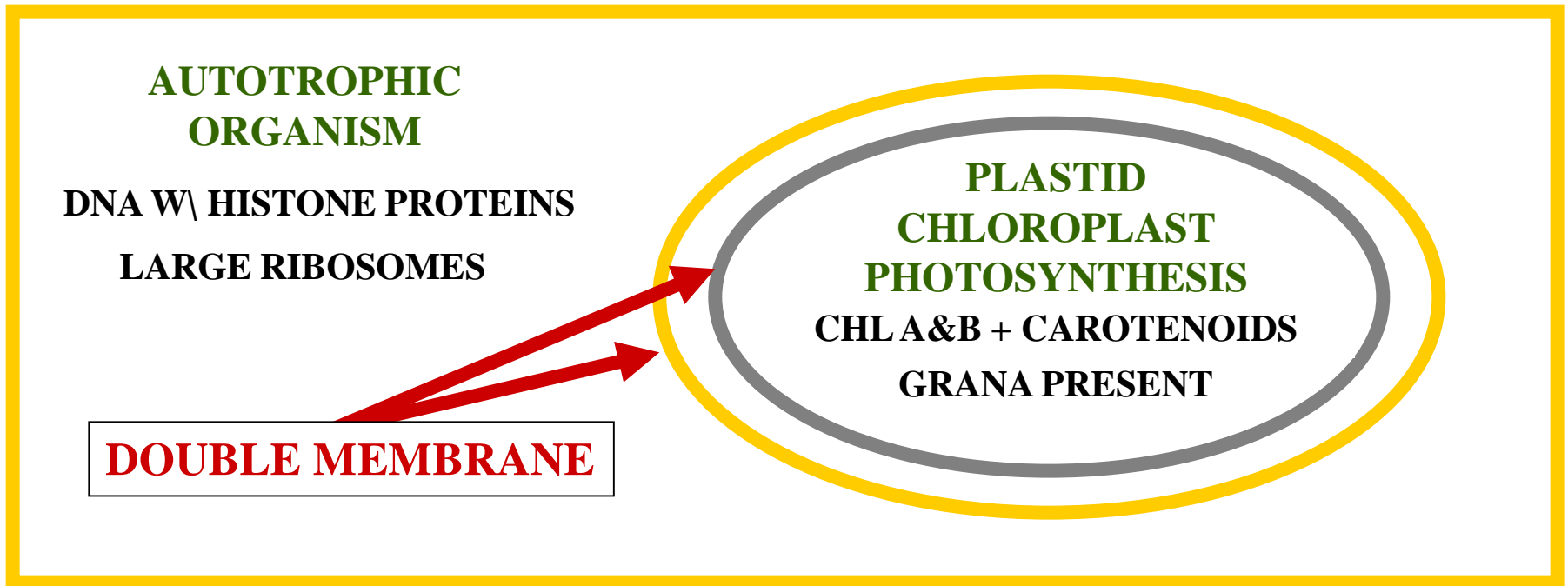
LARGE RIBOSOMES

DOUBLE MEMBRANE

**PLASTID
CHLOROPLAST
PHOTOSYNTHESIS
CHL A&B + CAROTENOIDS
GRANA PRESENT**

PLANT CELL

AUTOTROPHIC ORGANISM

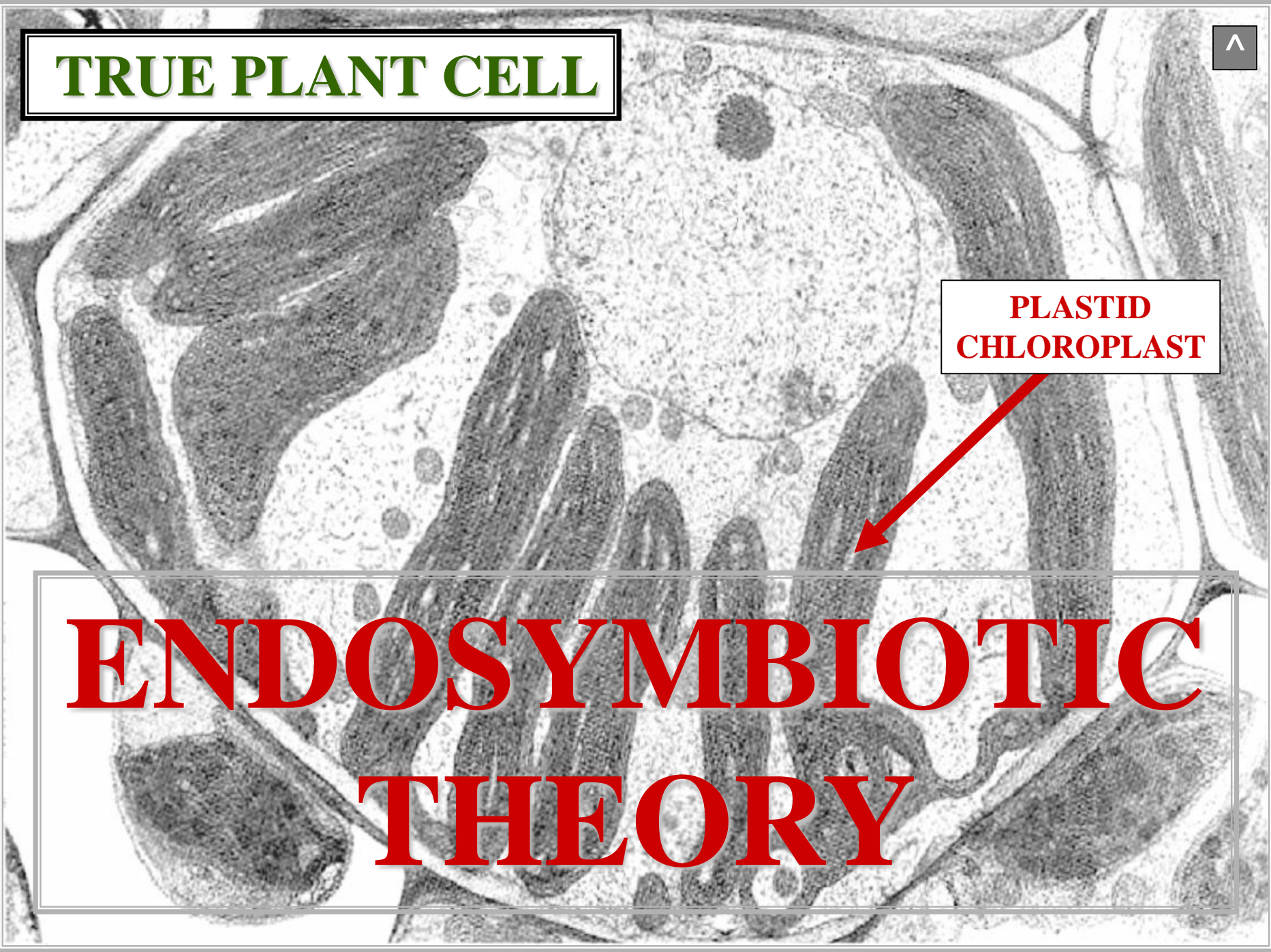


TRUE PLANT CELL

TRUE PLANT CELL

PLASTID
CHLOROPLAST

ENDOSYMBIOTIC THEORY





GENERAL TAXONOMIC TERMS

THALLOPHYTES
VS
EMBRYOPHYTES

THALLOPHYTES

THALLOPHYTES



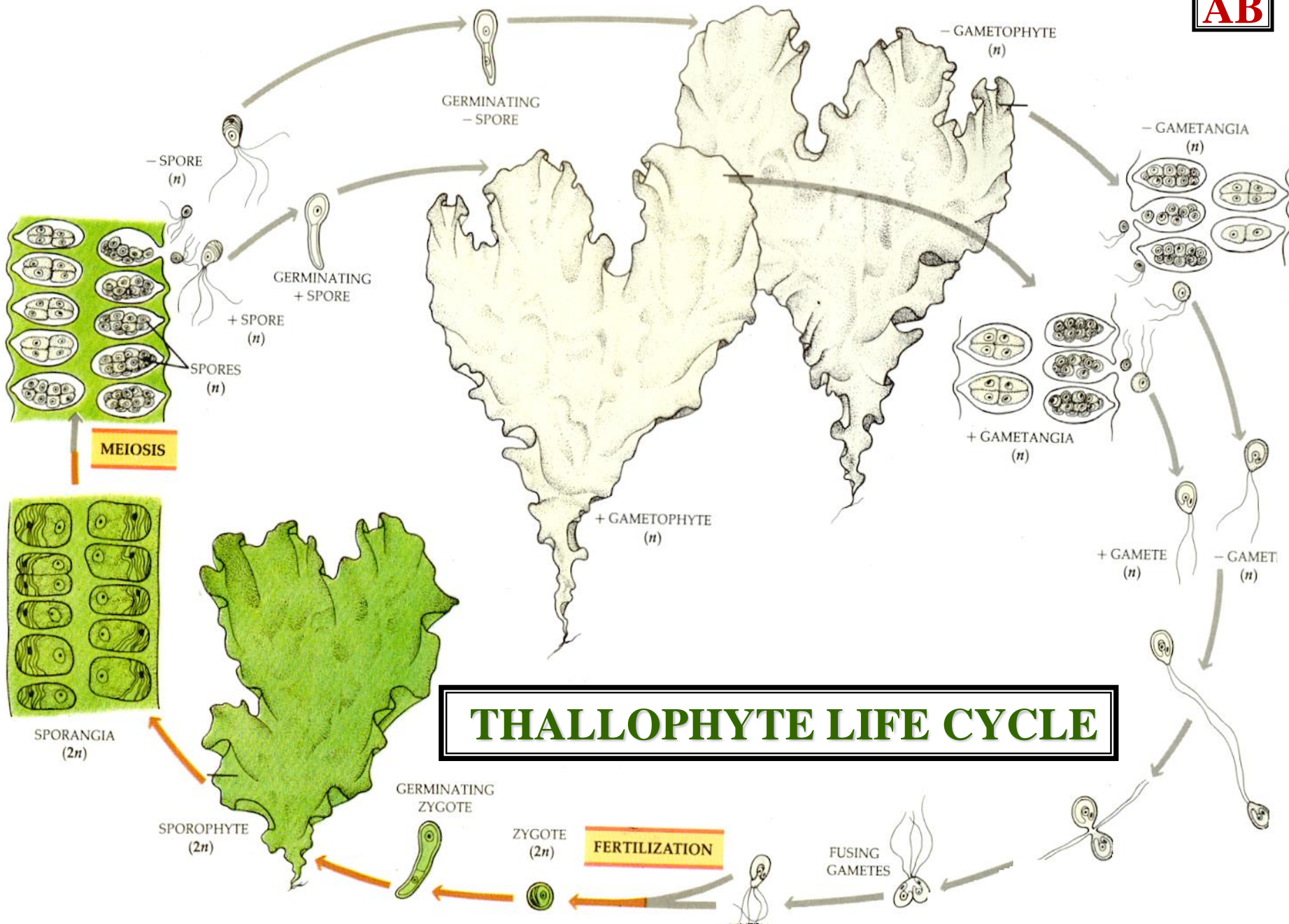
NON-EMBRYO BEARING PLANTS

THALLOPHYTES

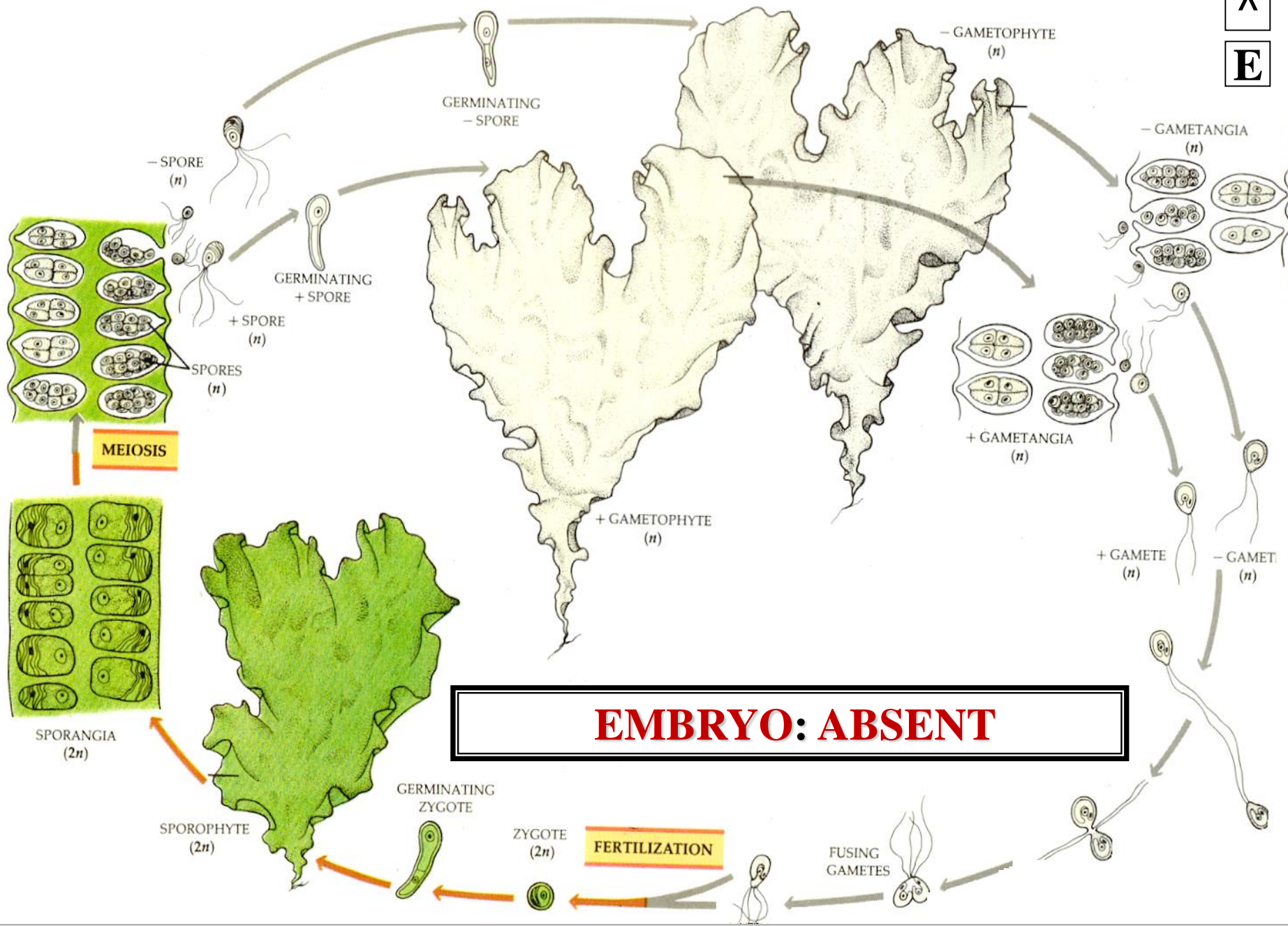


NON-EMBRYO BEARING PLANTS

THALLOPHYTES



^
E



EMBRYOPHYTES

EMBRYOPHYTES



EMBRYO BEARING PLANTS

EMBRYOPHYTES

EMBRYOPHYTES

EMBRYO BEARING PLANTS



EMBRYOPHYTE LIFE CYCLE

PR

YOUNG SPOROPOPHYTE FROND

GAMETOPHYTE

FOOT

SHOOT APEX

RHIZOIDS

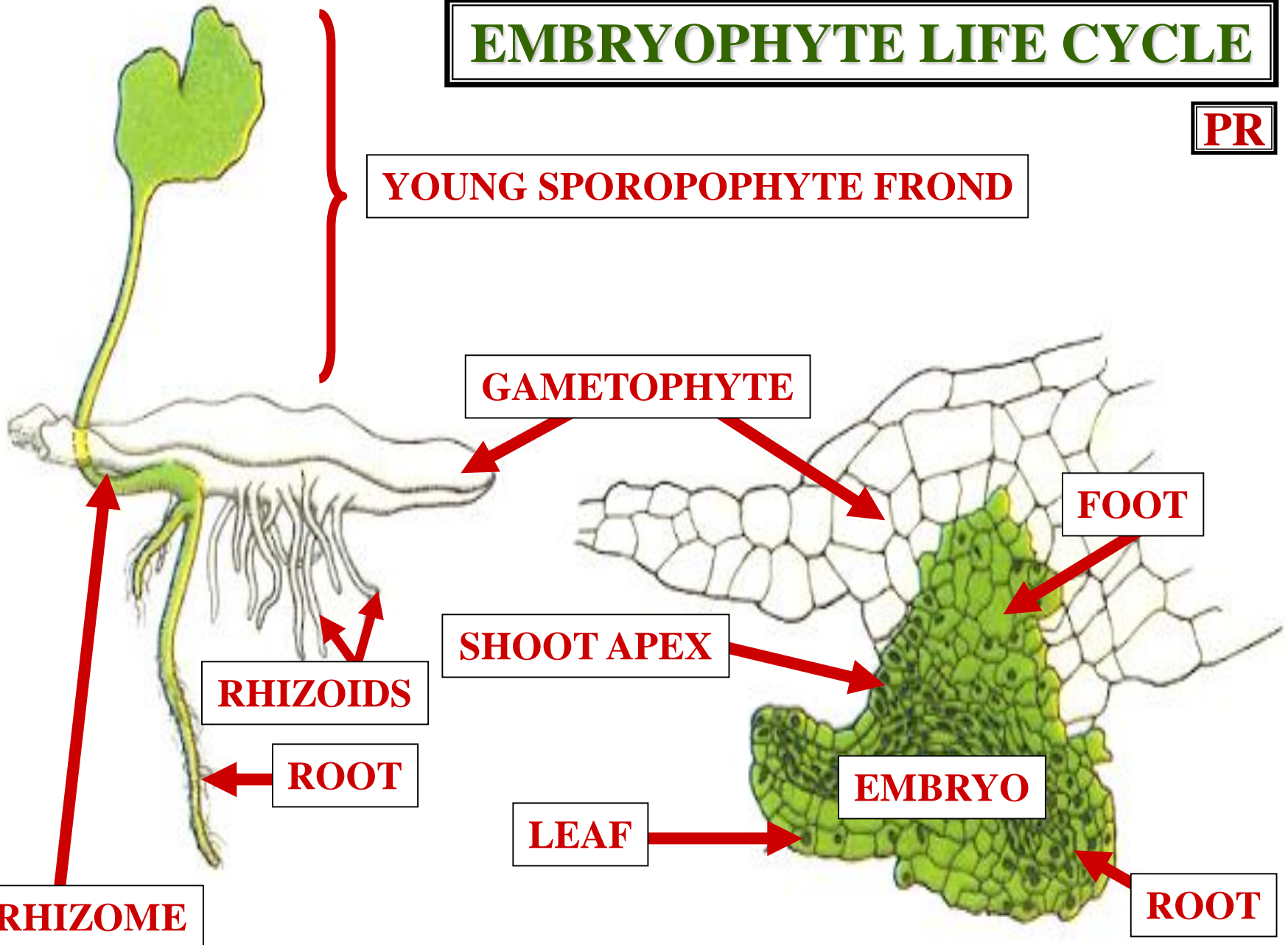
ROOT

EMBRYO

LEAF

ROOT

RHIZOME



EMBRYO: PRESENT

YOUNG SPOROPOHYTE FROND

GAMETOPHYTE

FOOT

SHOOT APEX

RHIZOIDS

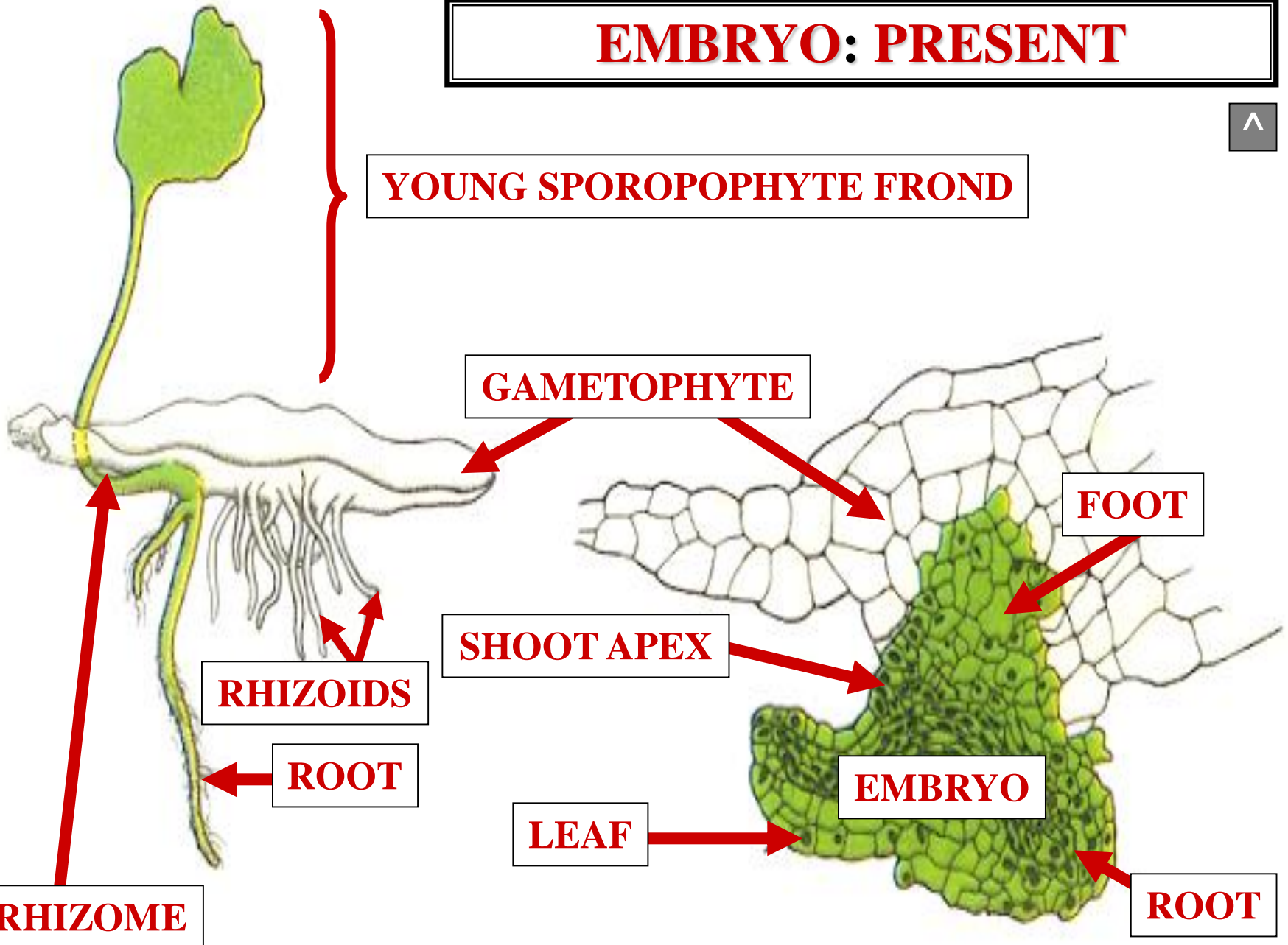
ROOT

EMBRYO

LEAF

ROOT

RHIZOME



BRYOPHYTES
VS
TRACHEOPHYTES

BRYOPHYTES

BRYOPHYTES



**NON-VASCULAR
EMBRYOPHYTES**

BRYOPHYTES



NON-VASCULAR EMBRYOPHYTES

BRYOPHYTES



VASCULAR TISSUE

AB



C.S.

VASCULAR TISSUE: ABSENT

^
T



C.S.

TRACHEOPHYTES

TRACHEOPHYTES



**VASCULAR
EMBRYOPHYTES**

TRACHEOPHYTES

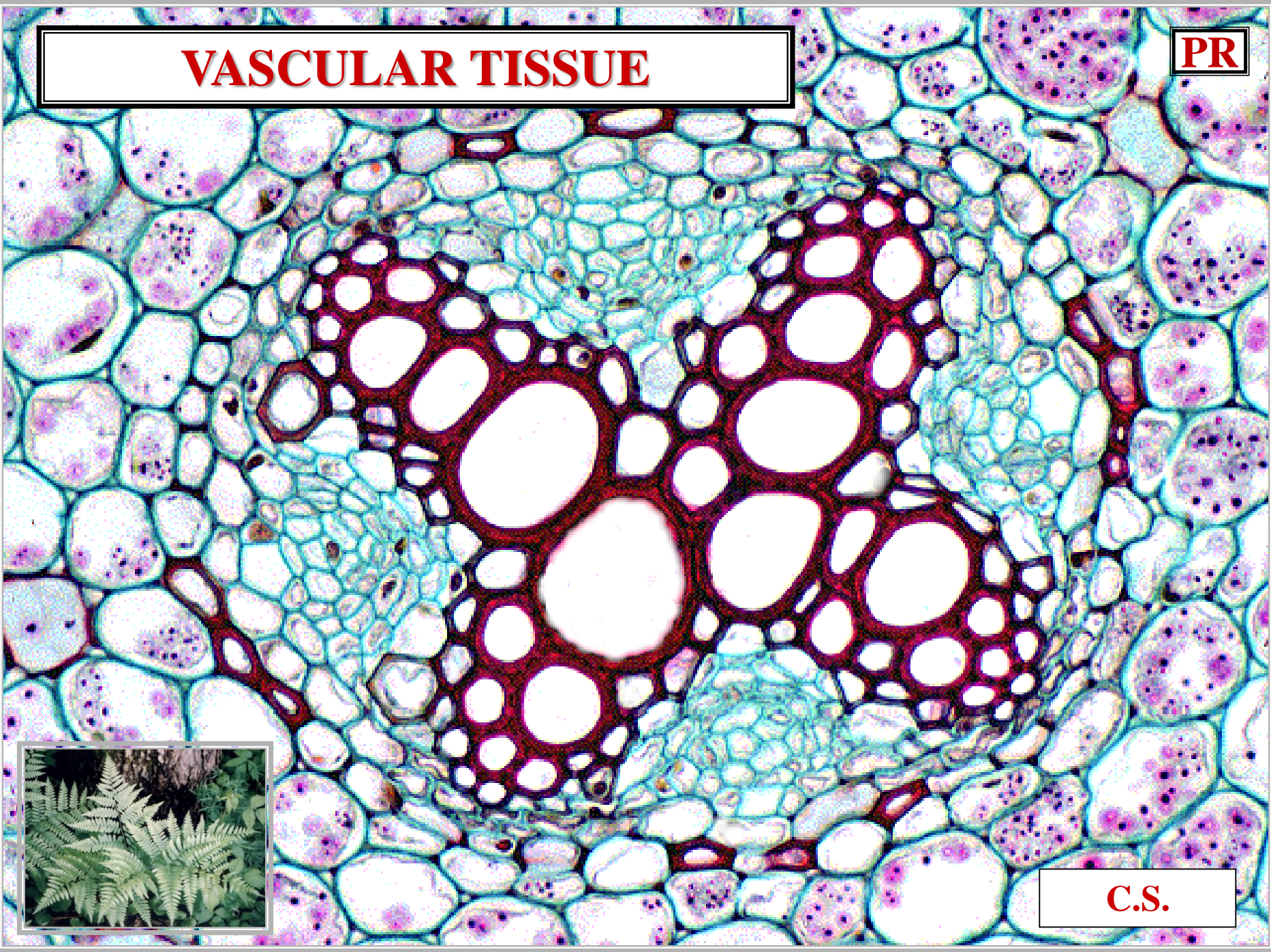
TRACHEOPHYTES



VASCULAR EMBRYOPHYTES

VASCULAR TISSUE

PR



C.S.

VASCULAR TISSUE: PRESENT

?



C.S.

VASCULAR TISSUE: PRESENT

X

?



C.S.

VASCULAR TISSUE: PRESENT

XYLEM & PHLOEM

?



C.S.

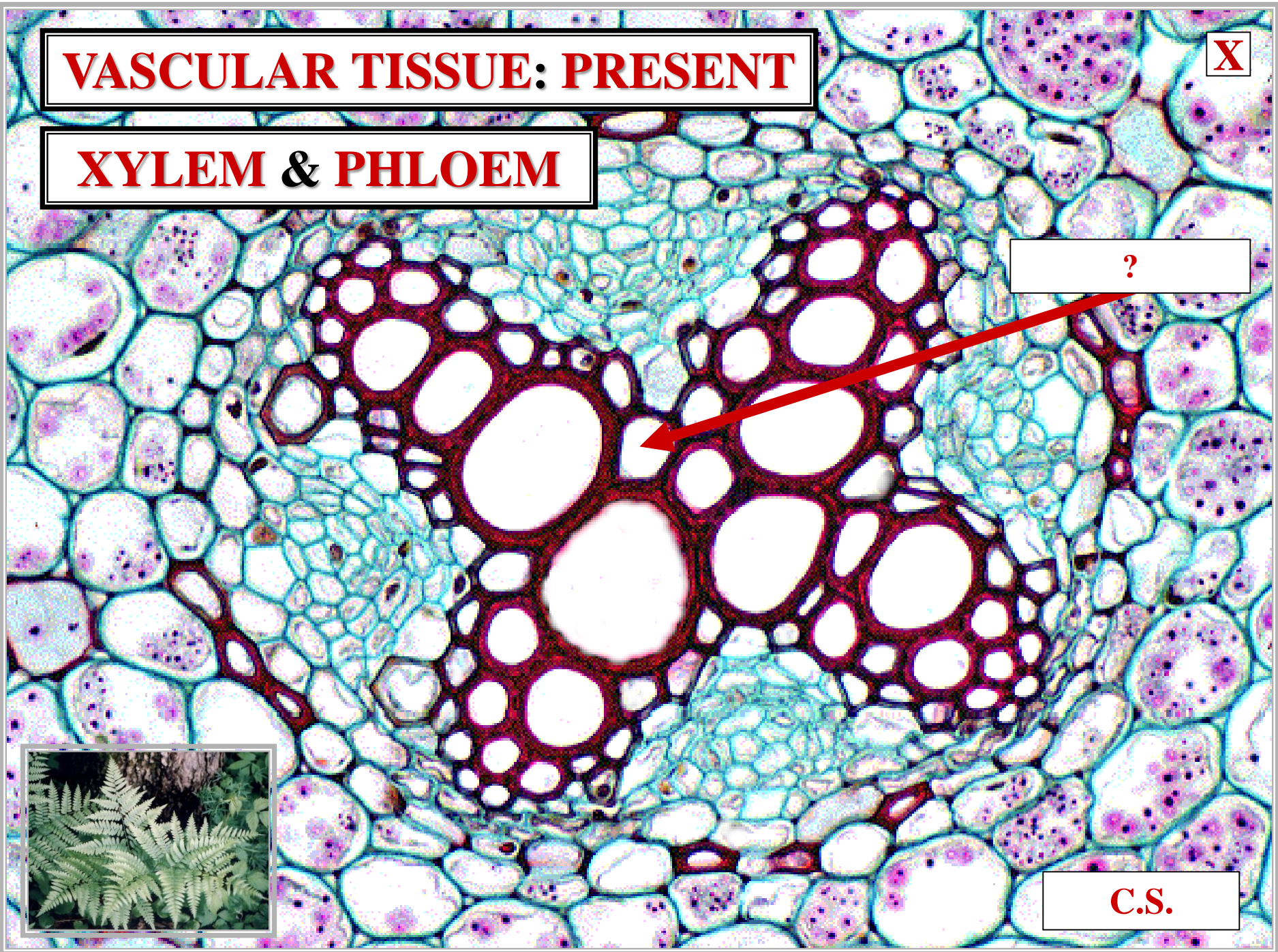
VASCULAR TISSUE: PRESENT

XYLEM & PHLOEM

X

?

C.S.



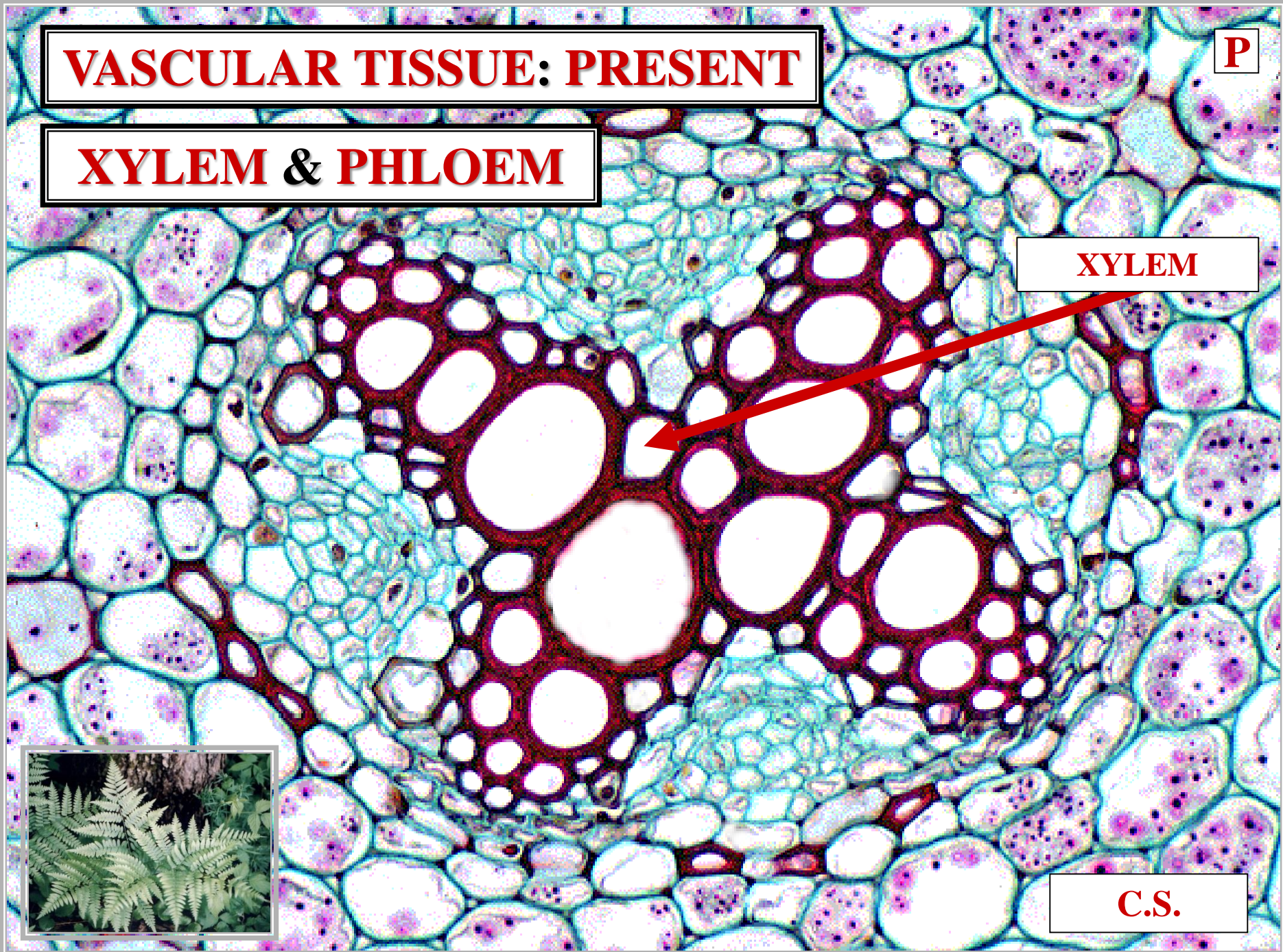
VASCULAR TISSUE: PRESENT

XYLEM & PHLOEM

P

XYLEM

C.S.



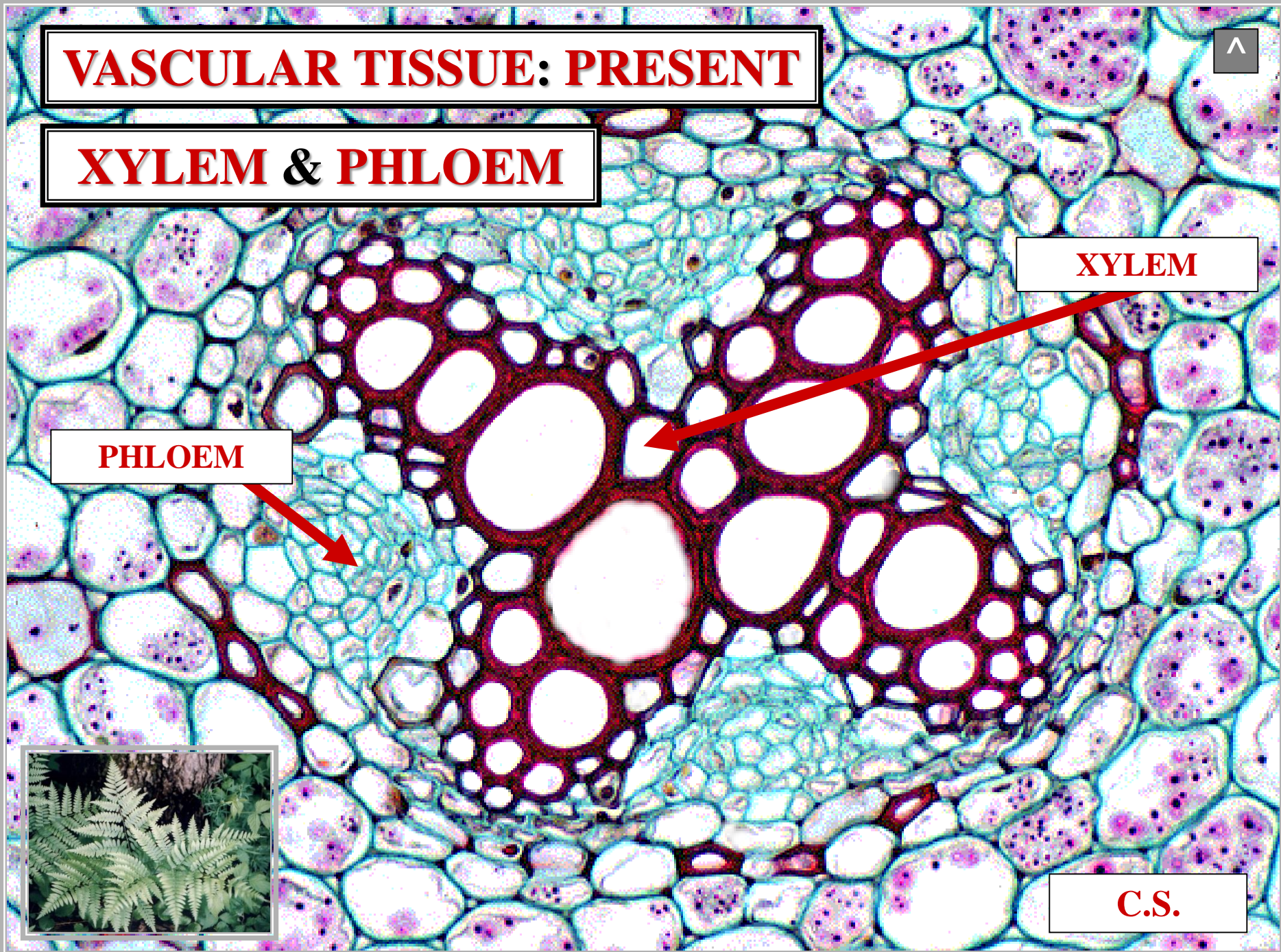
VASCULAR TISSUE: PRESENT

XYLEM & PHLOEM

XYLEM

PHLOEM

C.S.



PTERIDOPHYTES
VS
SPERMATOPHYTES

PTERIDOPHYTES

PTERIDOPHYTES



NON-SEED BEARING
TRACHEOPHYTES

PTERIDOPHYTES

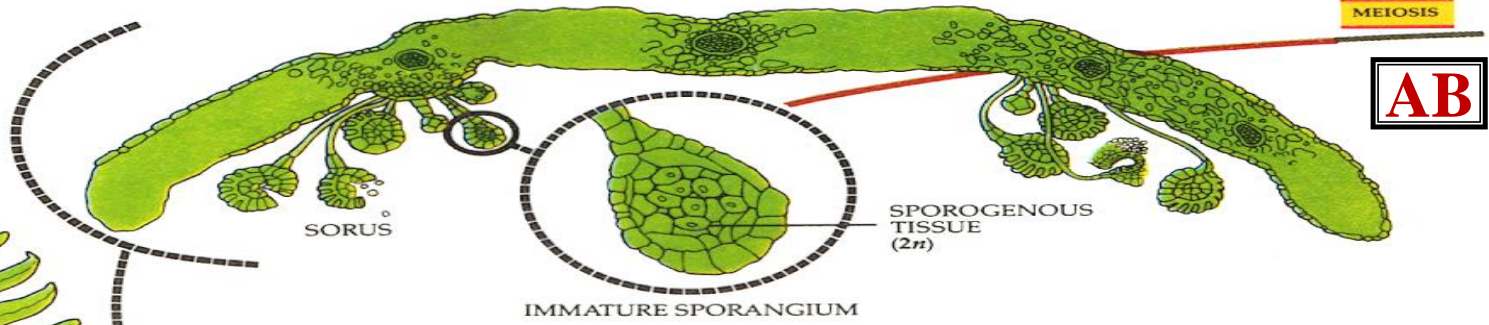


**NON-SEED BEARING
TRACHEOPHYTES**

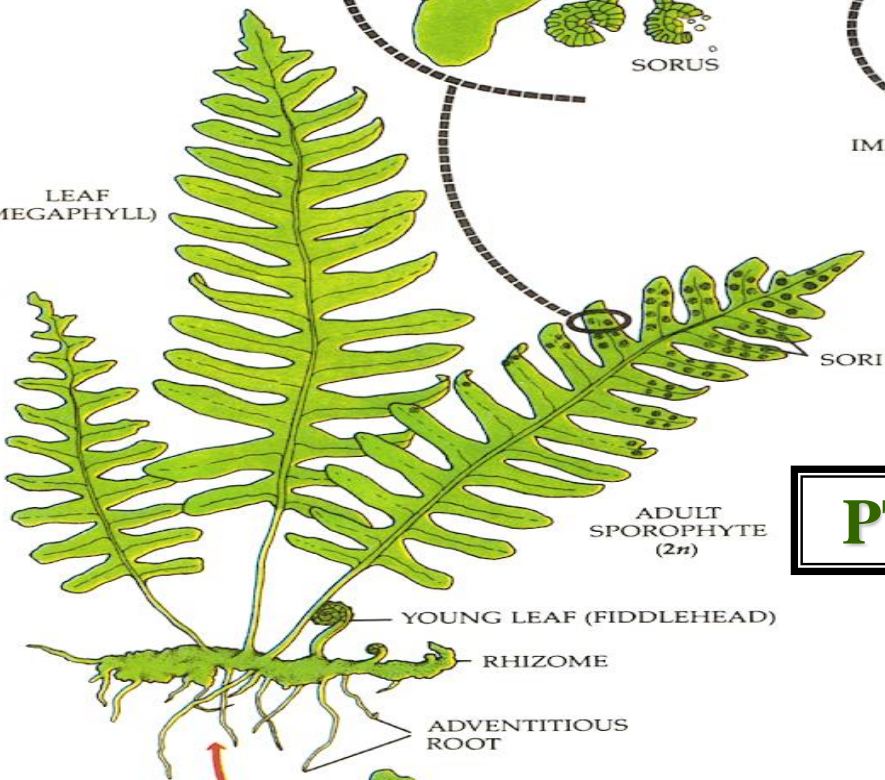
PTERIDOPHYTES

MEIOSIS

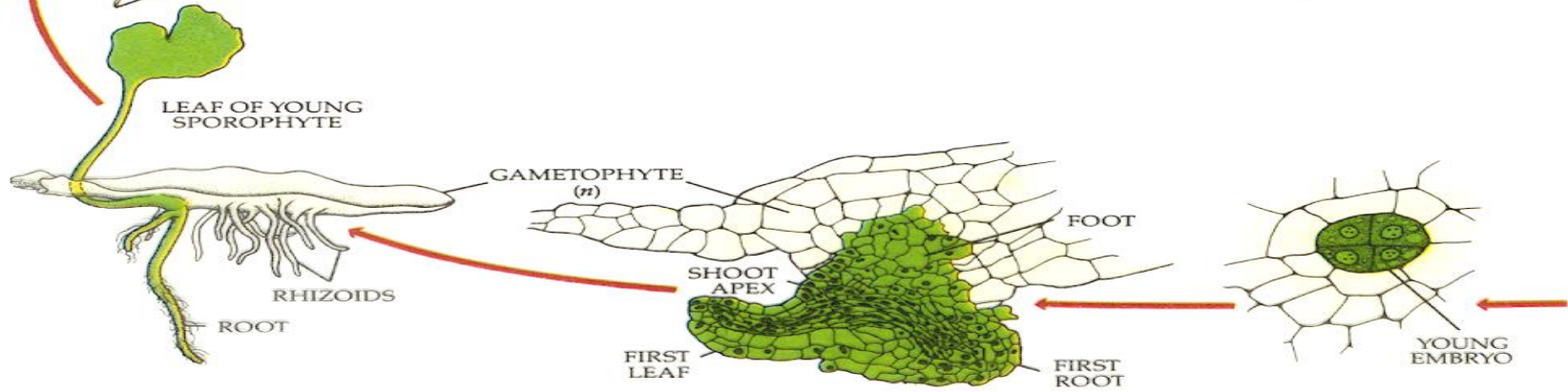
AB



LEAF (MEGAPHYLL)

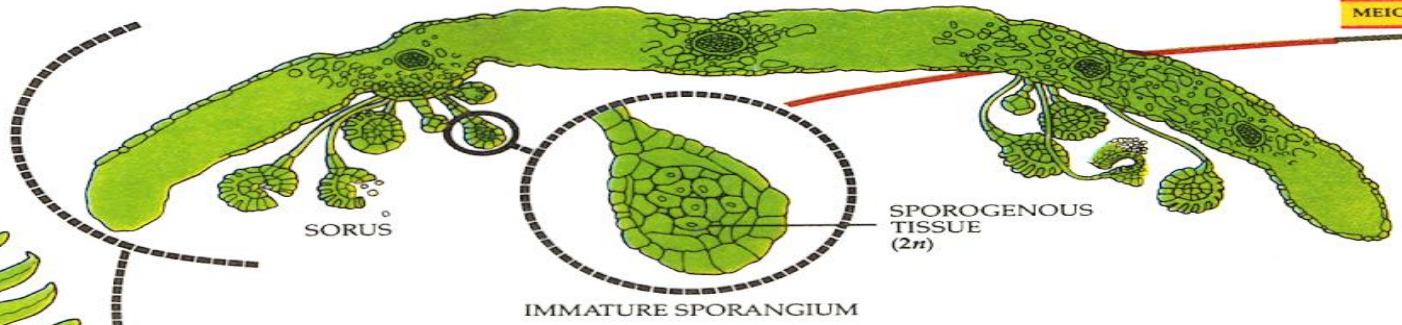


PTERIDOPHYTE LIFE CYCLE

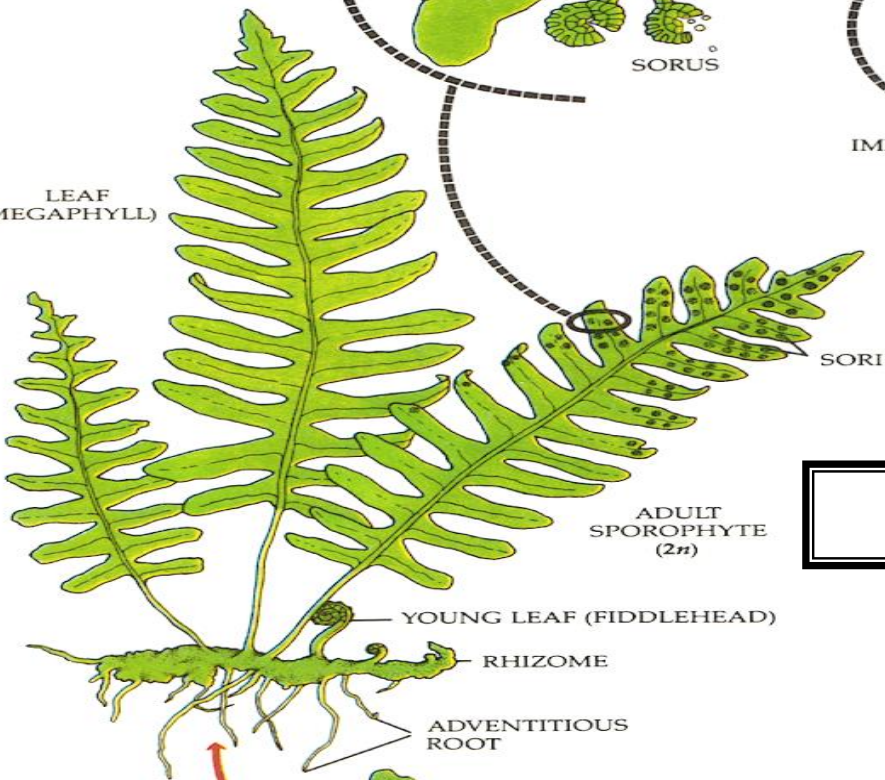


MEIOSIS

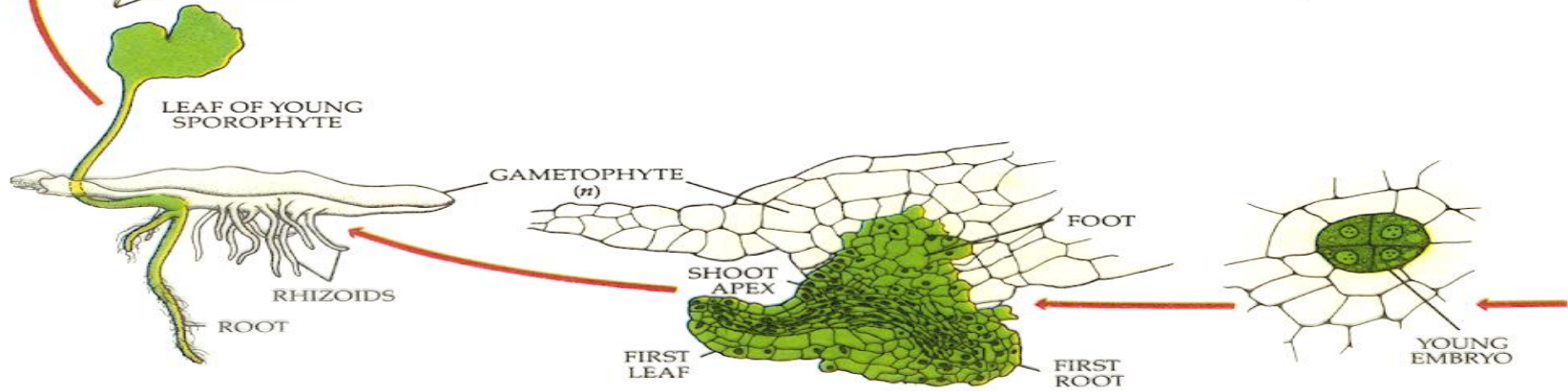
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S



LEAF (MEGAPHYLL)



SEED: ABSENT



SPERMATOPHYTES

SPERMATOPHYTES



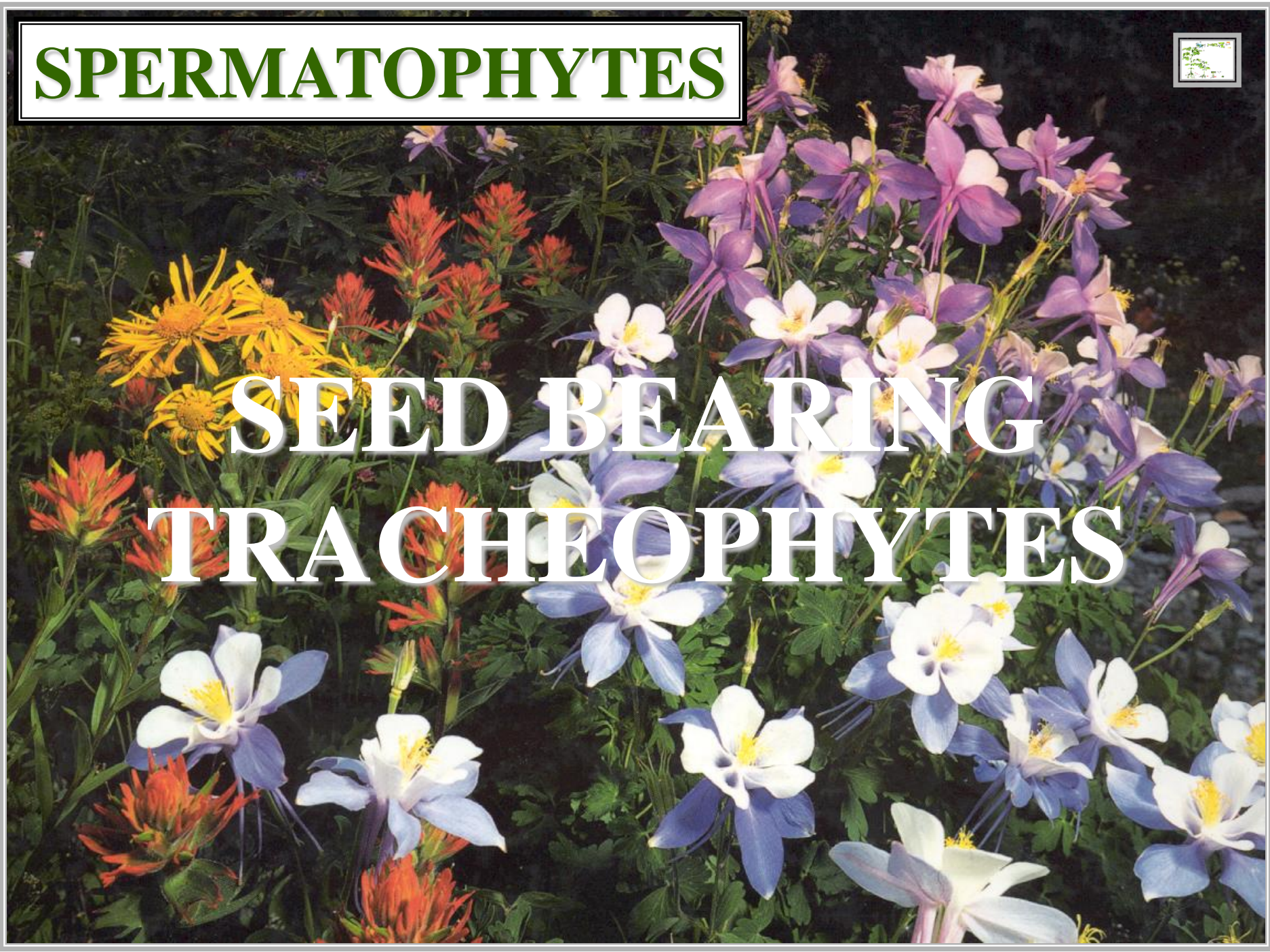
**SEED BEARING
TRACHEOPHYTES**

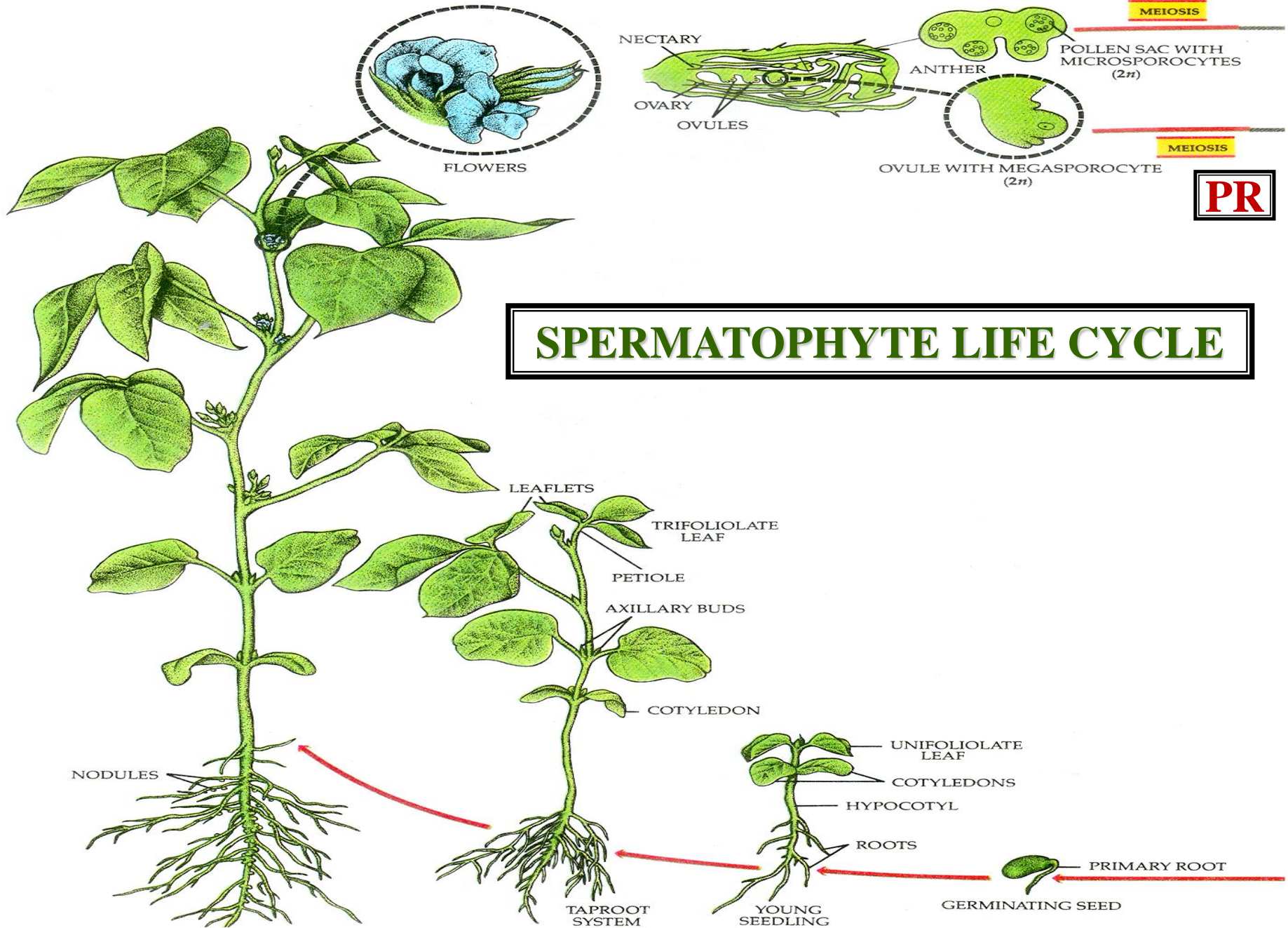
SPERMATOPHYTES

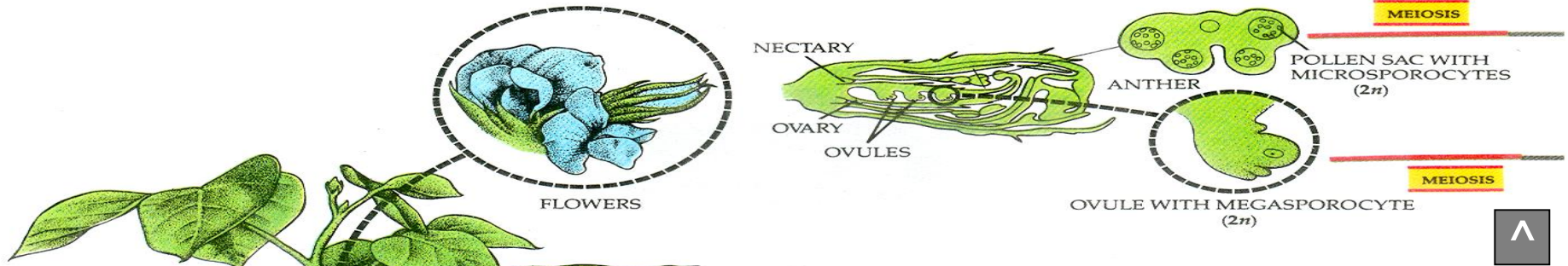
SPERMATOPHYTES



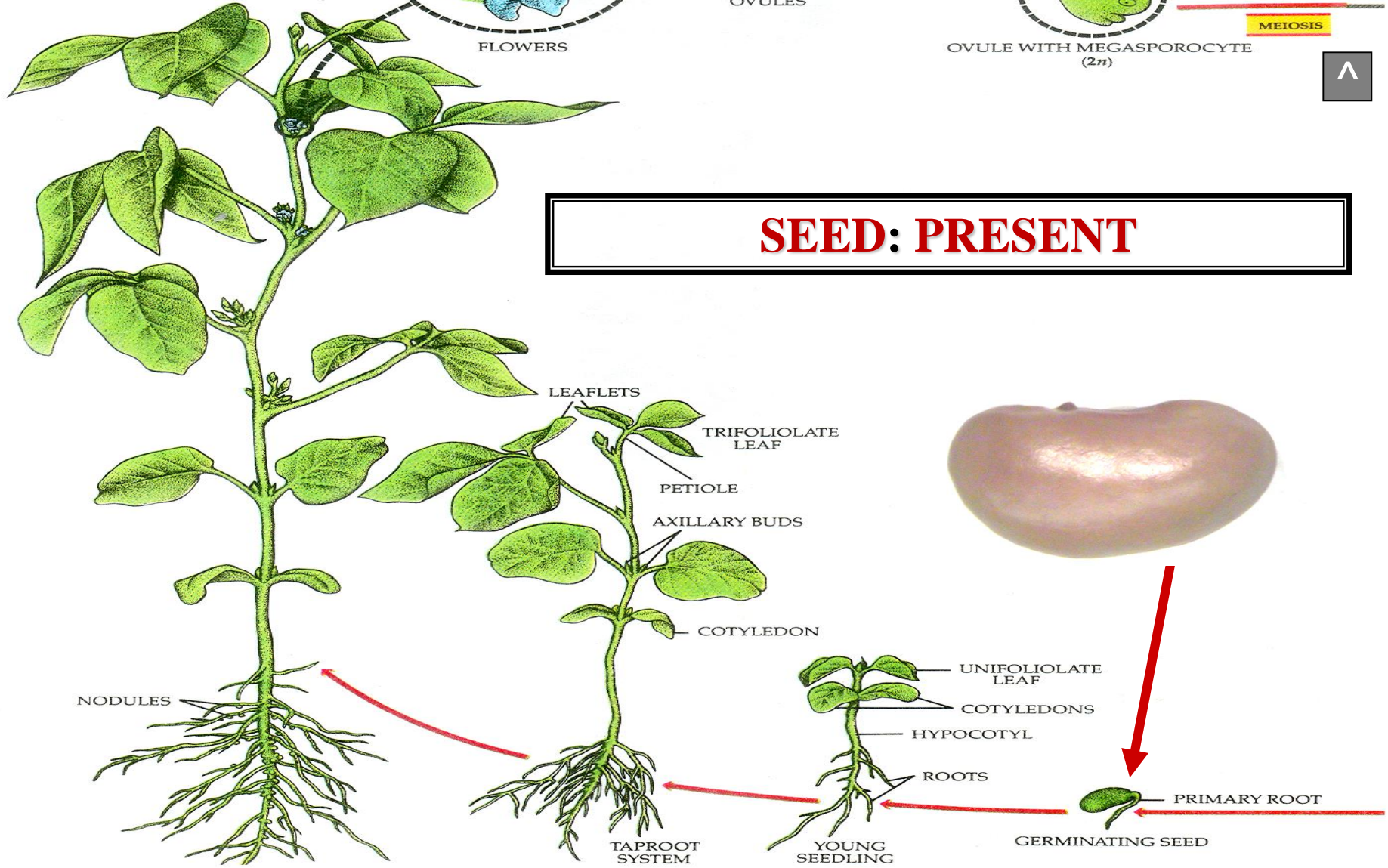
SEED BEARING
TRACHEOPHYTES







SEED: PRESENT



GYMNOSPERMS
VS
ANGIOSPERMS

GYMNOSPERMS

GYMNOSPERMS



NON-FLOWERING
SPERMATOPHYTES

GYMNOSPERMS

The background of the slide is a close-up photograph of a gymnosperm branch. It features numerous long, thin, green needles radiating from a central point. In the center, there are several mature, brown, woody cones. The lighting is soft, highlighting the texture of the needles and the intricate structure of the cones.

NON-FLOWERING SPERMATOPHYTES

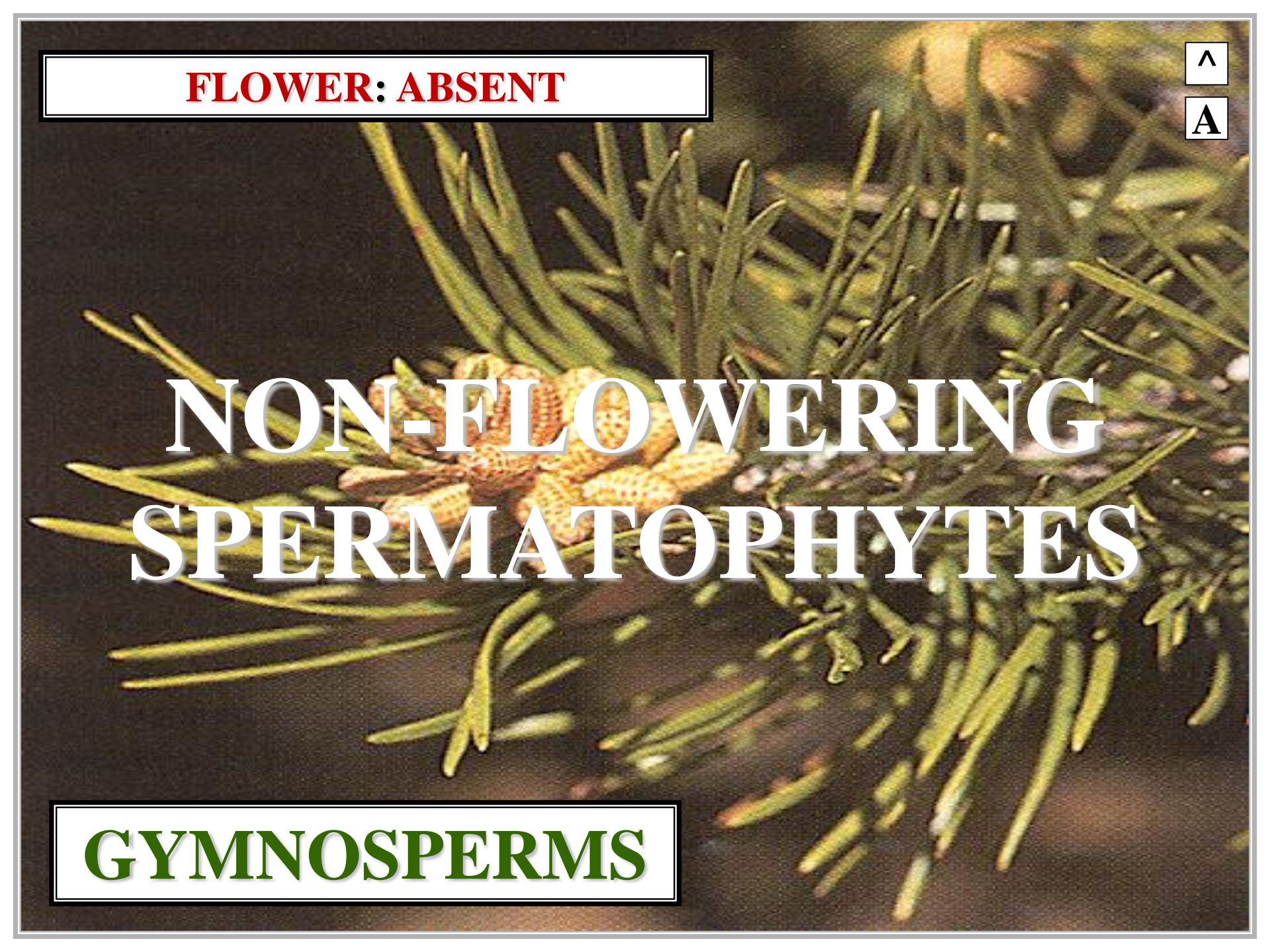
GYMNOSPERMS

FLOWER: ABSENT

^
A

NON-FLOWERING SPERMATOPHYTES

GYMNOSPERMS



ANGIOSPERMS

ANGIOSPERMS



**FLOWERING
SPERMATOPHYTES**

ANGIOSPERMS

**FLOWERING
SPERMATOPHYTES**

ANGIOSPERMS



FLOWER: PRESENT

**FLOWERING
SPERMATOPHYTES**

ANGIOSPERMS



TAXONOMIC HIERARCHY



Common potato



Eggplant



Habanero pepper



Tomato



Morning glory



Sweet potato



Maple



Sunflower



Pea



Corn



Grass



PLANTAE



MAGNOLIOPHYTA



MAGNOLIOPSIDA



MAGNOLIALES



MAGNOLIACEAE



LIRIODENDRON

TULIP POPLAR



TULIPIFERA

TAXONOMIC HIERARCHY



RANK VS TAXON

RANK



TAXONOMIC RANK

ANY LEVEL

TAXONOMIC HIERARCHY

TAXONOMIC RANK



Common potato



Eggplant



Habanero pepper



Tomato



Morning glory



Sweet potato



Maple



Sunflower



Pea



Corn



Grass



RANK



RANK



RANK



RANK



RANK

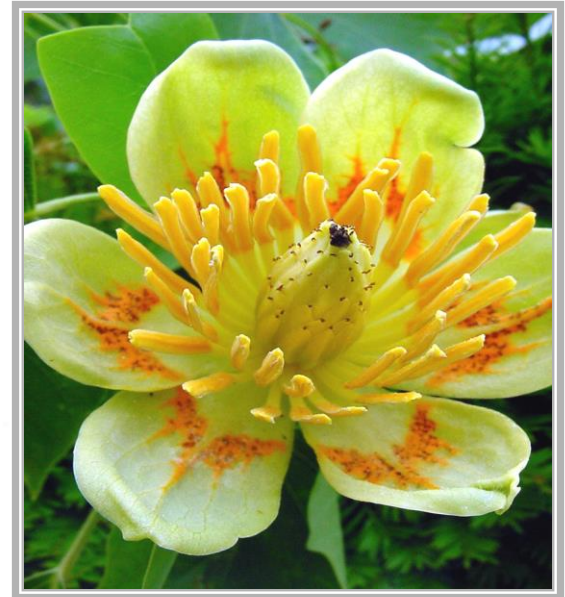


RANK



RANK

TULIP POPLAR



RANK
ANY LEVEL OF THE
TAXONOMIC
HIERARCHY

TAXON

TAXONOMIC TAXON

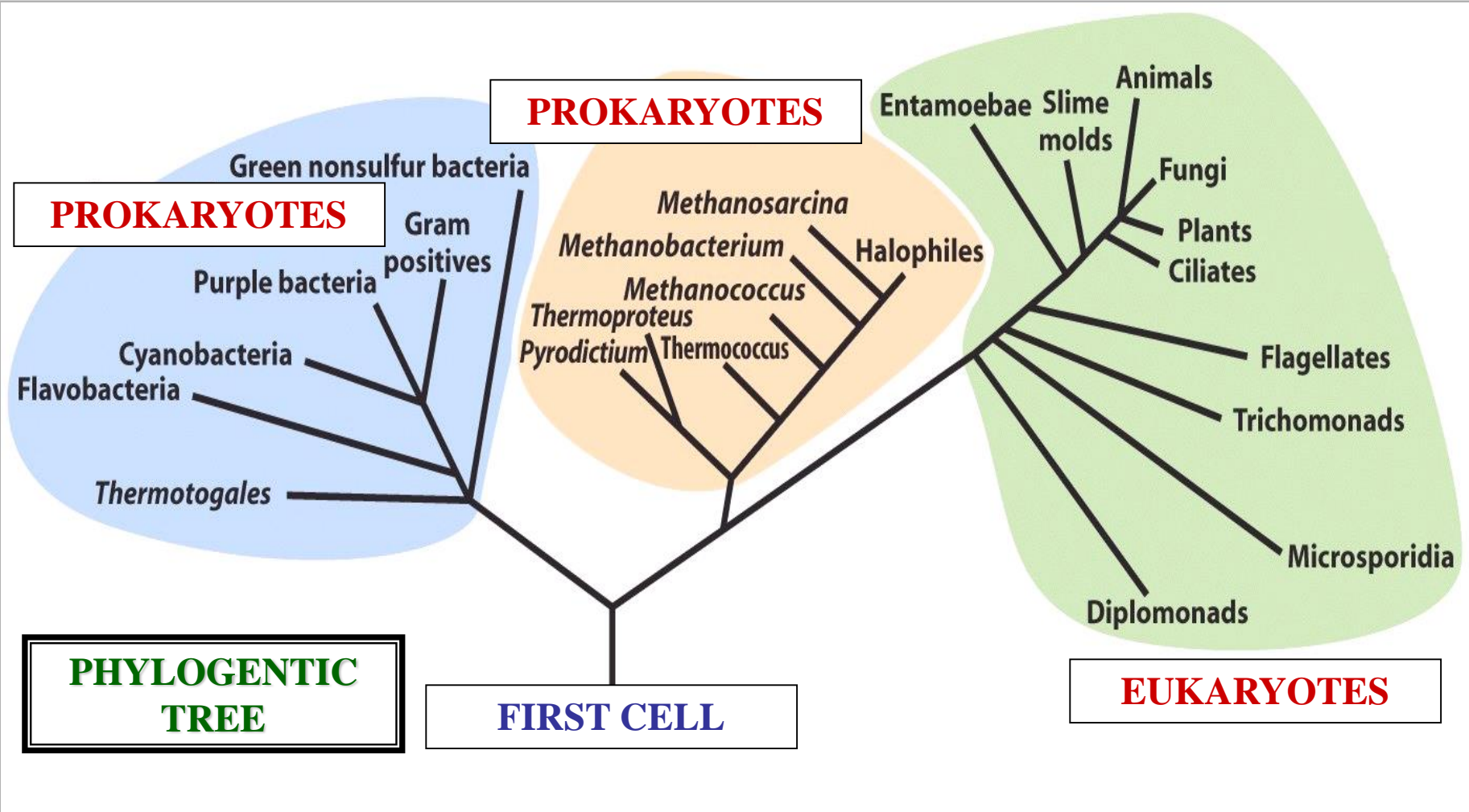
**ANY TAXONOMIC
ENTITY WITHIN
RANK**

TAXONOMIC TAXON



RANK VS TAXON APPLIED

RANK VS TAXON APPLIED



DOMAIN

RANK

DOMAIN

EUBACTERIA

DOMAIN

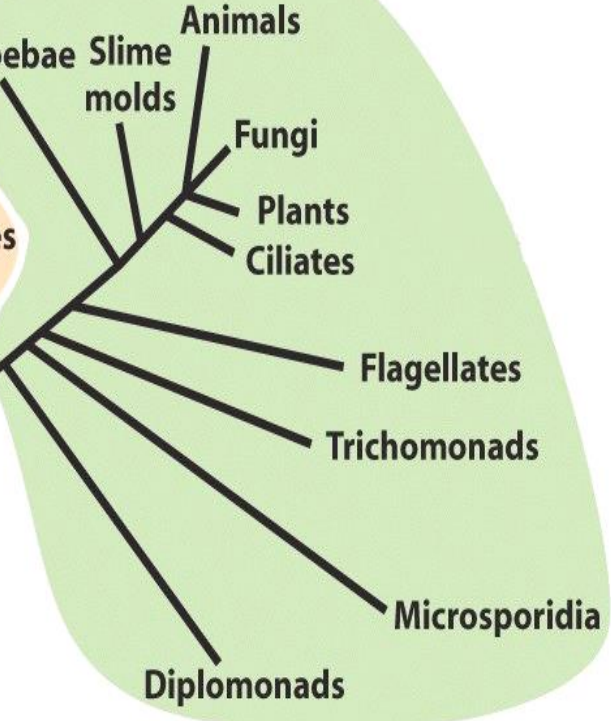
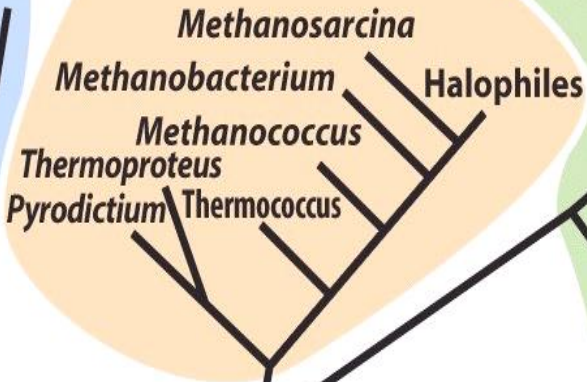
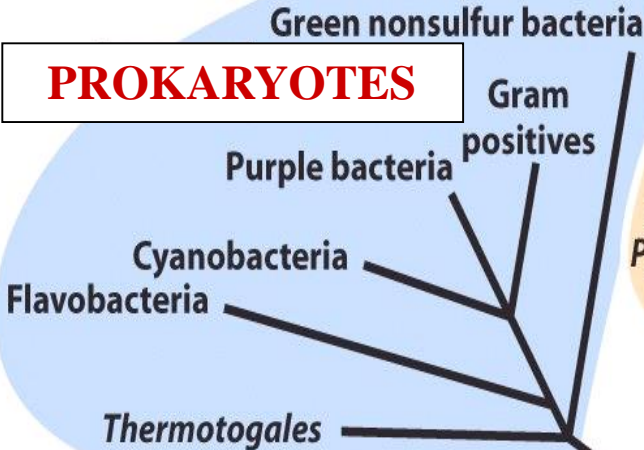
ARCHAEBACTERIA

DOMAIN

EUKARYA

PROKARYOTES

PROKARYOTES



PHYLOGENETIC TREE

FIRST CELL

EUKARYOTES