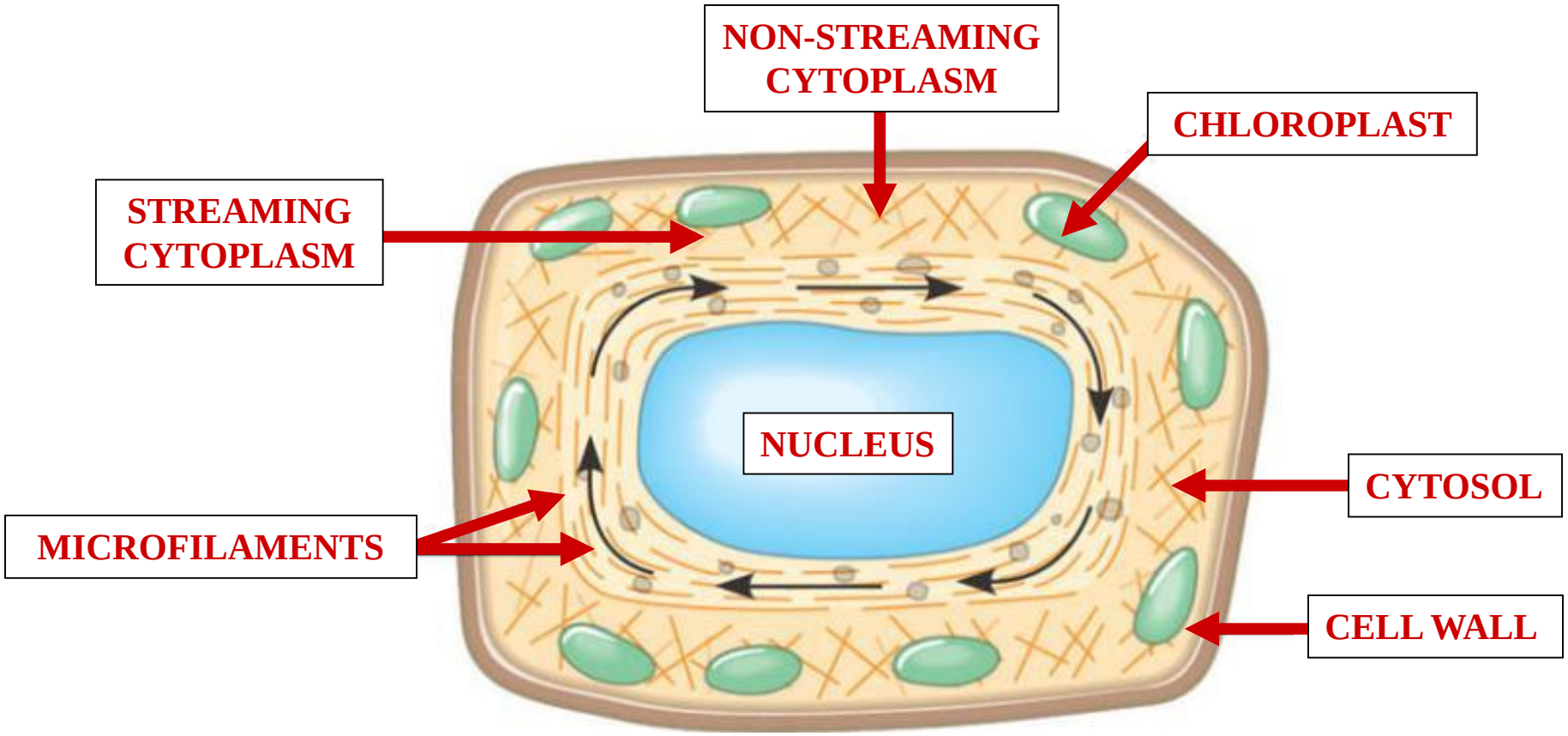
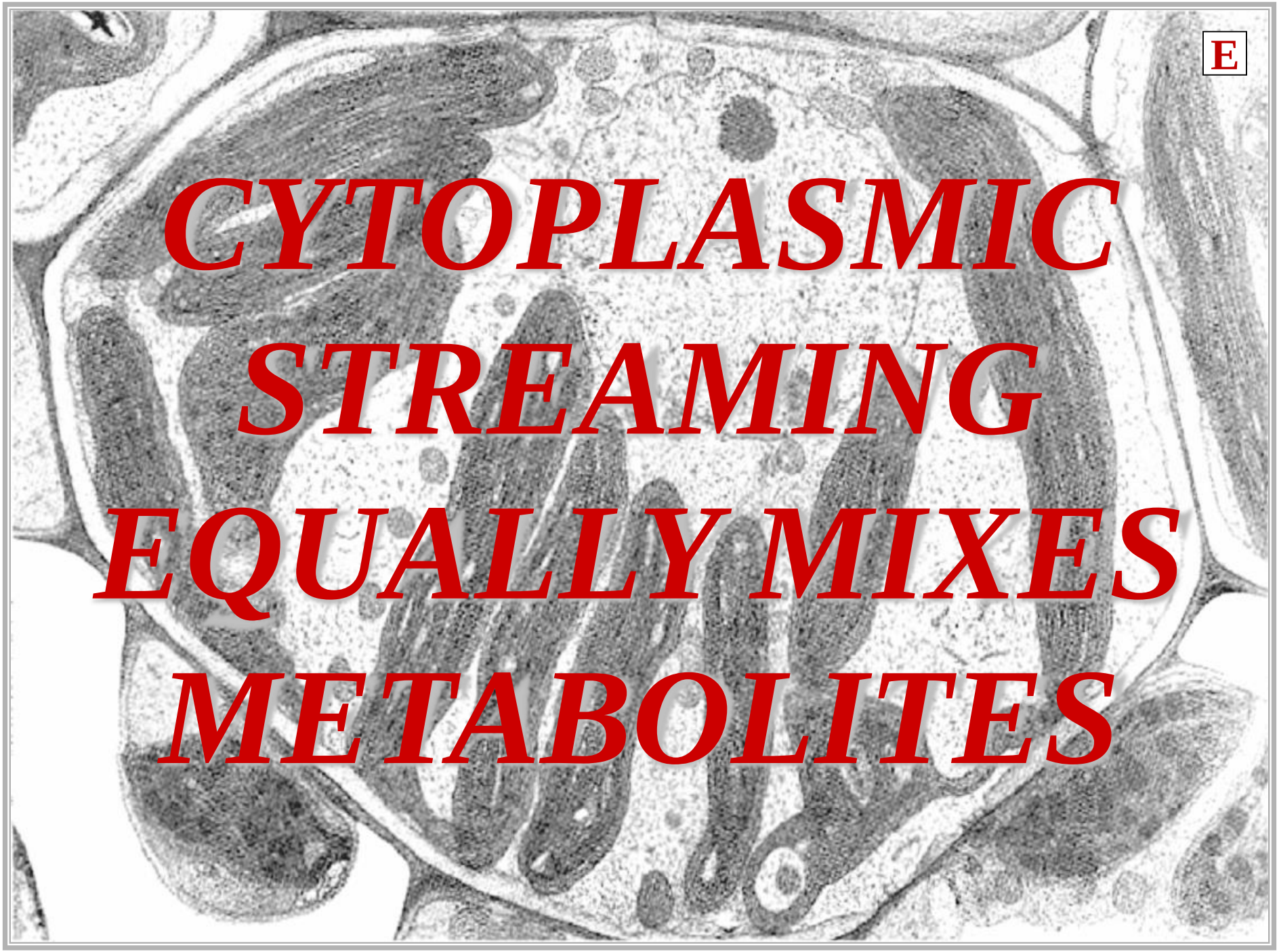
CYTOPLASMIC STREAMING

EM



CYTOPLASMIC STREAMING = CYCLOSIS


E
CYTOPLASMIC
STREAMING
EQUALLY MIXES
METABOLITES


H
EFFICIENT
CELL
METABOLISM


HOMEOSTASIS

MICROTUBULES

MICROTUBULES

HOLLOW TUBULIN TUBULES

MICROTUBULES

MICROTUBULES

HOLLOW TUBULIN TUBULES

FOUND THROUGHOUT CYTOSOL

MICROTUBULES

MICROTUBULES

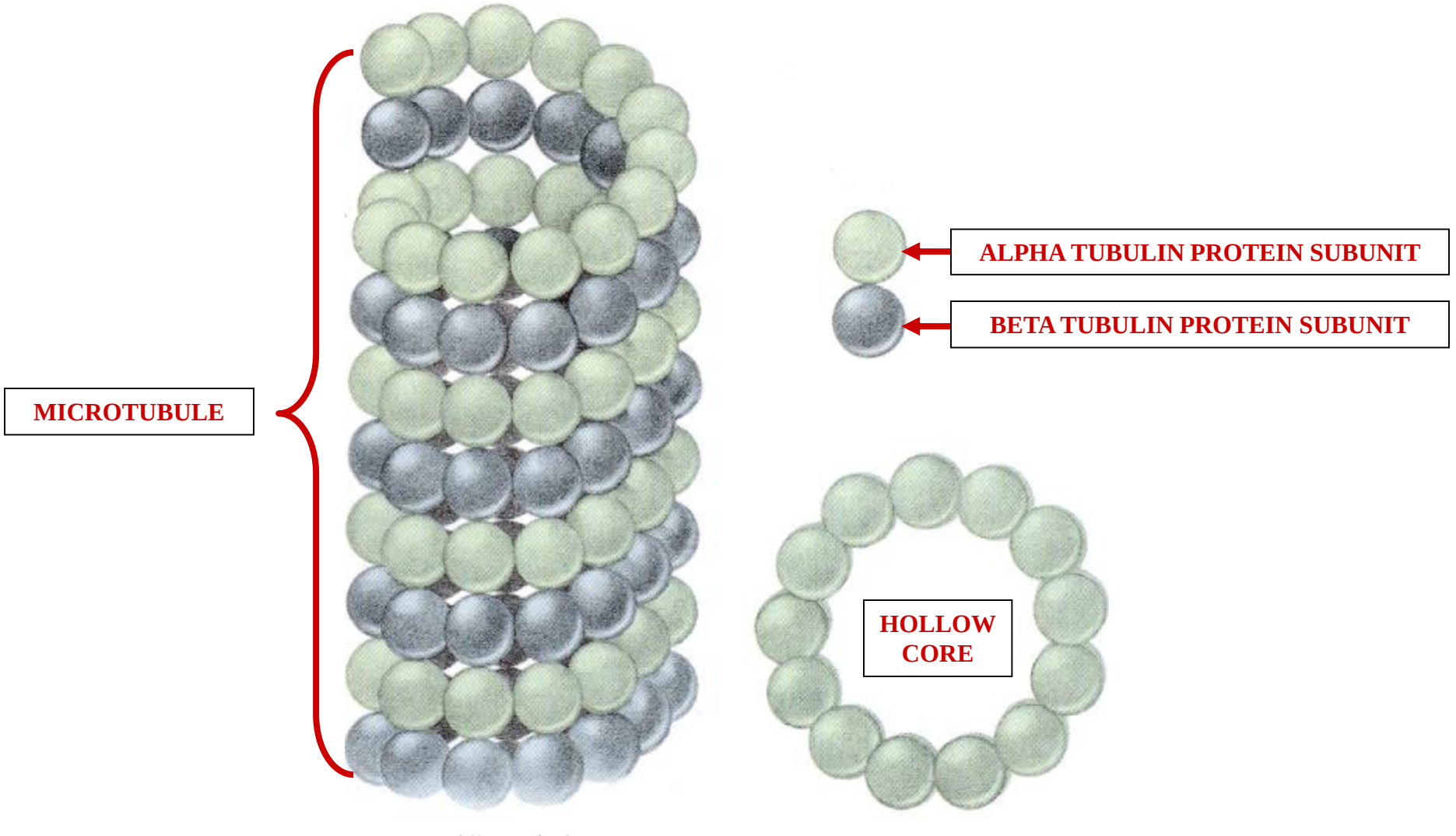
HOLLOW TUBULIN TUBULES

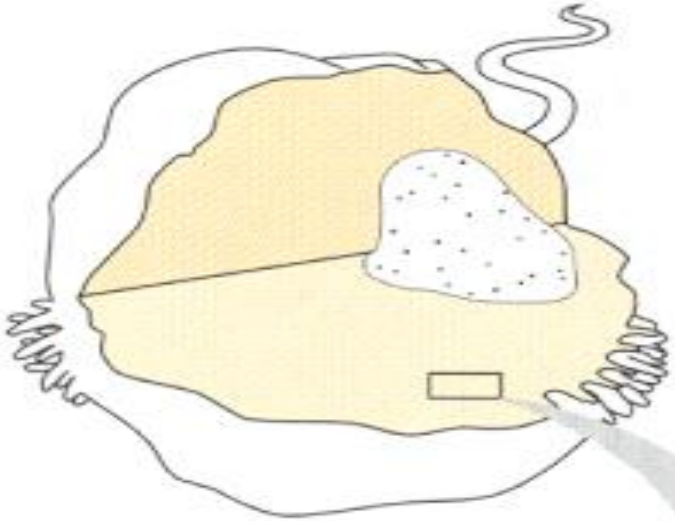
FOUND THROUGHOUT CYTOSOL

SUPPORT MICROFILAMENTS

MICROTUBULES

MICROTUBULE COMPOSITION

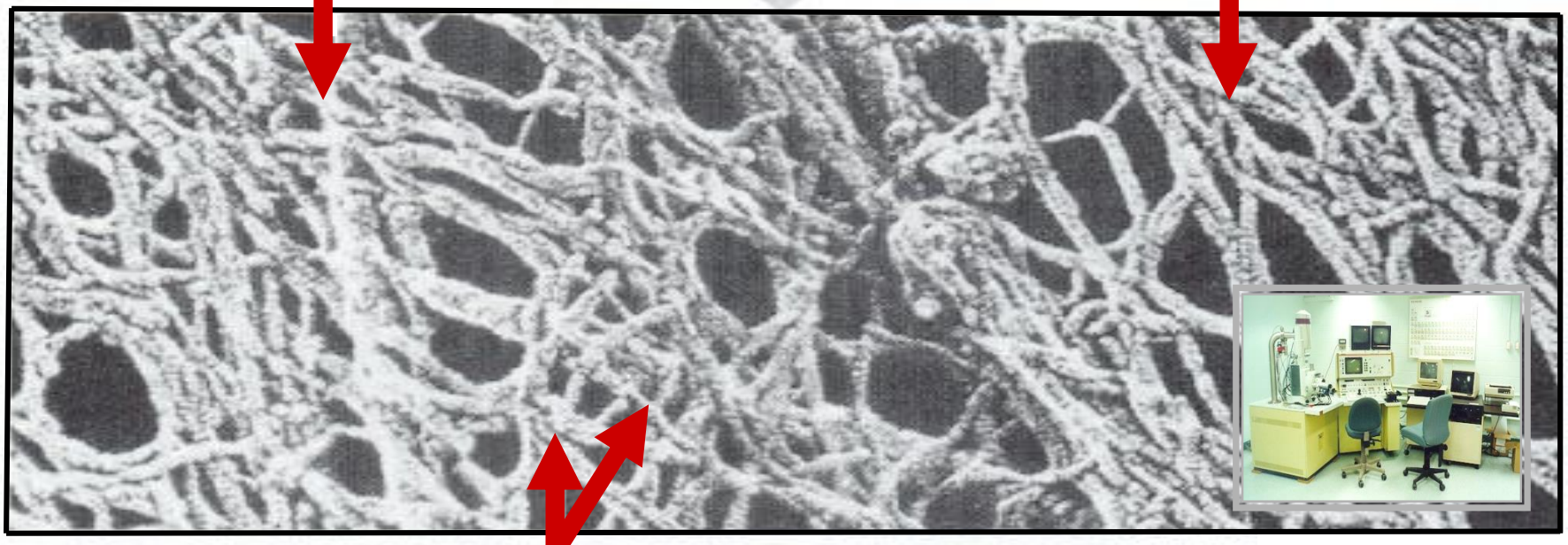




CYTOSKELETON ULTRASTRUCTURE

MICROTUBULE

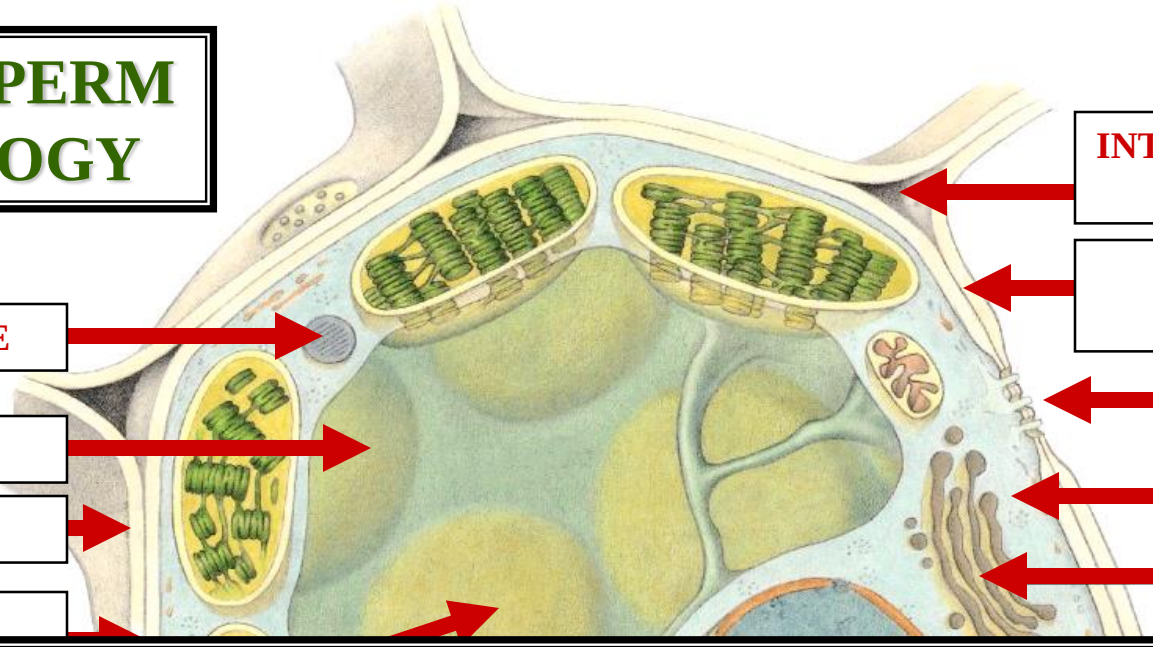
CYTOSOL



MICROFILAMENTS

ANGIOSPERM CYTOLOGY

D



INTERCELLULAR SPACE

MIDDLE LAMELLA

PLASMODESMATA

CYTOSOL

GOLGI BODY

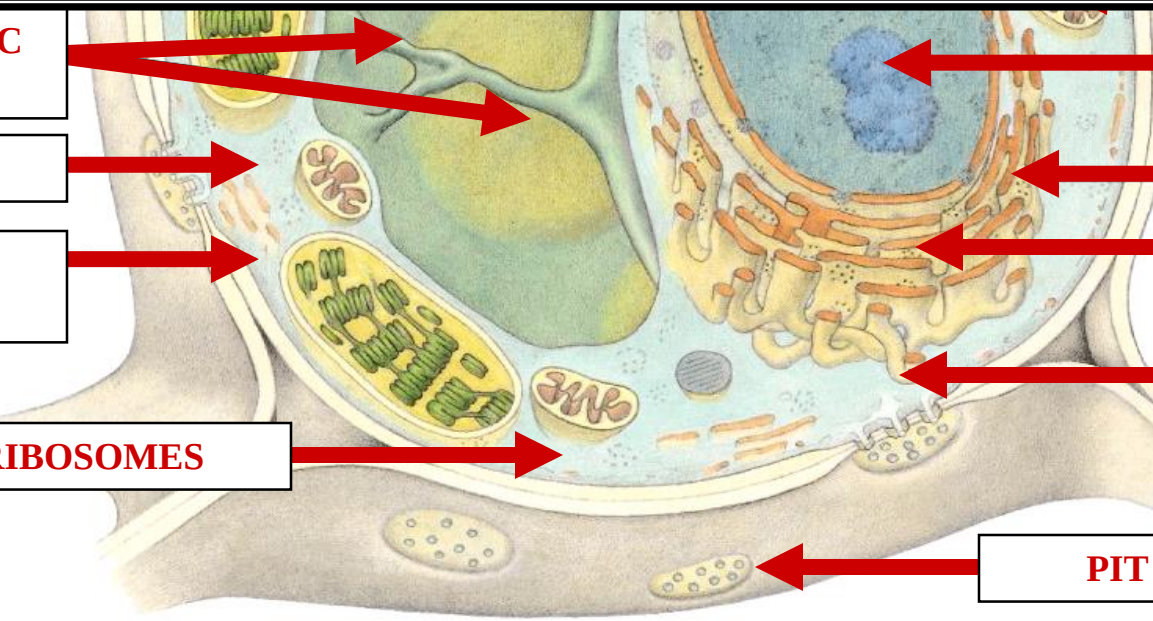
PEROXISOME

VACUOLE

CELL WALL

MIDDLE

SUMMARY



CYTOPLASMIC STRAND

CYTOSOL

CELL MEMBRANE

RIBOSOMES

NUCLEOLUS

RIBOSOMES

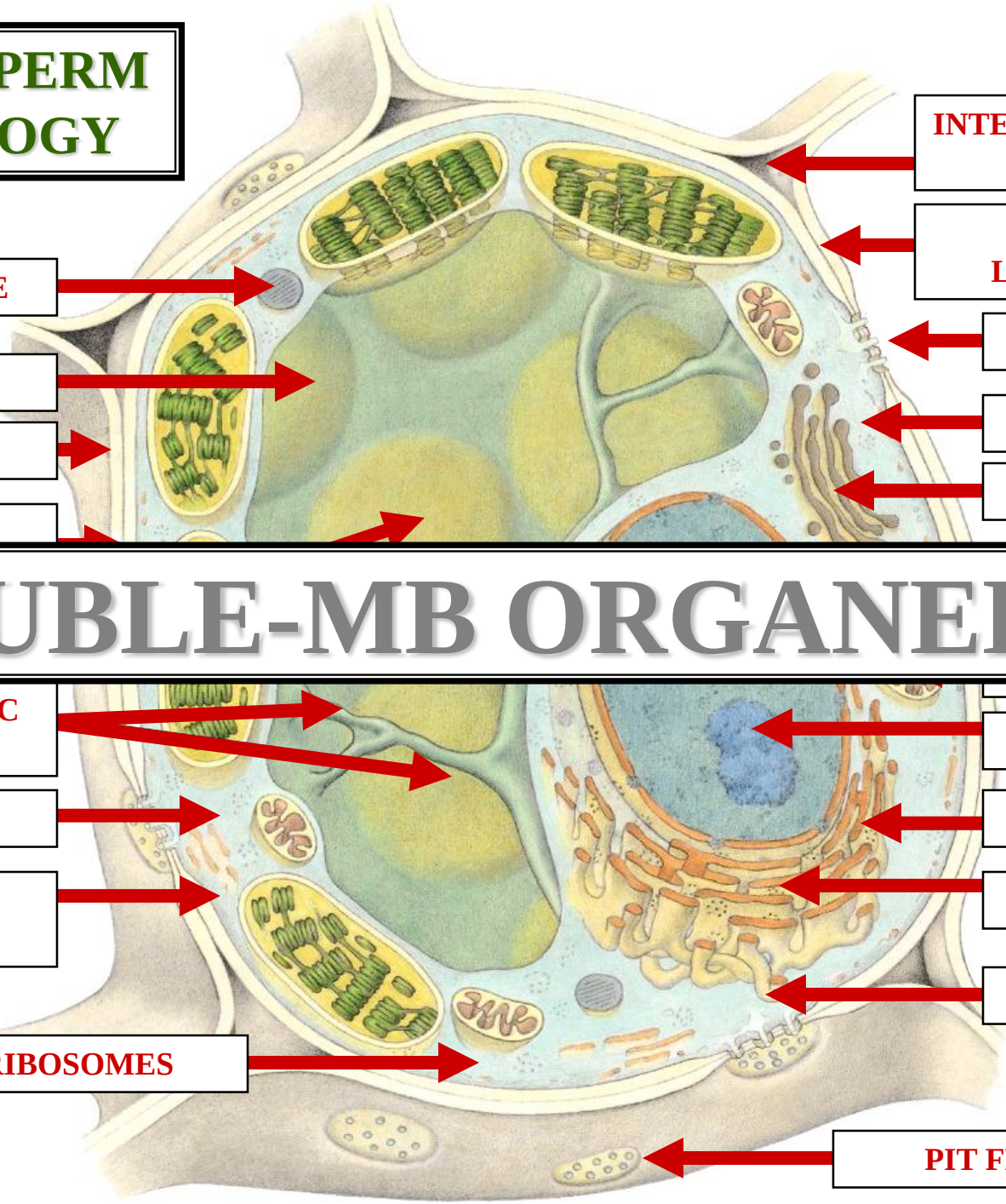
ROUGH ER

SMOOTH ER

PIT FIELD

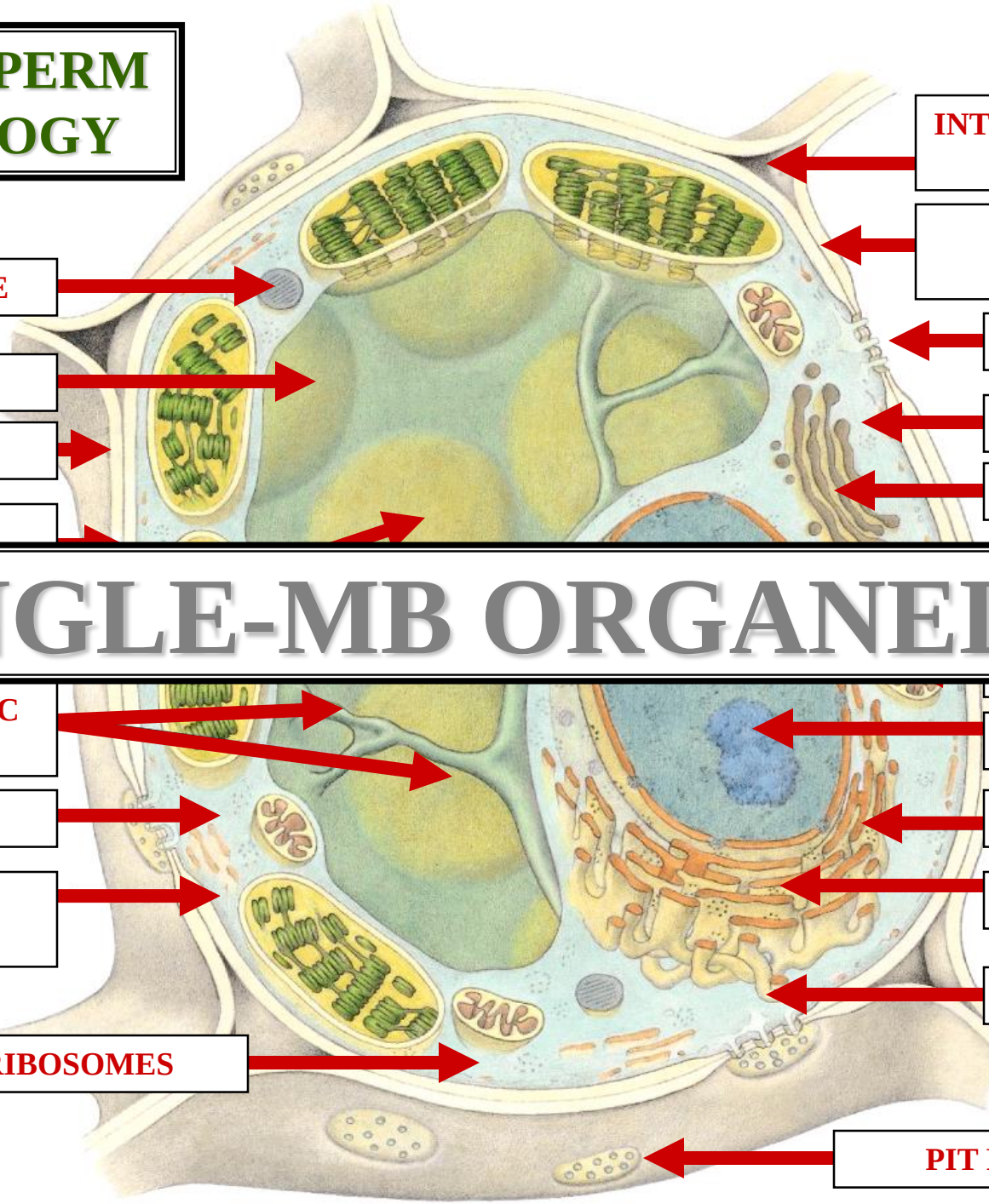
ANGIOSPERM CYTOLOGY

S



DOUBLE-MB ORGANELLES

ANGIOSPERM CYTOLOGY



INTERCELLULAR SPACE

MIDDLE LAMELLA

PLASMODESMATA

CYTOSOL

GOLGI BODY

PEROXISOME

VACUOLE

CELL WALL

MIDDLE

SINGLE-MB ORGANELLES

CYTOPLASMIC STRAND

CYTOSOL

CELL MEMBRANE

RIBOSOMES

NUCLEOLUS

RIBOSOMES

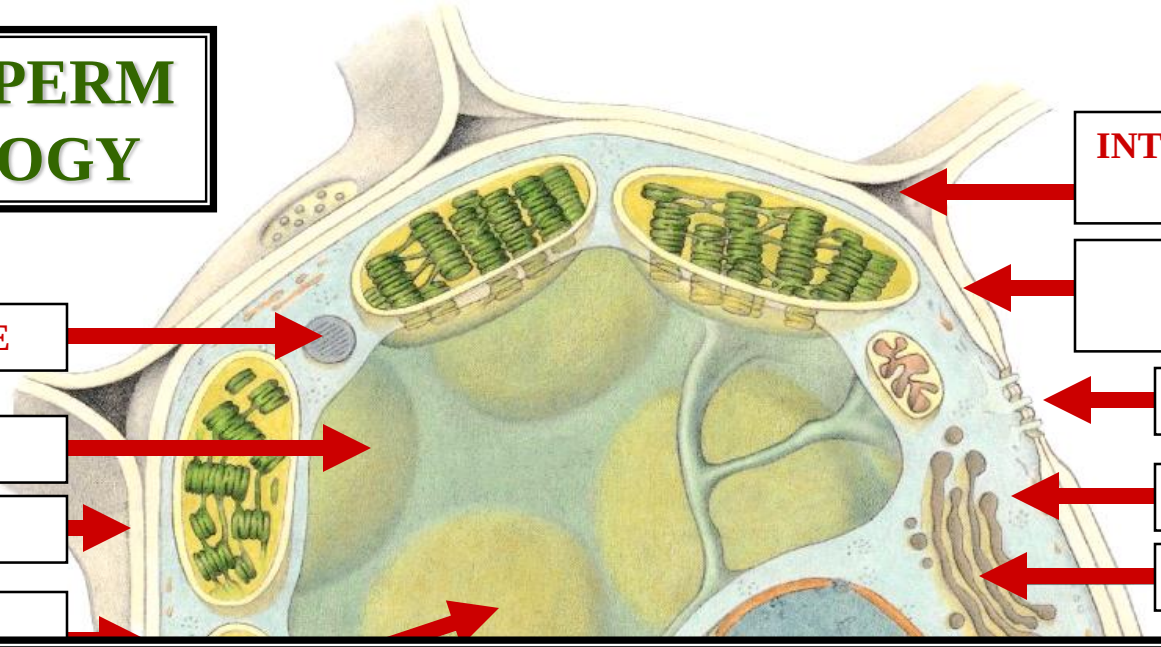
ROUGH ER

SMOOTH ER

PIT FIELD

ANGIOSPERM CYTOLOGY

E



INTERCELLULAR SPACE

MIDDLE LAMELLA

PLASMODESMATA

CYTOSOL

GOLGI BODY

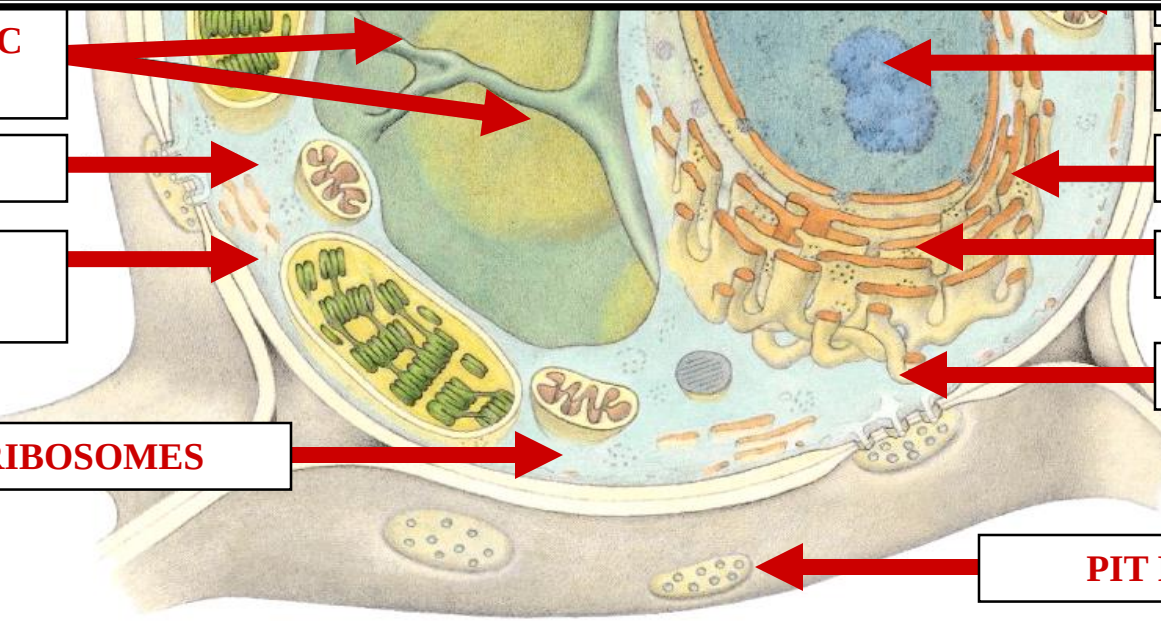
PEROXISOME

VACUOLE

CELL WALL

MIDDLE

NON-MB ORGANELLE



CYTOPLASMIC STRAND

CYTOSOL

CELL MEMBRANE

RIBOSOMES

NUCLEOLUS

RIBOSOMES

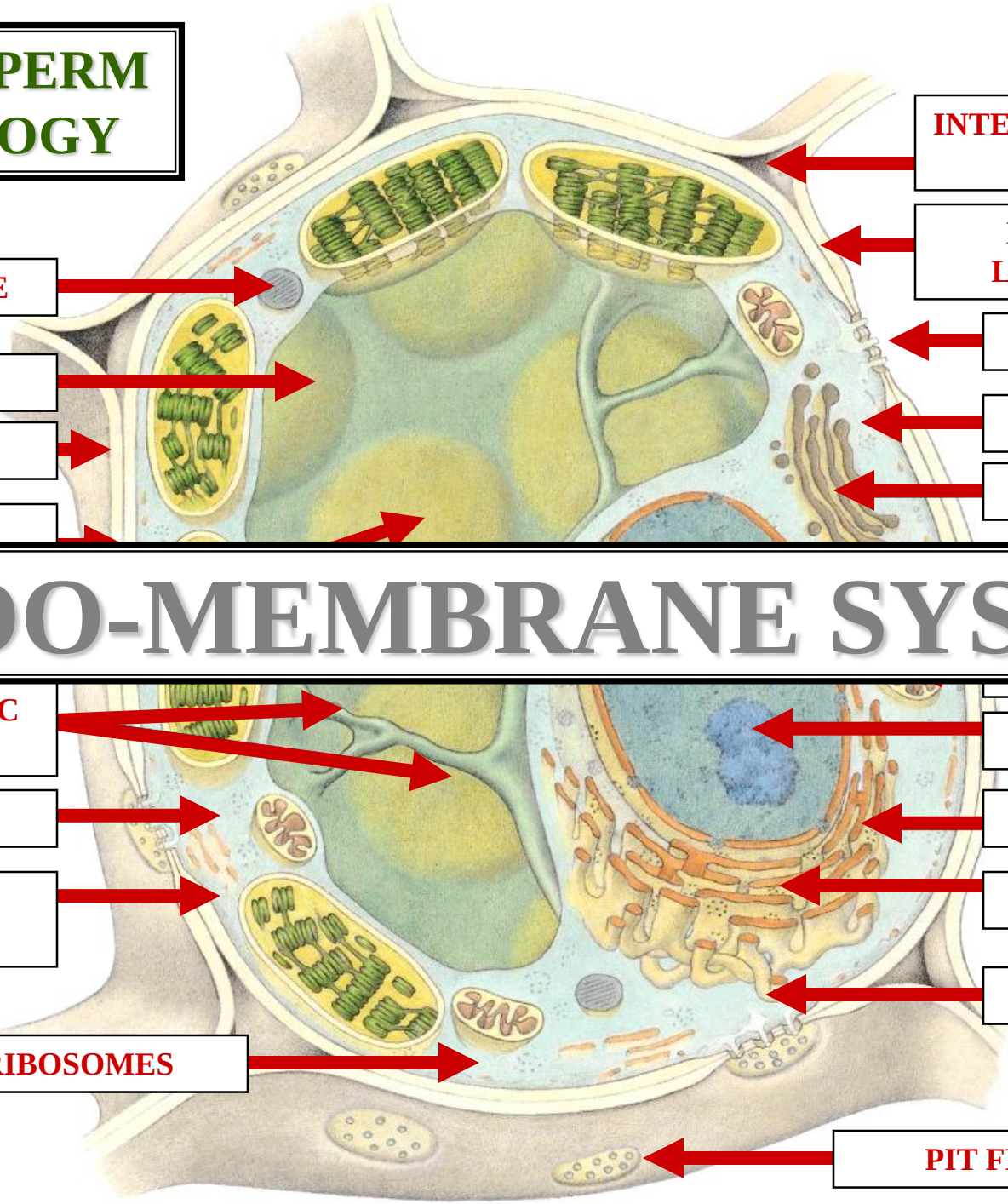
ROUGH ER

SMOOTH ER

PIT FIELD

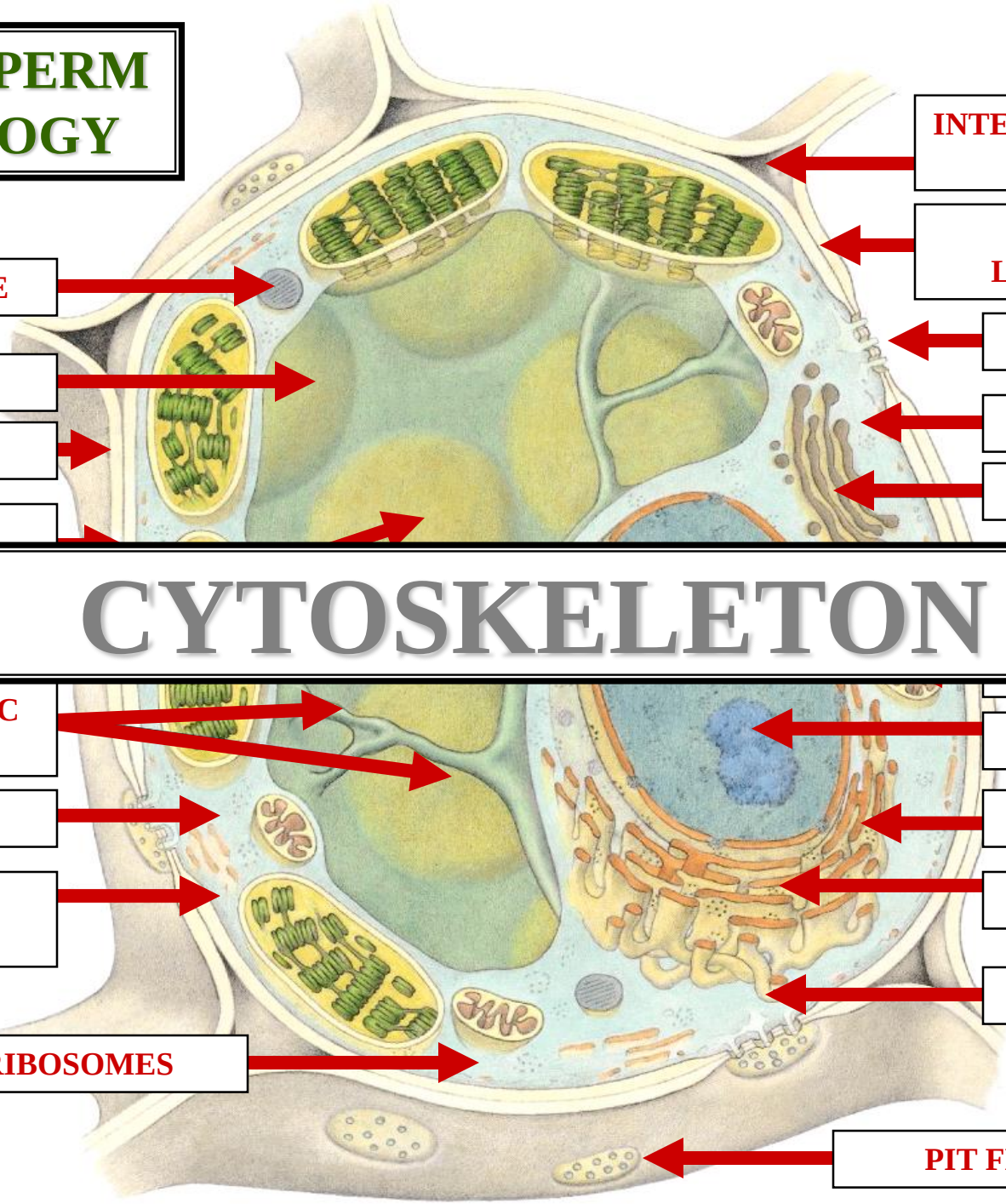
ANGIOSPERM CYTOLOGY

C



ENDO-MEMBRANE SYSTEM

ANGIOSPERM CYTOLOGY



INTERCELLULAR SPACE

MIDDLE LAMELLA

PLASMODESMATA

CYTOSOL

GOLGI BODY

PEROXISOME

VACUOLE

CELL WALL

MIDDLE

CYTOSKELETON

CYTOPLASMIC STRAND

CYTOSOL

CELL MEMBRANE

RIBOSOMES

NUCLEOLUS

RIBOSOMES

ROUGH ER

SMOOTH ER

PIT FIELD

LECTURE QUIZ

LECTURE QUIZ WEDNESDAY 16 MARCH

LECTURE QUIZ

ANGIOSPERM CYTOLOGY QUIZ

LECTURE QUIZ

FORMAT FILL IN QUESTIONS

LECTURE QUIZ

MUST SPELL CORRECTLY FOR FULL CREDIT

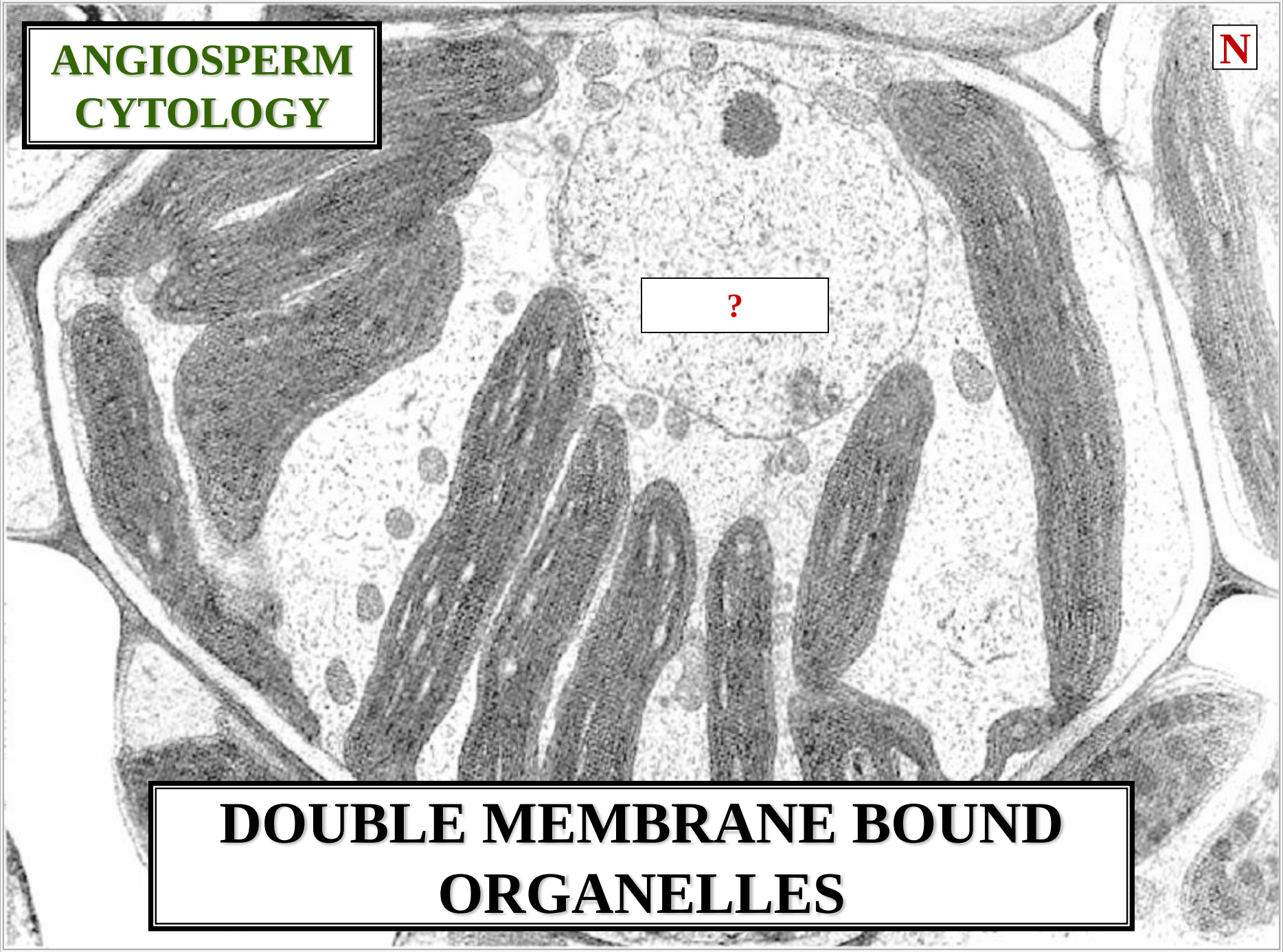
D

+

DOUBLE MEMBRANE BOUND ORGANELLE EVOLUTION

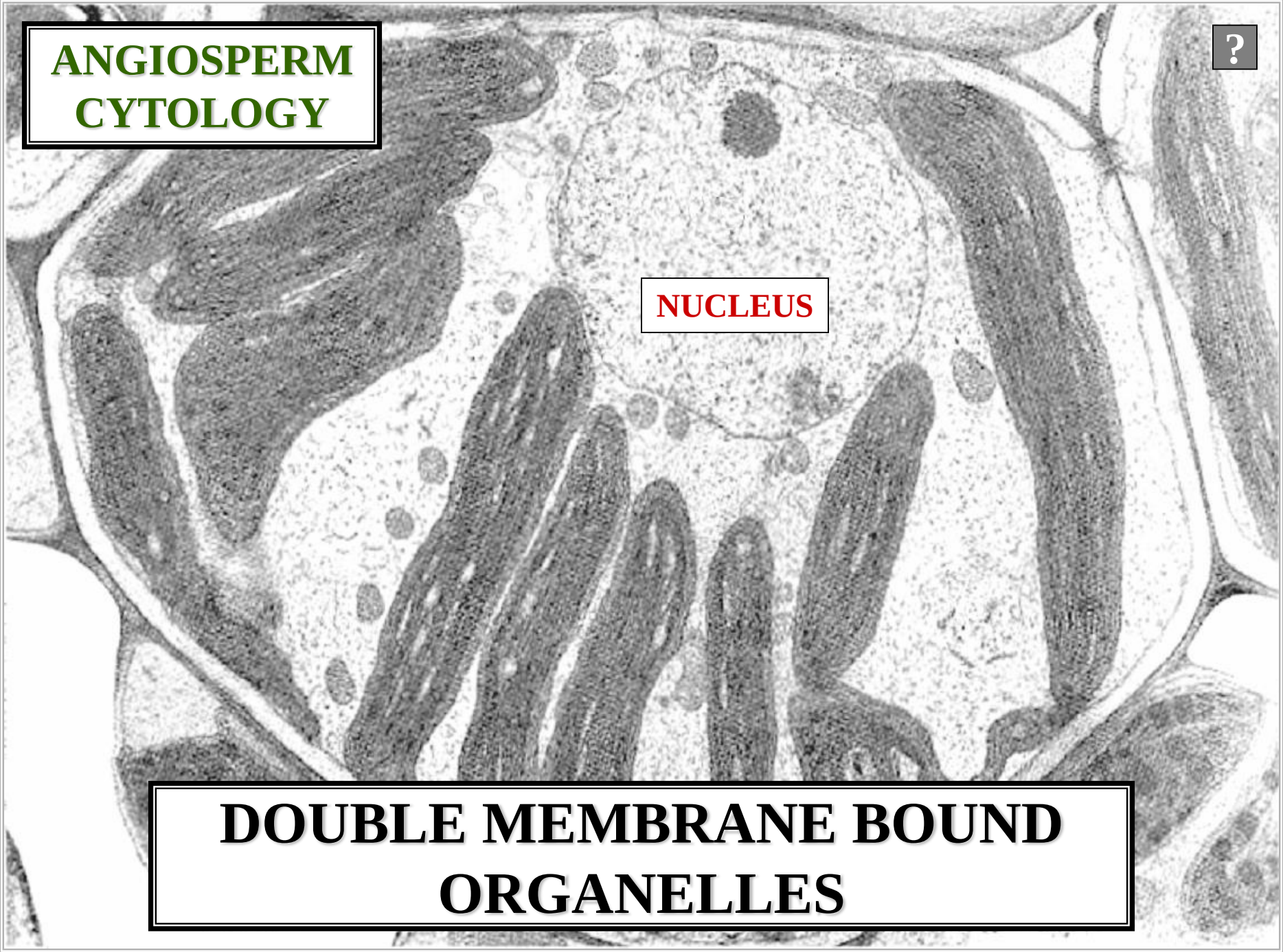
DOUBLE MEMBRANE BOUND ORGANELLE

REVIEW

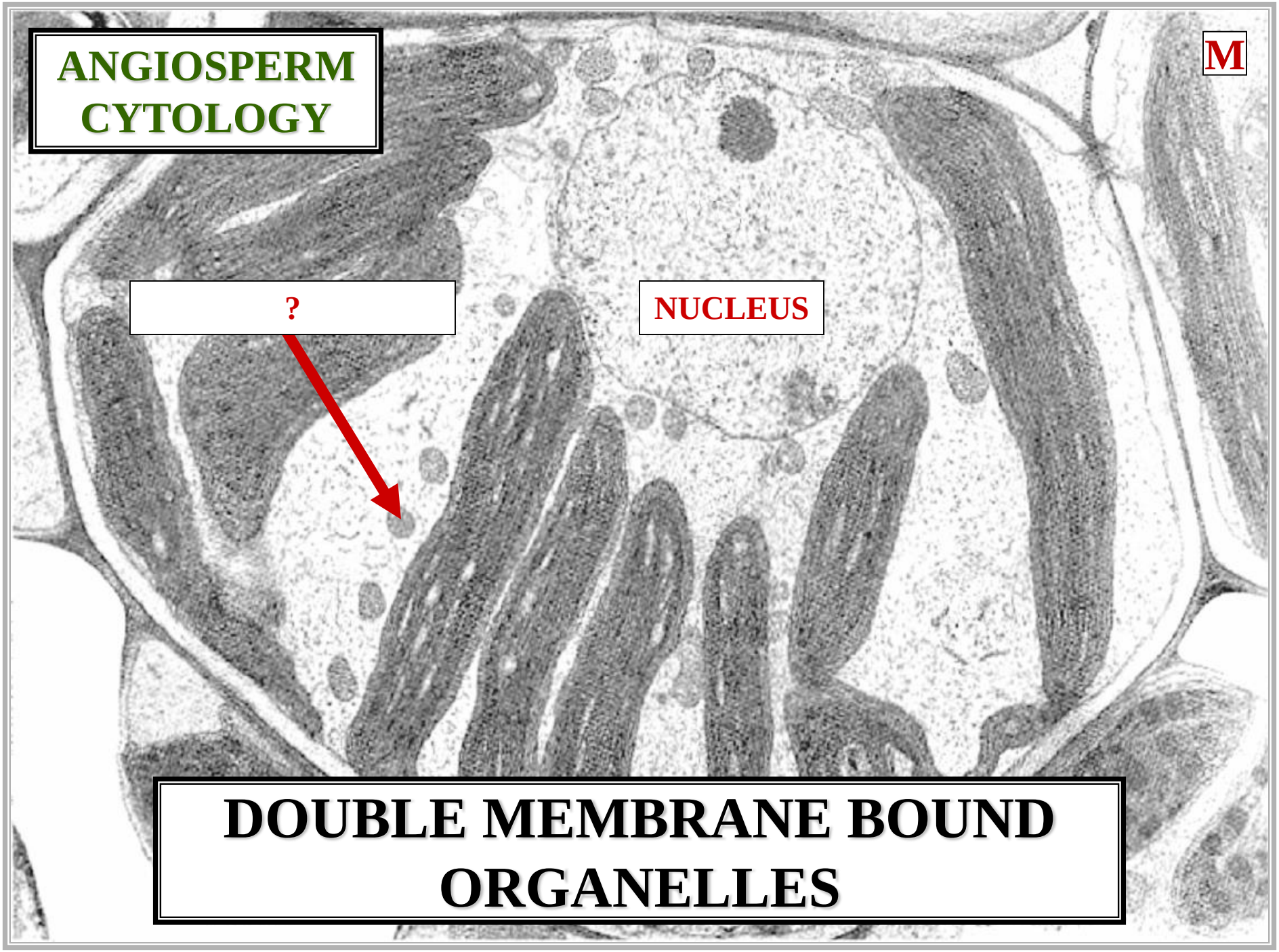

ANGIOSPERM CYTOLOGY
N
?
DOUBLE MEMBRANE BOUND ORGANELLES

ANGIOSPERM CYTOLOGY

?

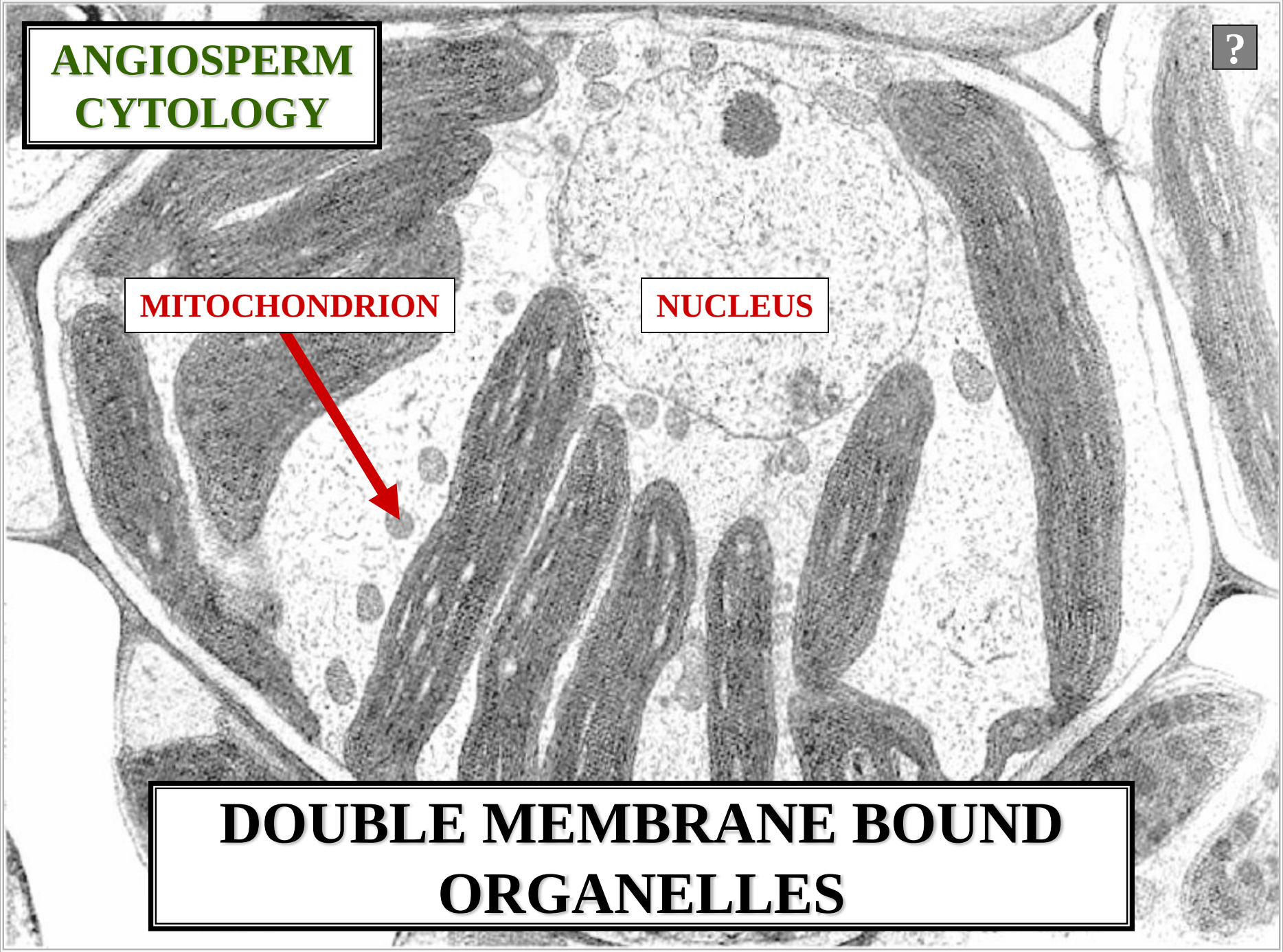


DOUBLE MEMBRANE BOUND ORGANELLES

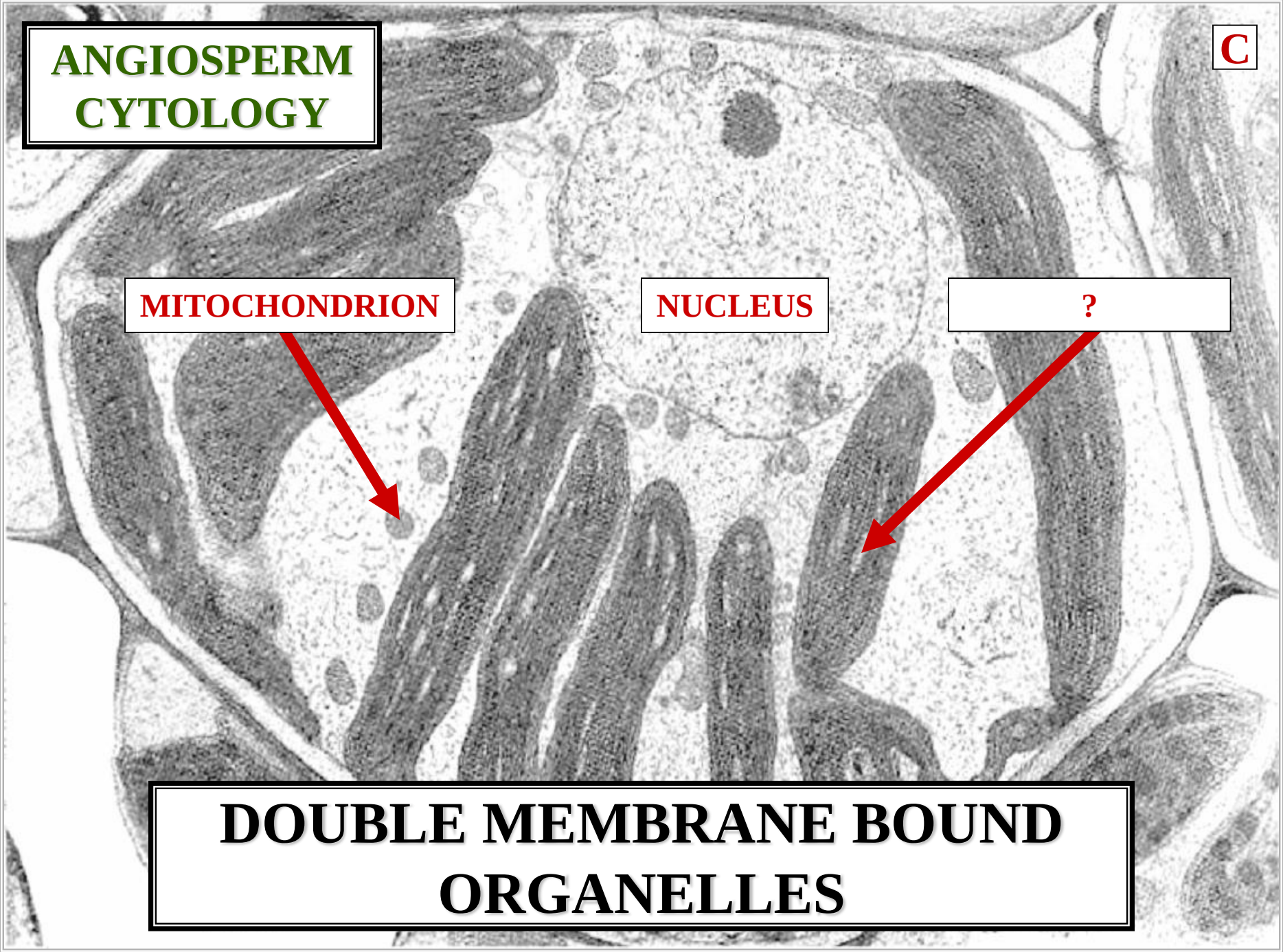

ANGIOSPERM CYTOLOGY
M
?
NUCLEUS
DOUBLE MEMBRANE BOUND ORGANELLES

ANGIOSPERM CYTOLOGY

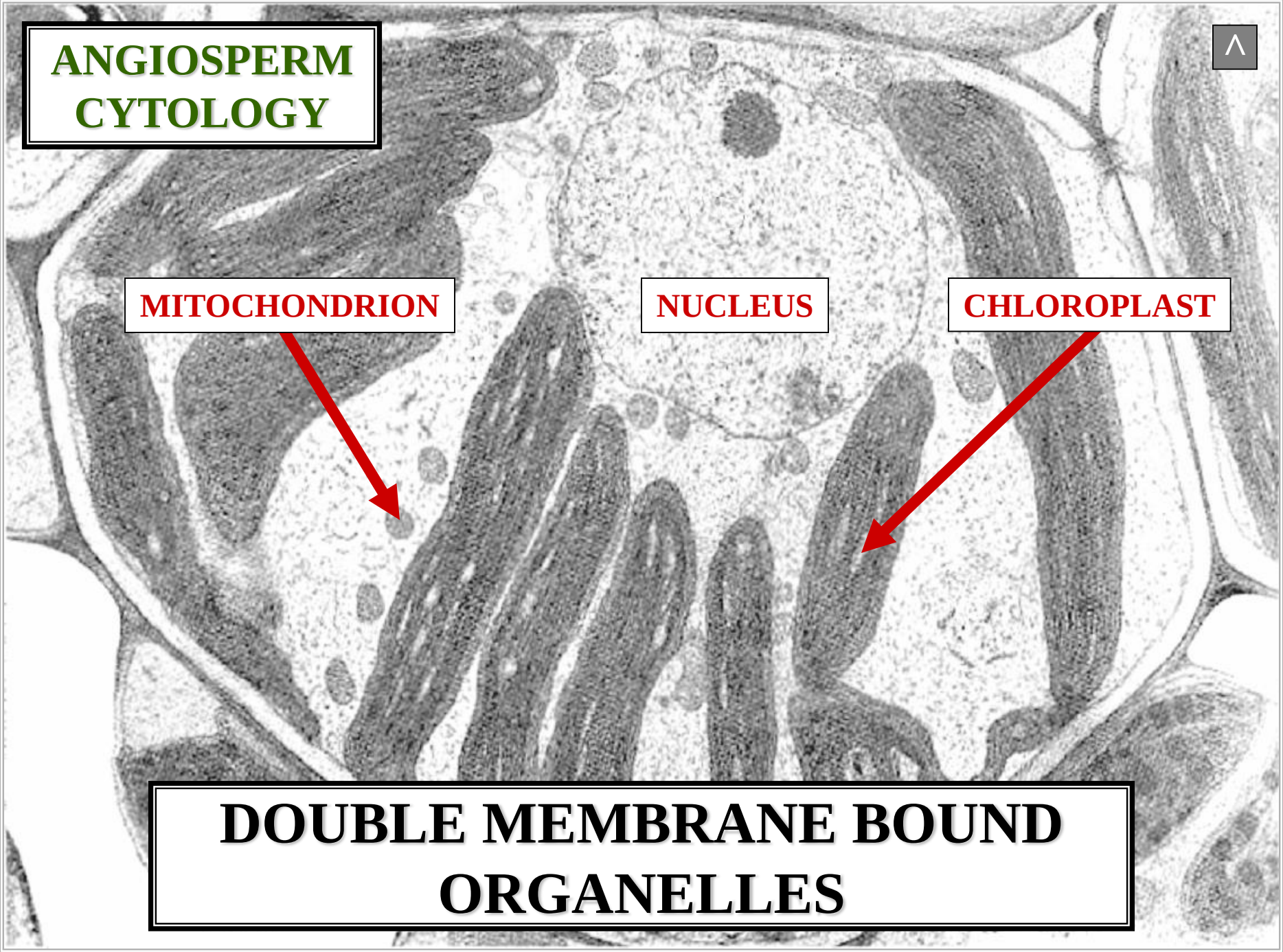
?



DOUBLE MEMBRANE BOUND ORGANELLES


ANGIOSPERM CYTOLOGY
C
MITOCHONDRION
NUCLEUS
?
DOUBLE MEMBRANE BOUND ORGANELLES

ANGIOSPERM CYTOLOGY



DOUBLE MEMBRANE BOUND ORGANELLES

A

AUTOGENOUS THEORY

AUTOGENOUS THEORY

AUTOGENOUS THEORY

NUCLEUS EVOLUTION

AUTOGENOUS THEORY

AUTOGENOUS THEORY

VIA PROKARYOTE MEMBRANE SPECALIZATION

AUTOGENOUS THEORY

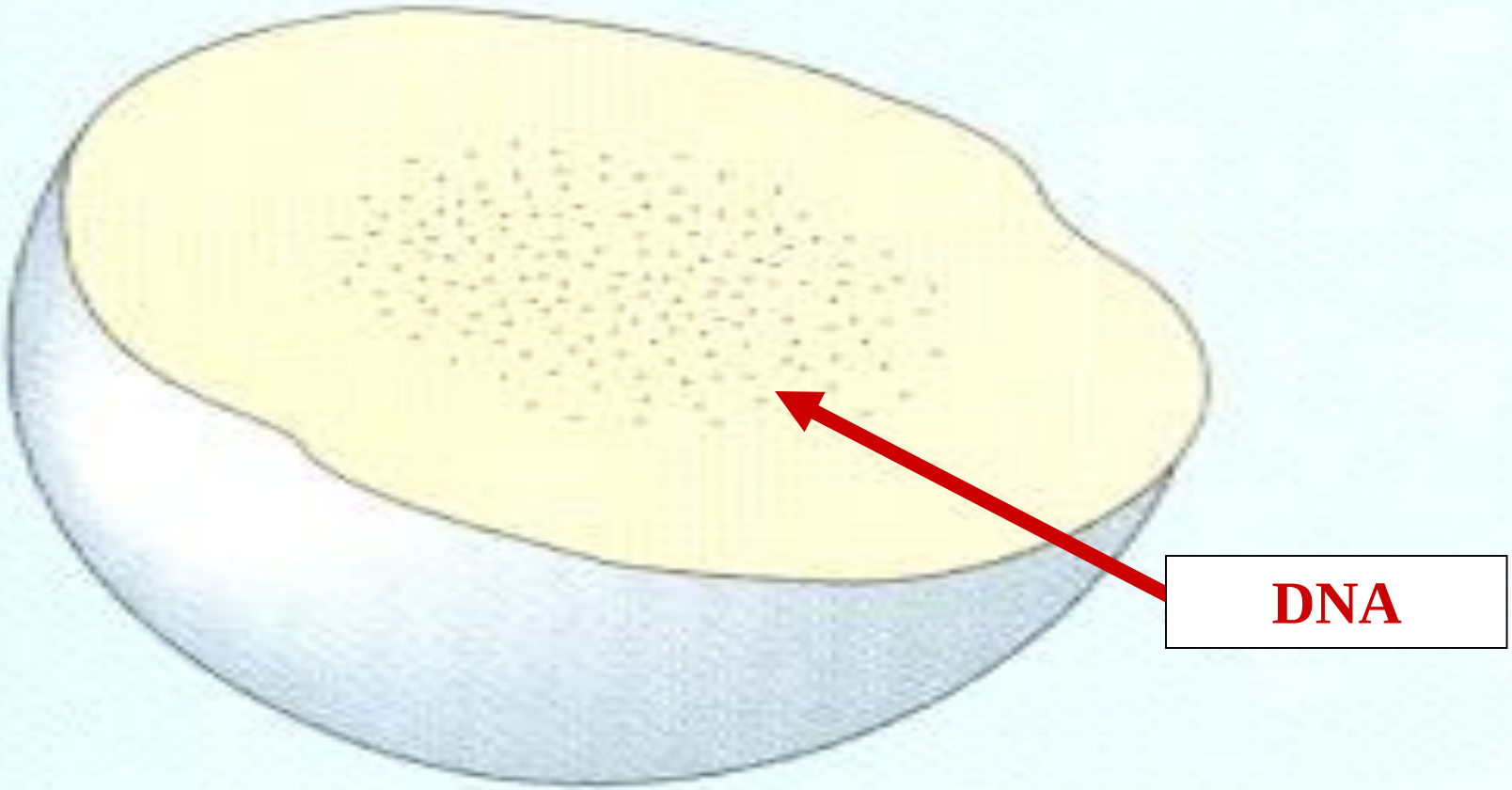
ANGIOSPERM CYTOLOGY

NUCLEUS

AUTOGENOUS THEORY

NUCLEUS EVOLUTION

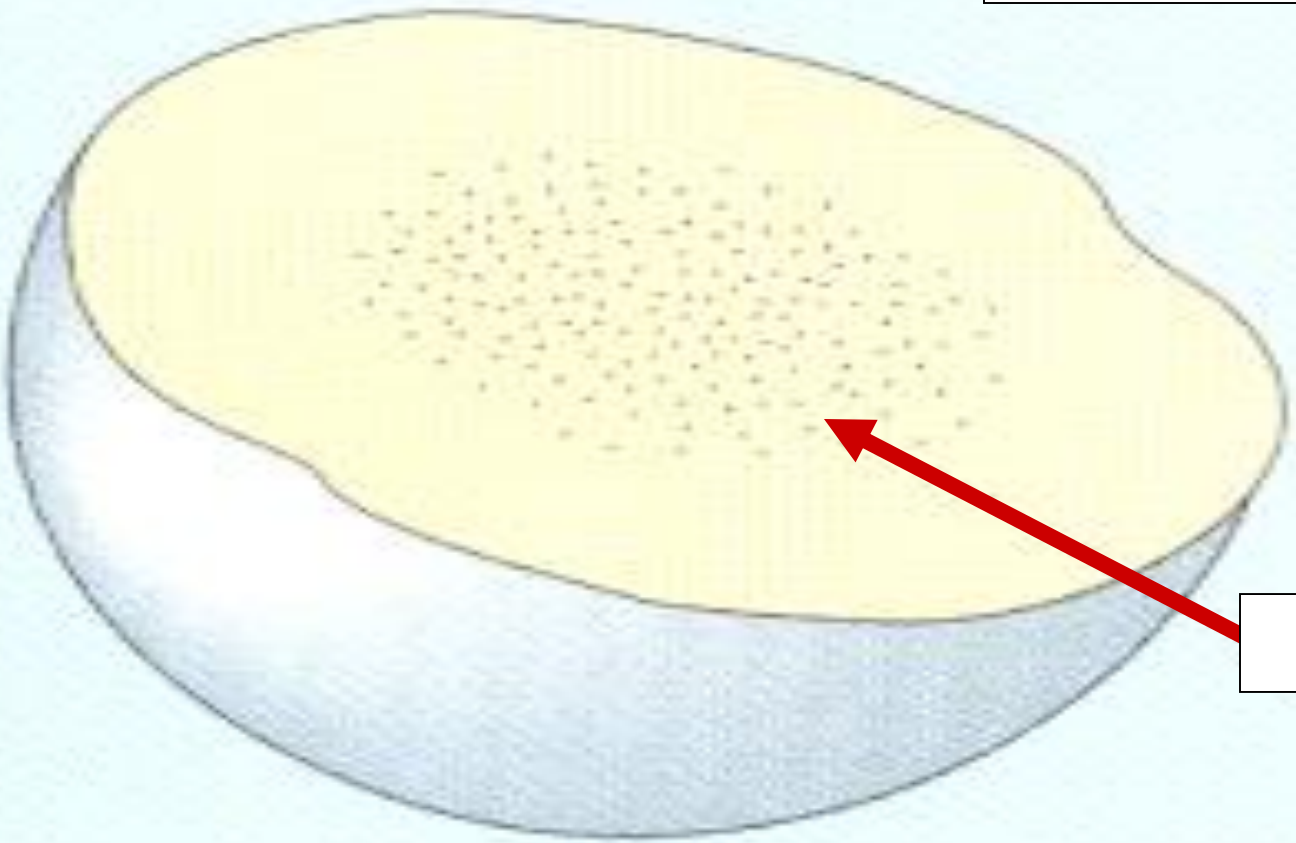
NUCLEUS EVOLUTION SCENARIO



ANCESTRAL PROKARYOTE

NU
AB

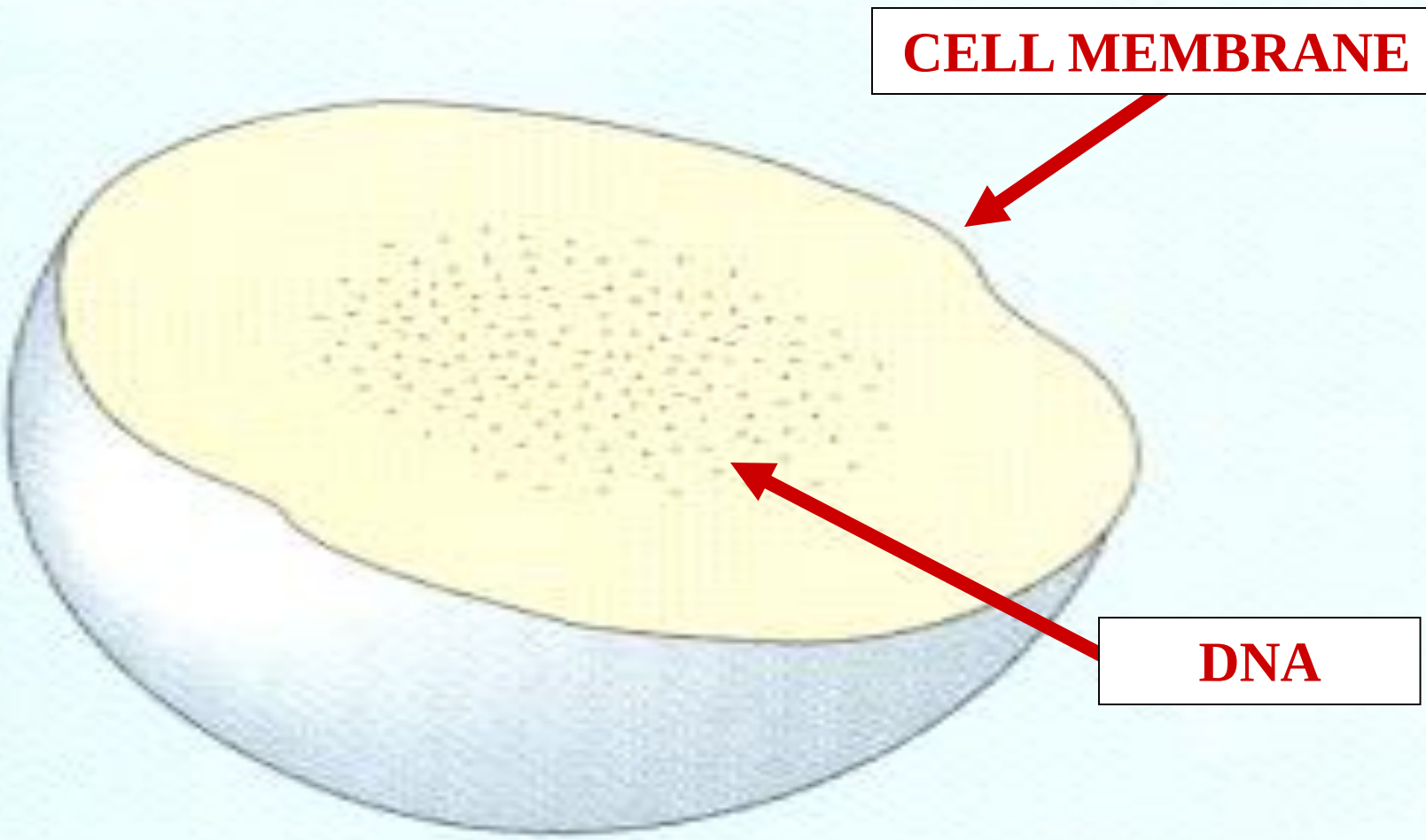
NUCLEUS: ABSENT



DNA

ANCESTRAL PROKARYOTE

CM

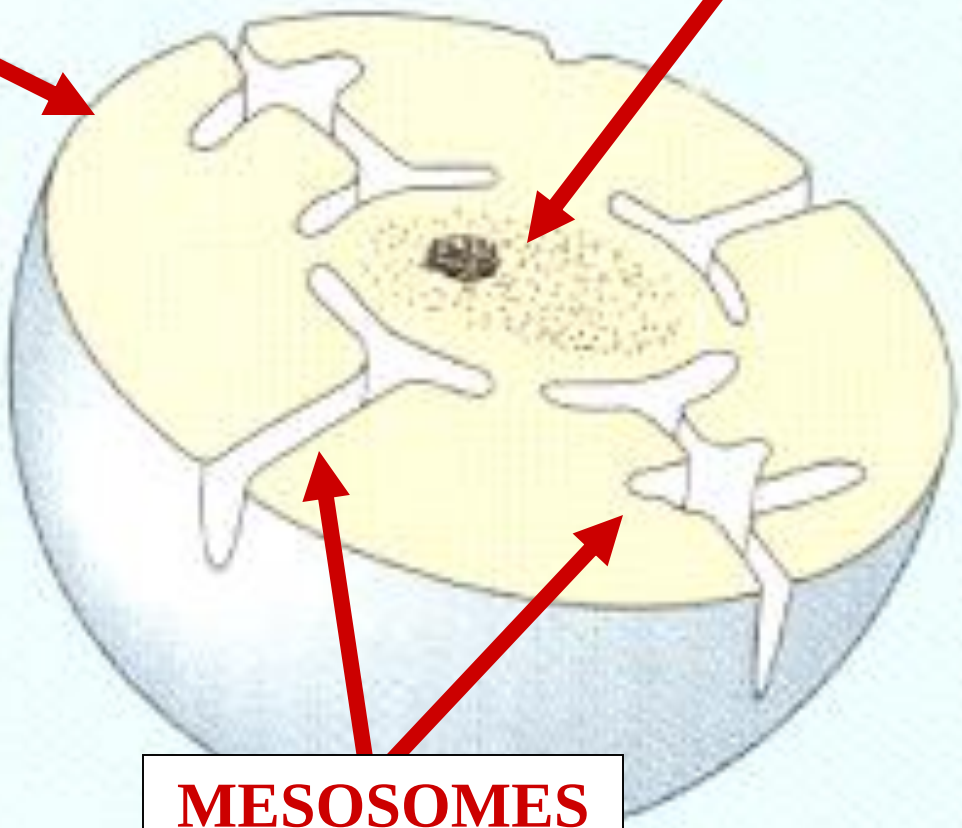


ANCESTRAL PROKARYOTE

M

CELL MEMBRANE

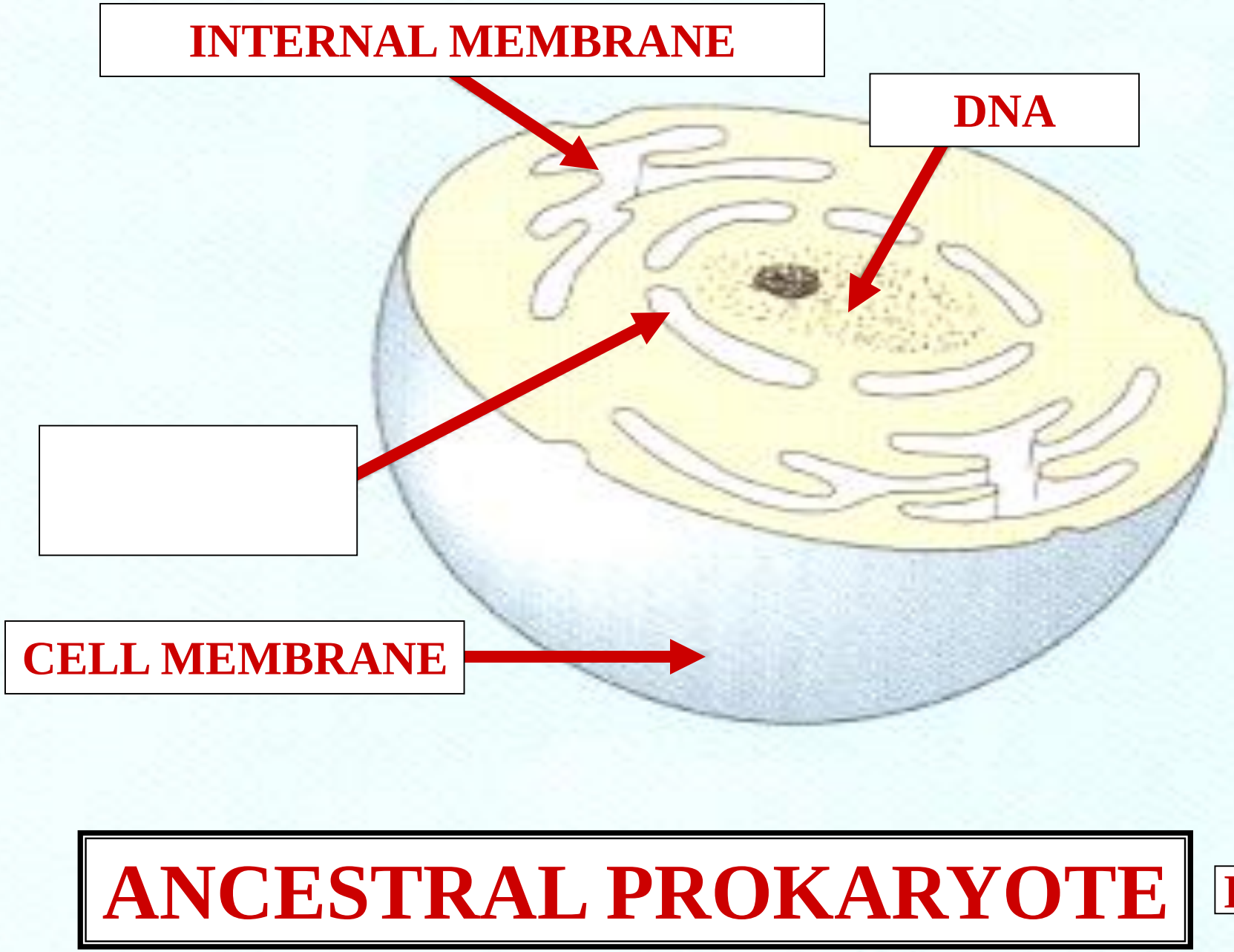
DNA



MESOSOMES

ANCESTRAL PROKARYOTE

IM



ANCESTRAL PROKARYOTE

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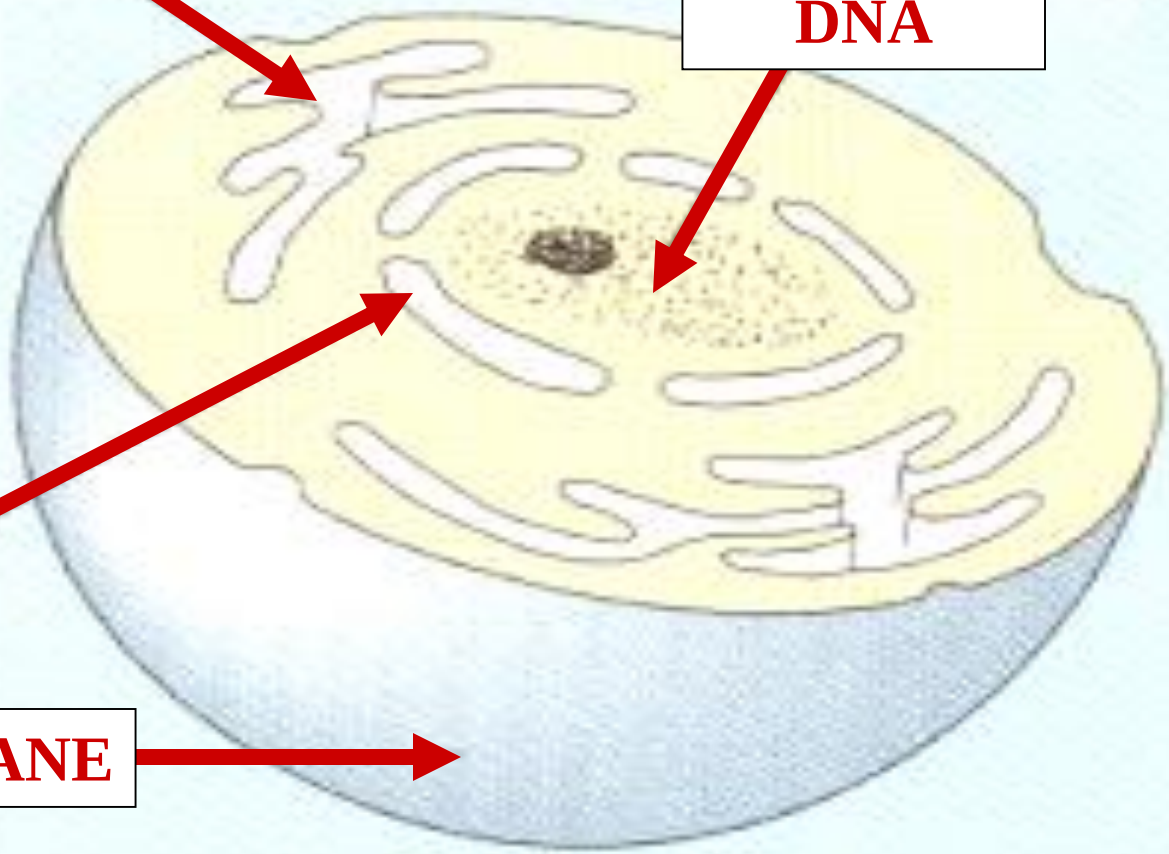
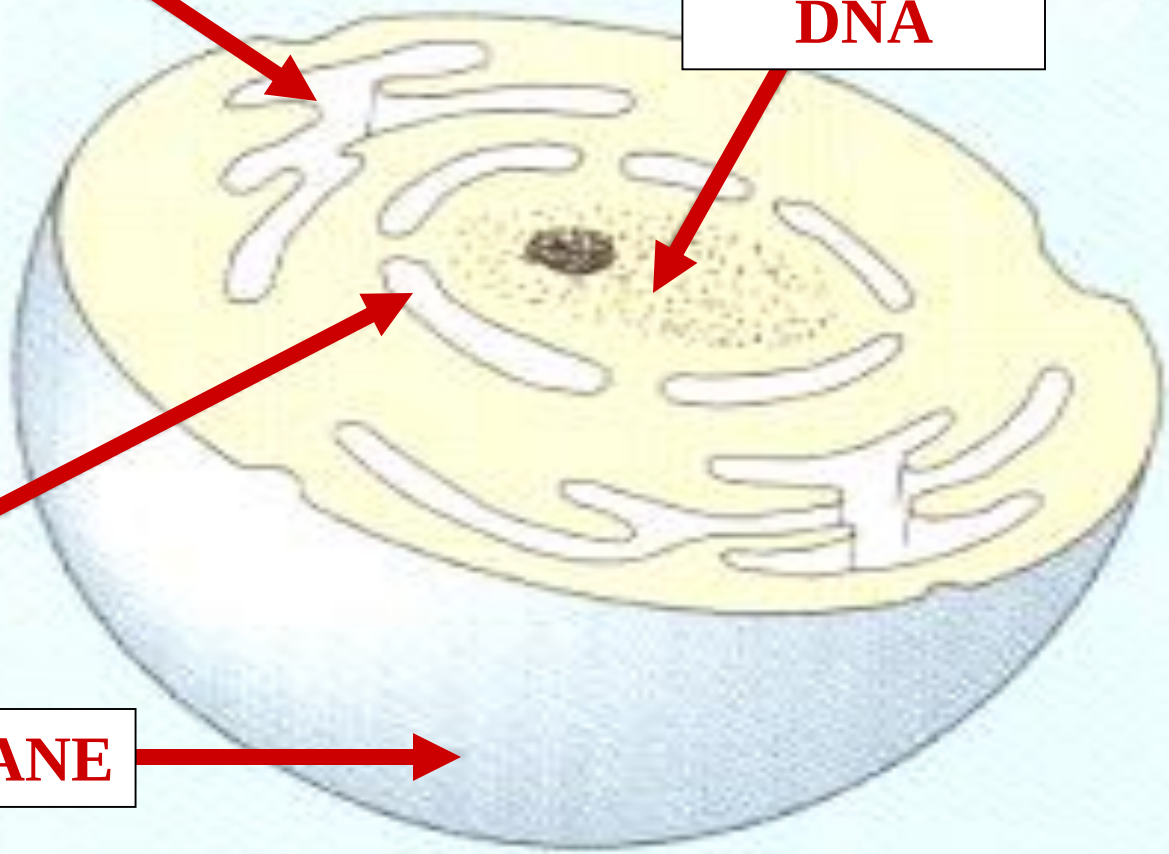


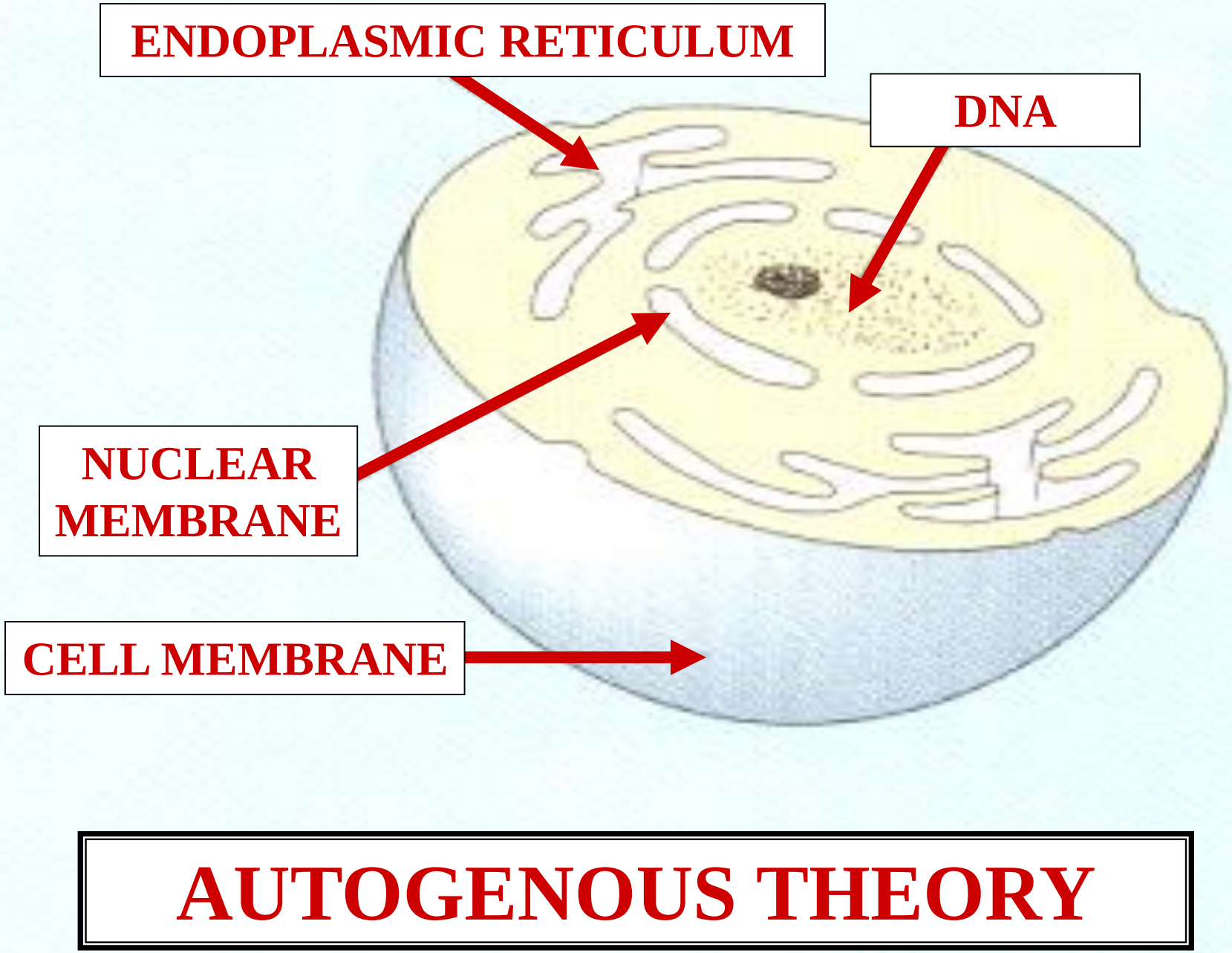
ANCESTRAL PROKARYOTE

NM

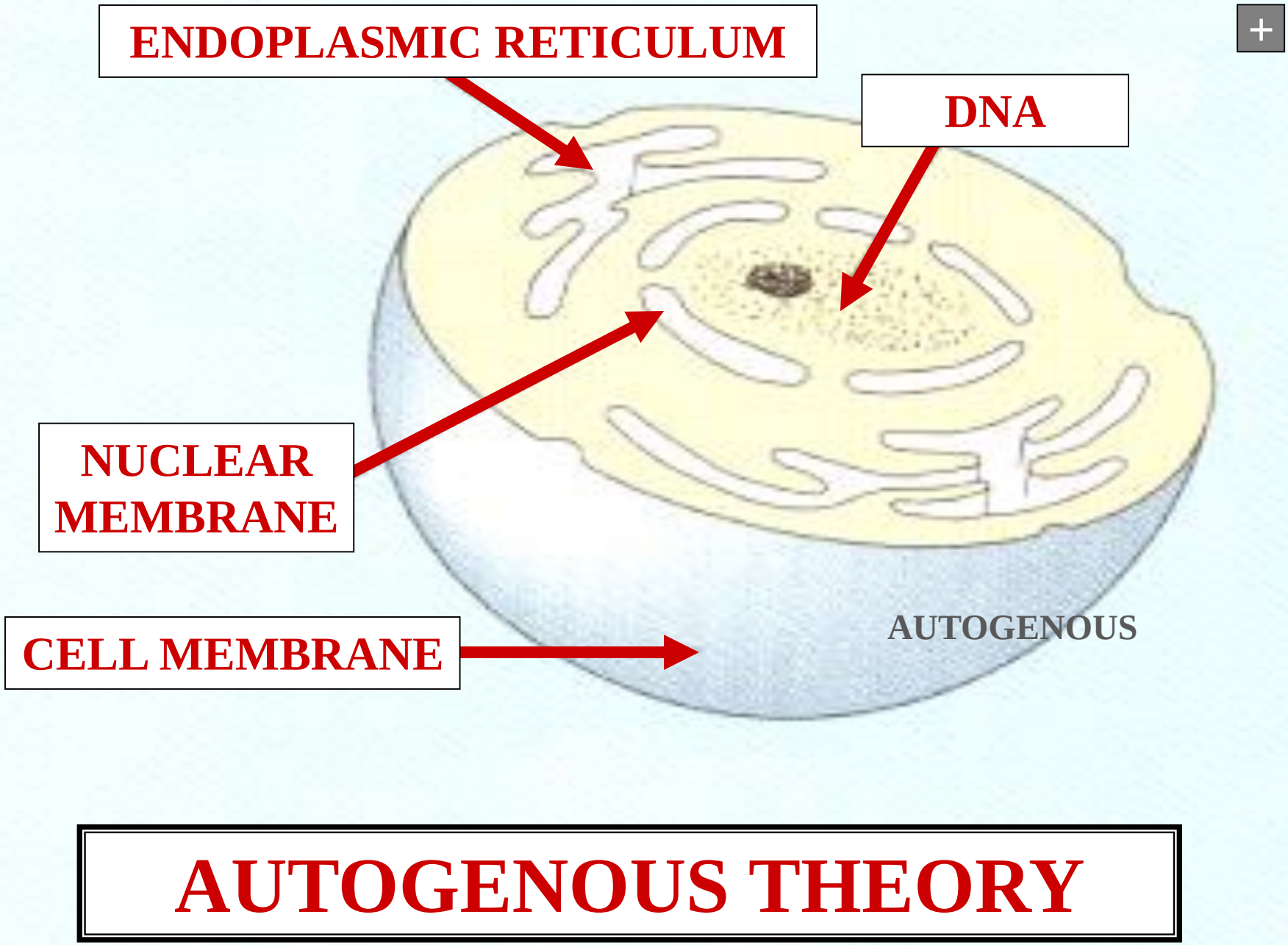


ANCESTRAL PROKARYOTE

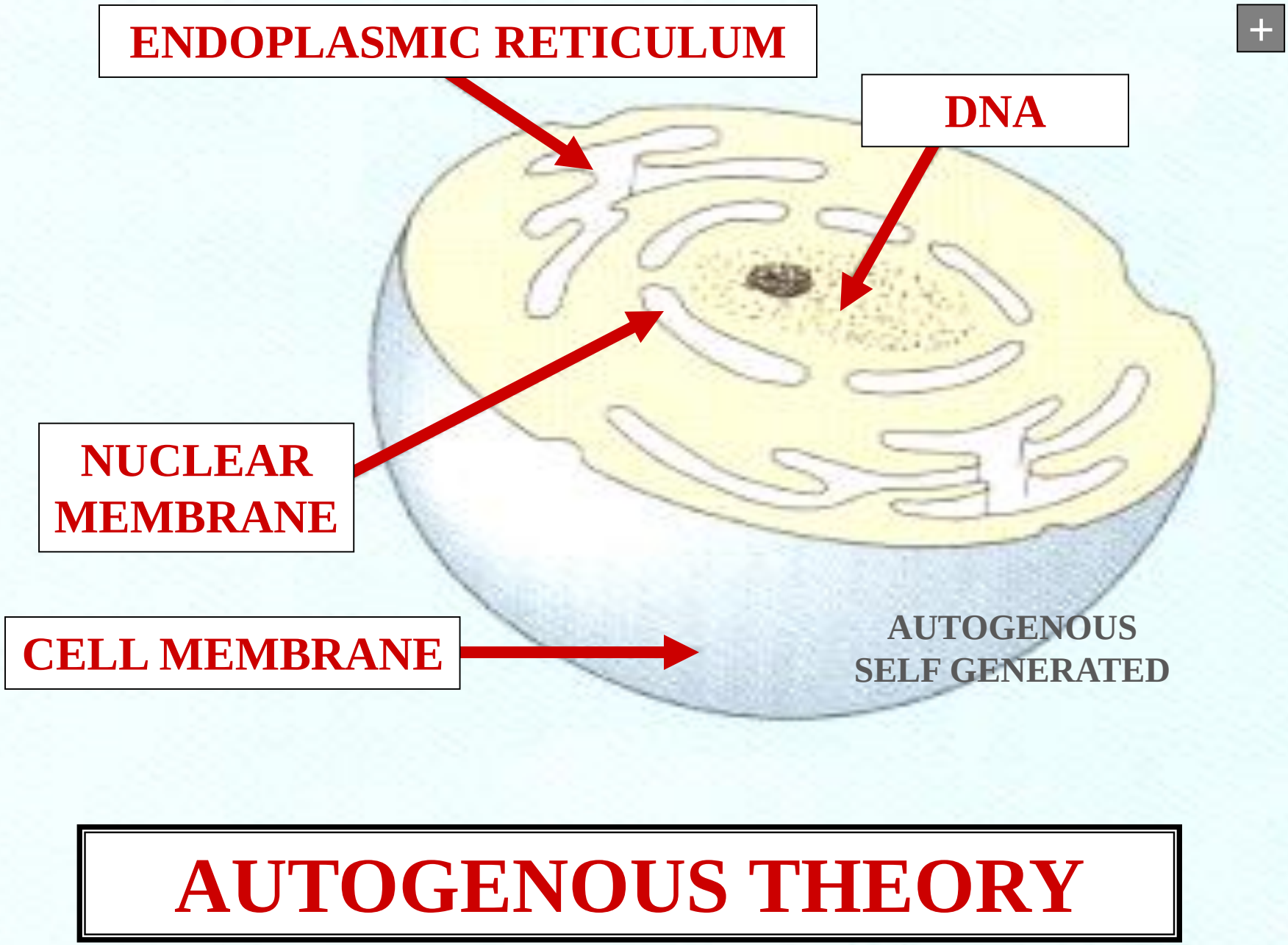
AT



AUTOGENOUS THEORY



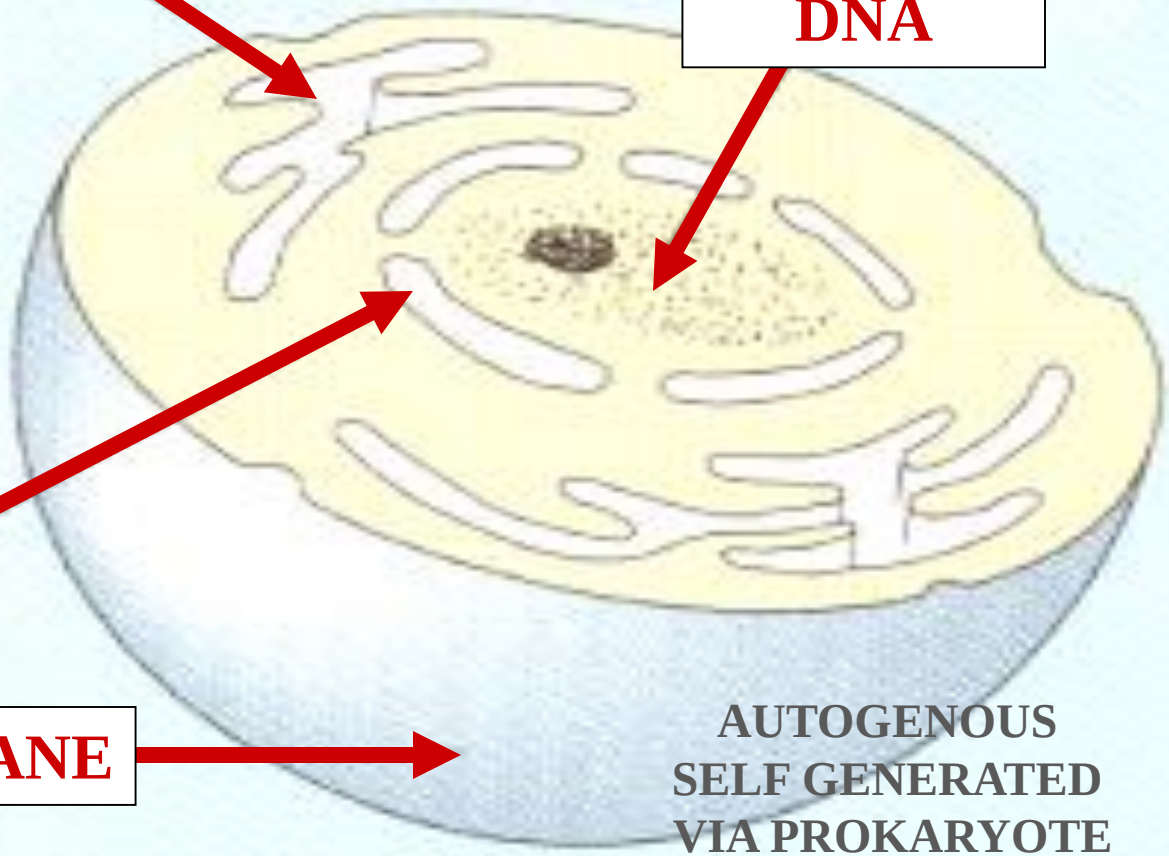
AUTOGENOUS THEORY



AUTOGENOUS THEORY

ENDOPLASMIC RETICULUM

DNA



NUCLEAR MEMBRANE

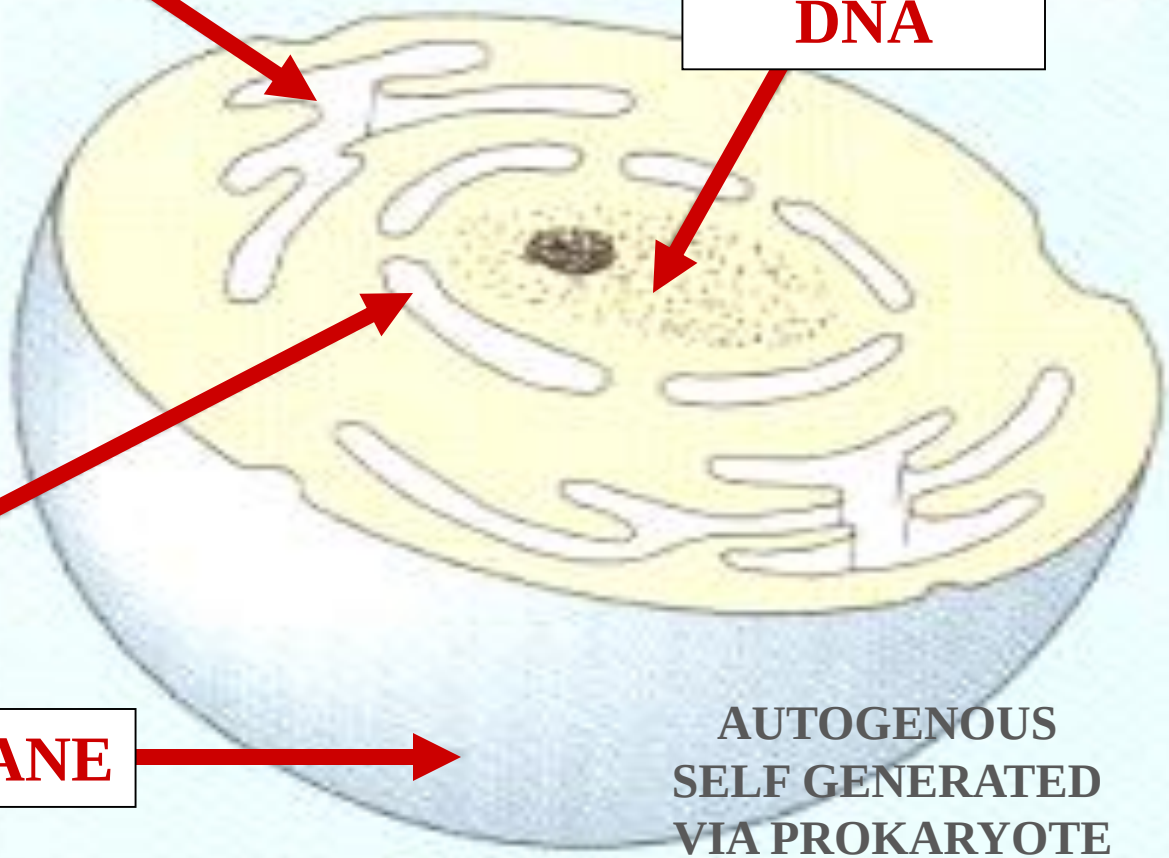
CELL MEMBRANE

AUTOGENOUS
SELF GENERATED
VIA PROKARYOTE
MEMBRANE SPECIALIZATION

AUTOGENOUS THEORY

ENDOPLASMIC RETICULUM

DNA



NUCLEAR MEMBRANE

CELL MEMBRANE

AUTOGENOUS
SELF GENERATED
VIA PROKARYOTE
MEMBRANE SPECIALIZATION

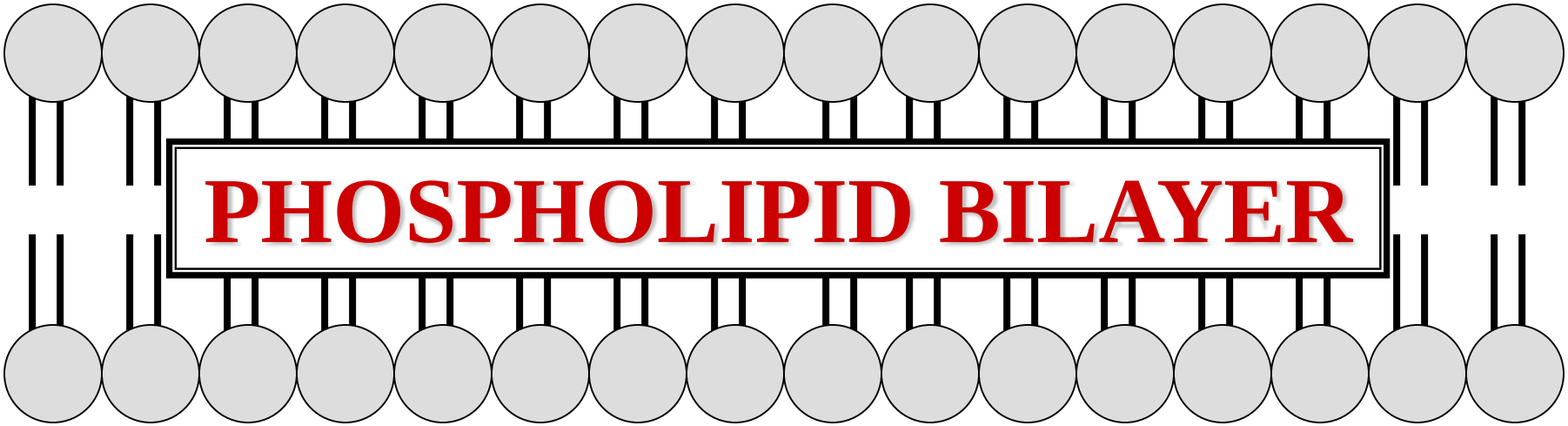
AUTOGENOUS THEORY

AUTOGENOUS THEORY SUPPORTING EVIDENCE

CELL MEMBRANE, ER & NUCLEAR MEMBRANE

CM

WATER WATER WATER

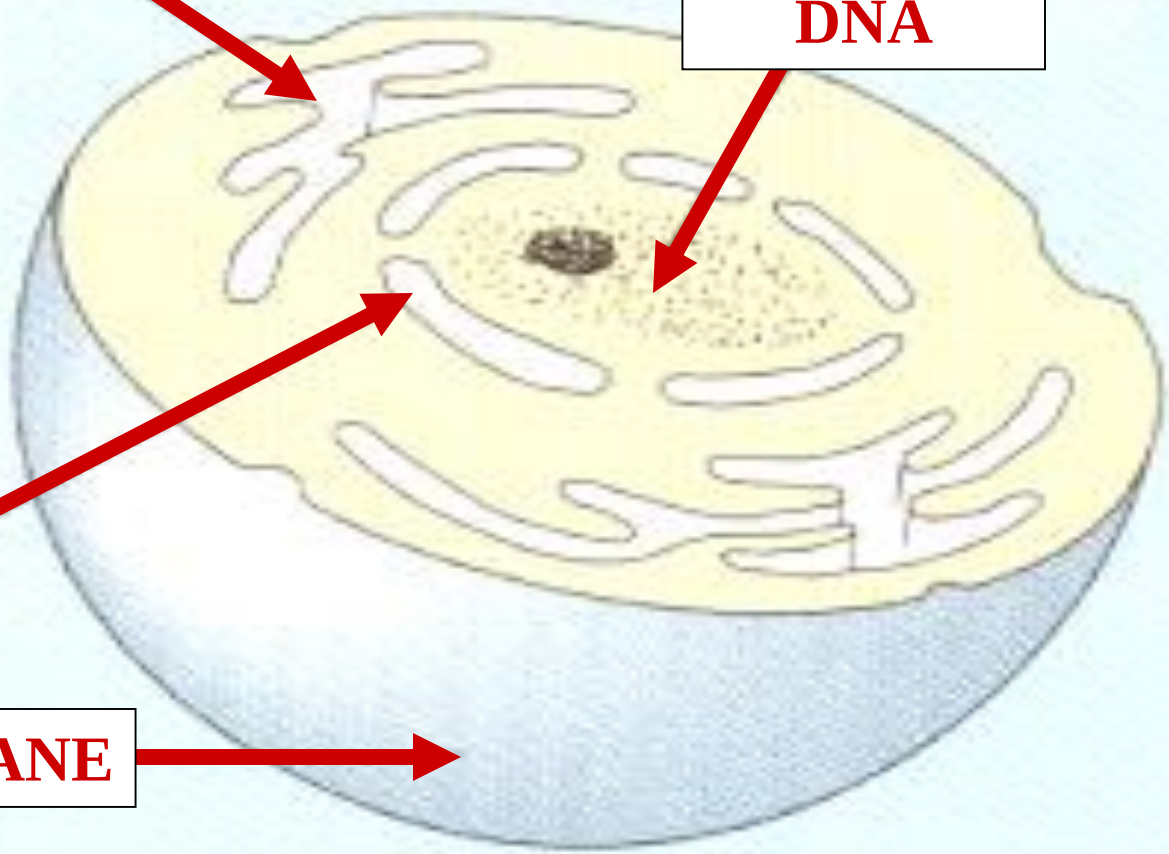


WATER WATER WATER

CELL MEMBRANE, ER & NUCLEAR MEMBRANE

ER

DNA



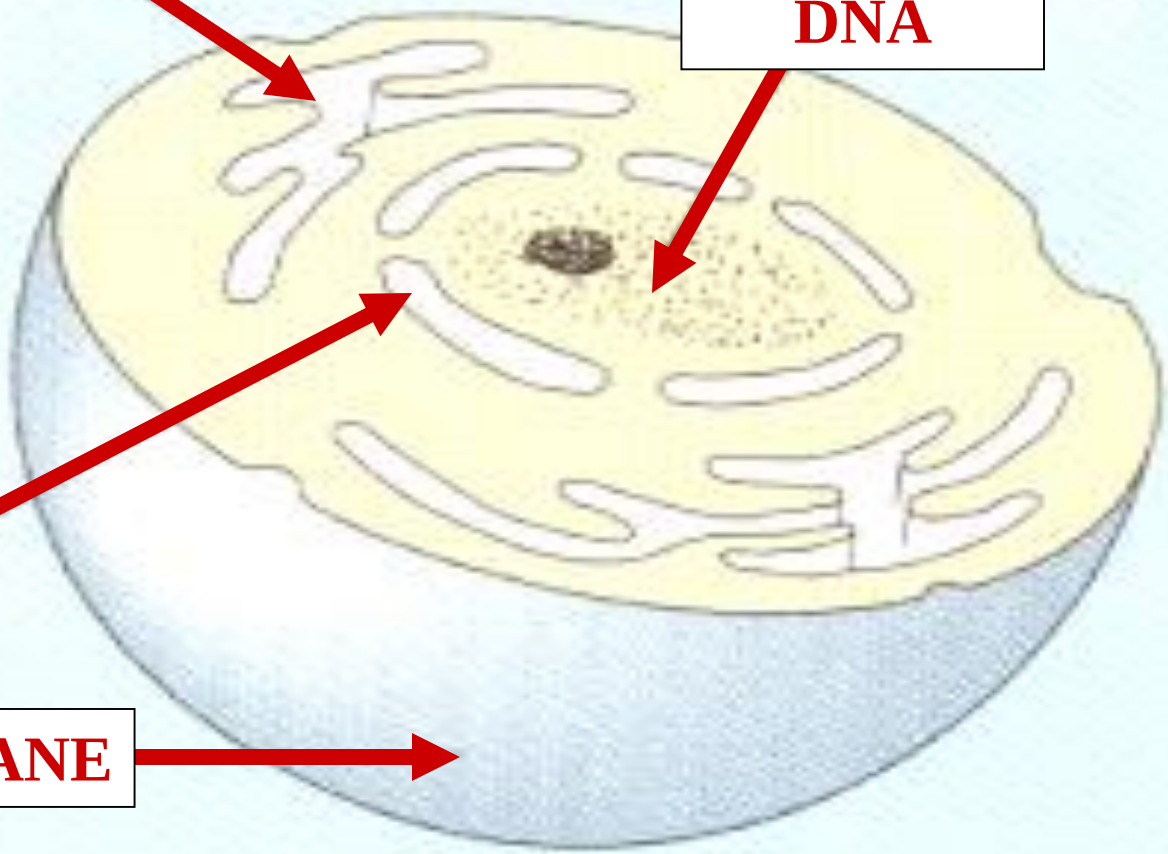
CELL MEMBRANE

EUKARYOYTE CELL

NM

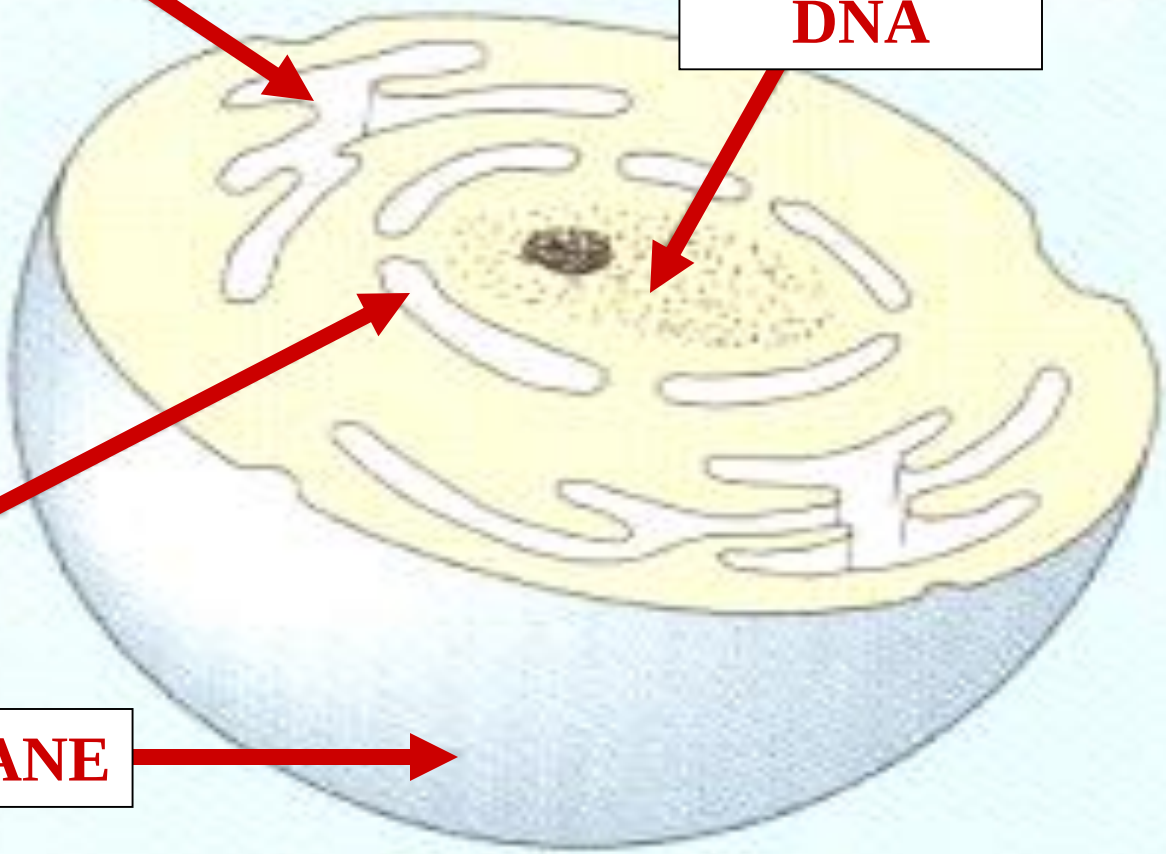
ENDOPLASMIC RETICULUM

DNA



CELL MEMBRANE

EUKARYOYTE CELL

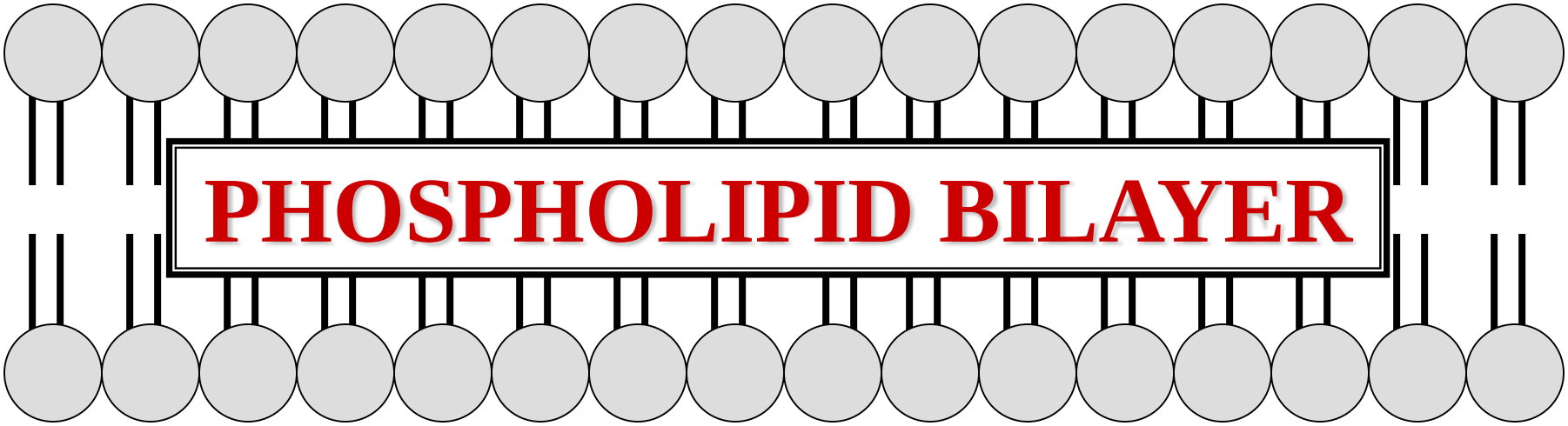


EUKARYOYTE CELL

ID

CELL MEMBRANE, ER & NUCLEAR MEMBRANE

WATER WATER WATER

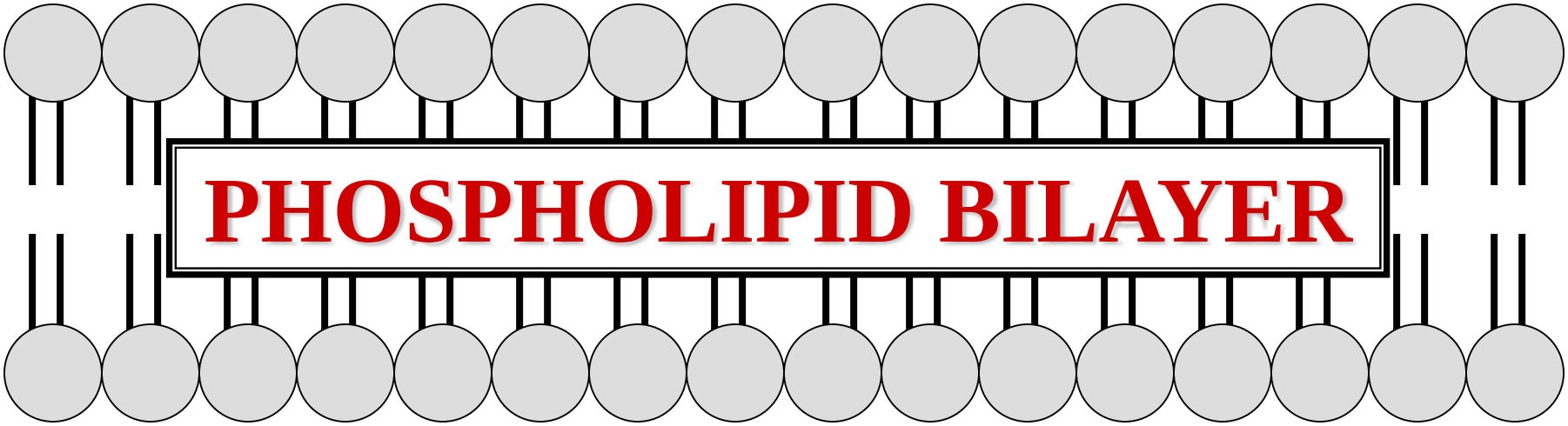


WATER WATER WATER

CELL MEMBRANE, ER & NUCLEAR MEMBRANE

CELL MEMBRANE, ER & NUCLEAR MEMBRANE

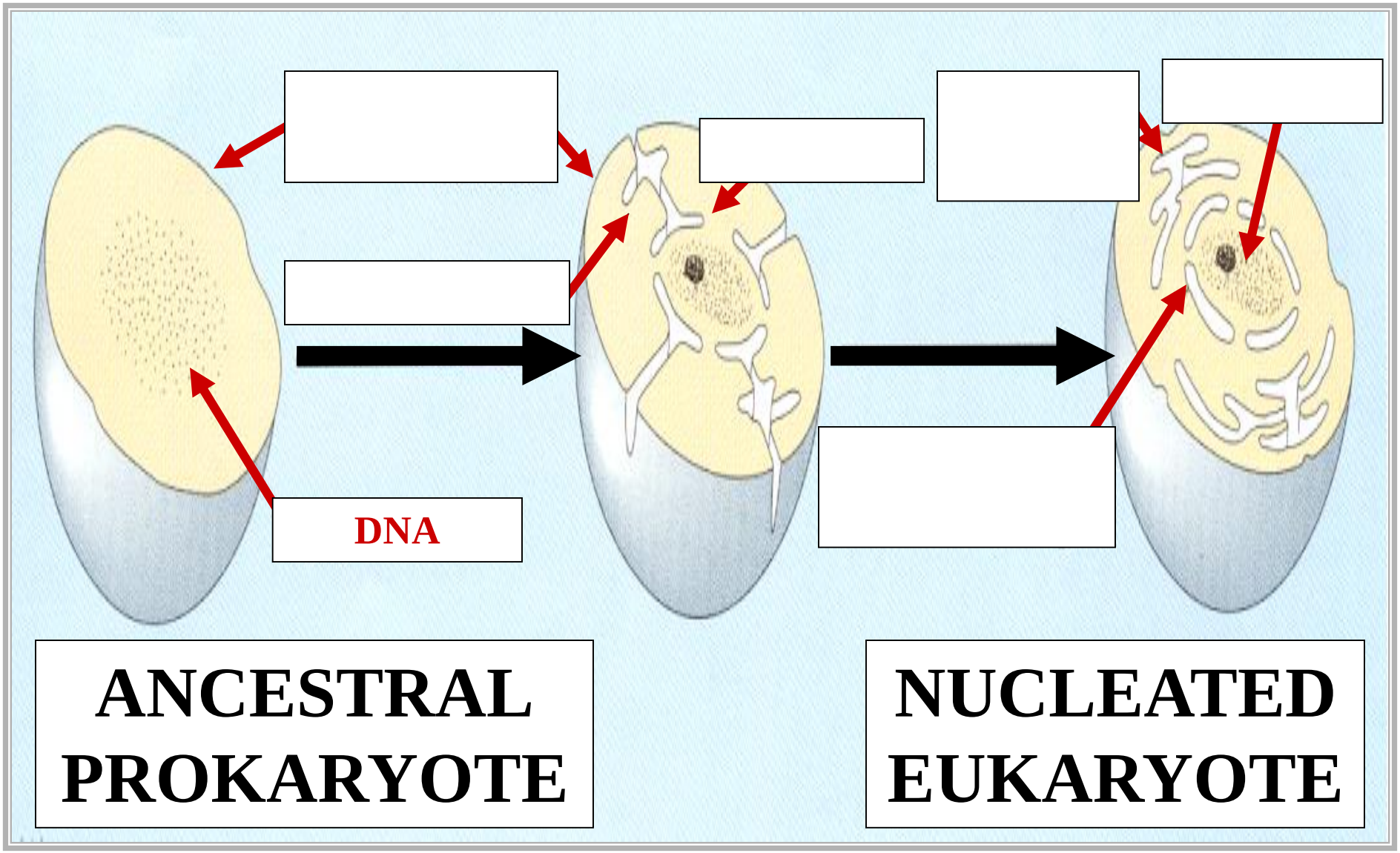
WATER WATER WATER



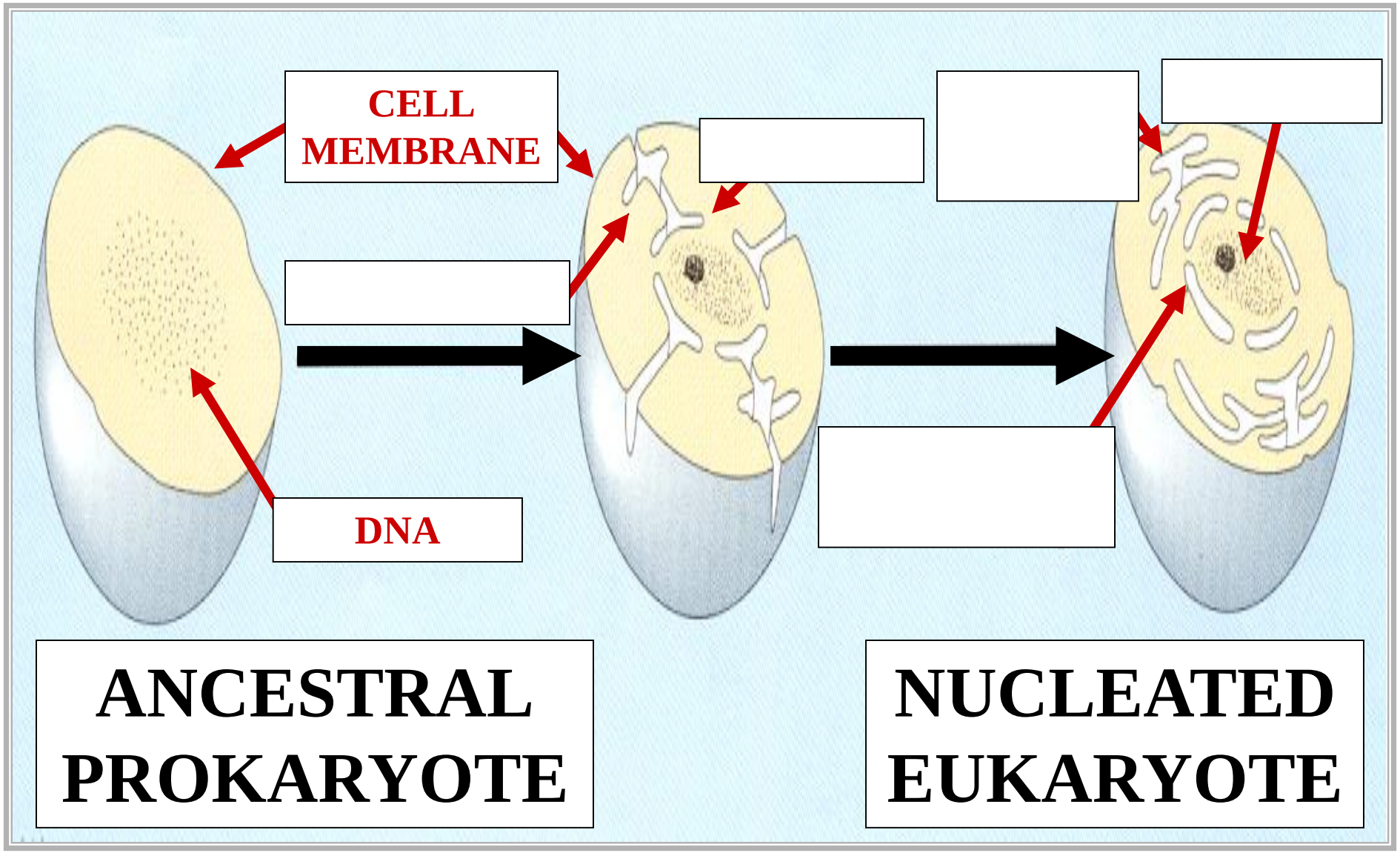
WATER WATER WATER

PHOSPHOLIPIDS IDENTICAL

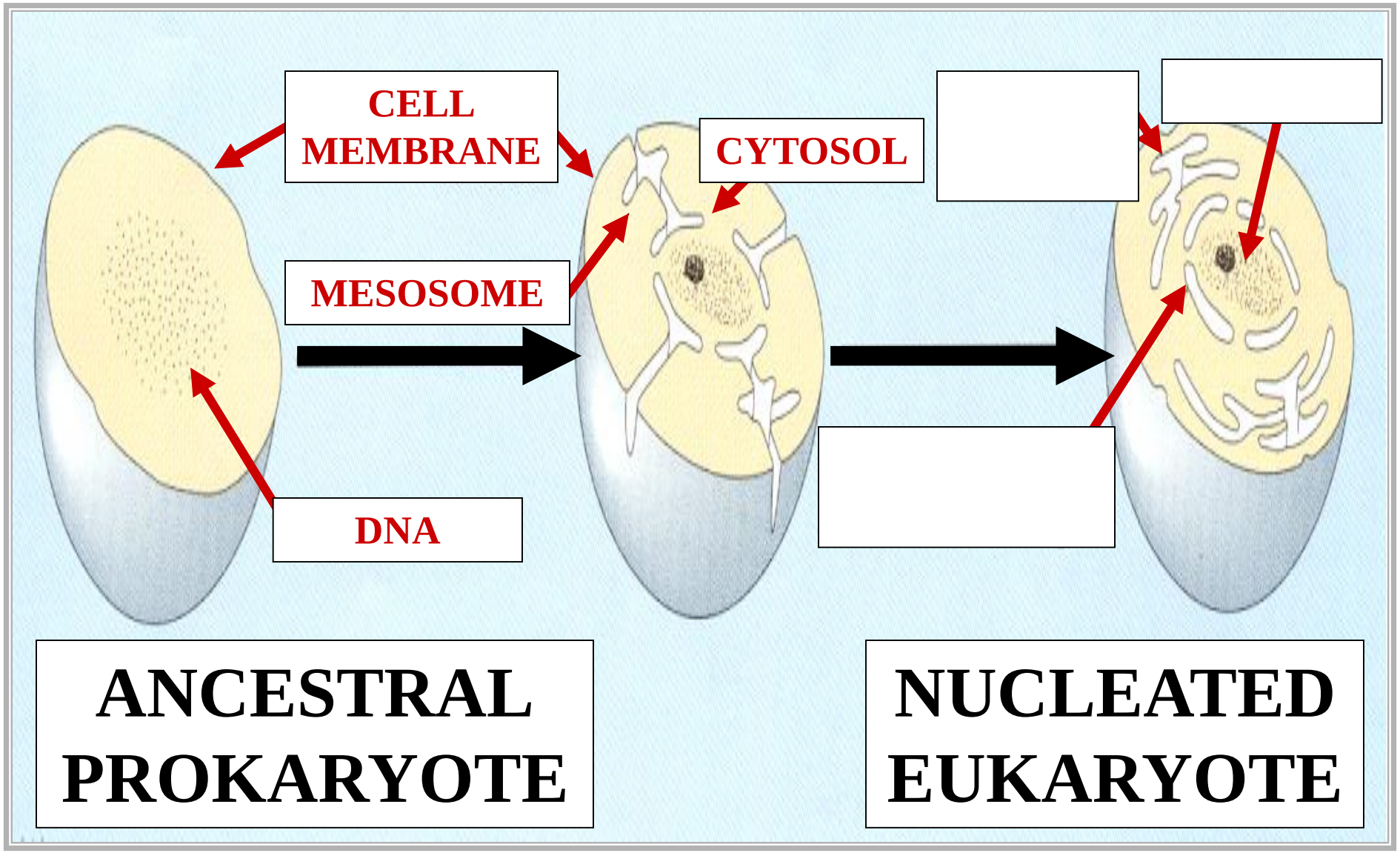
AUTOGENOUS THEORY



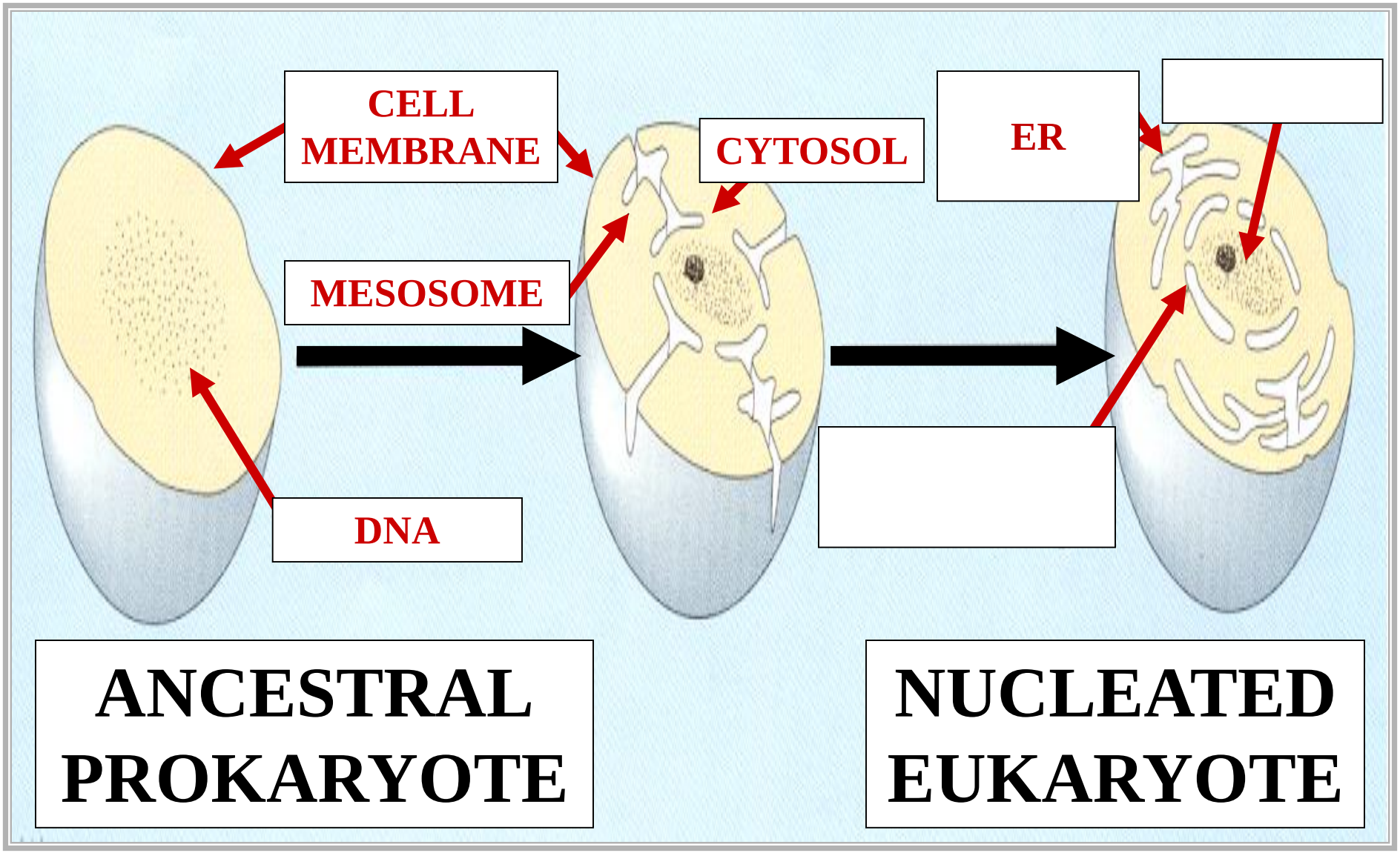
AUTOGENOUS THEORY



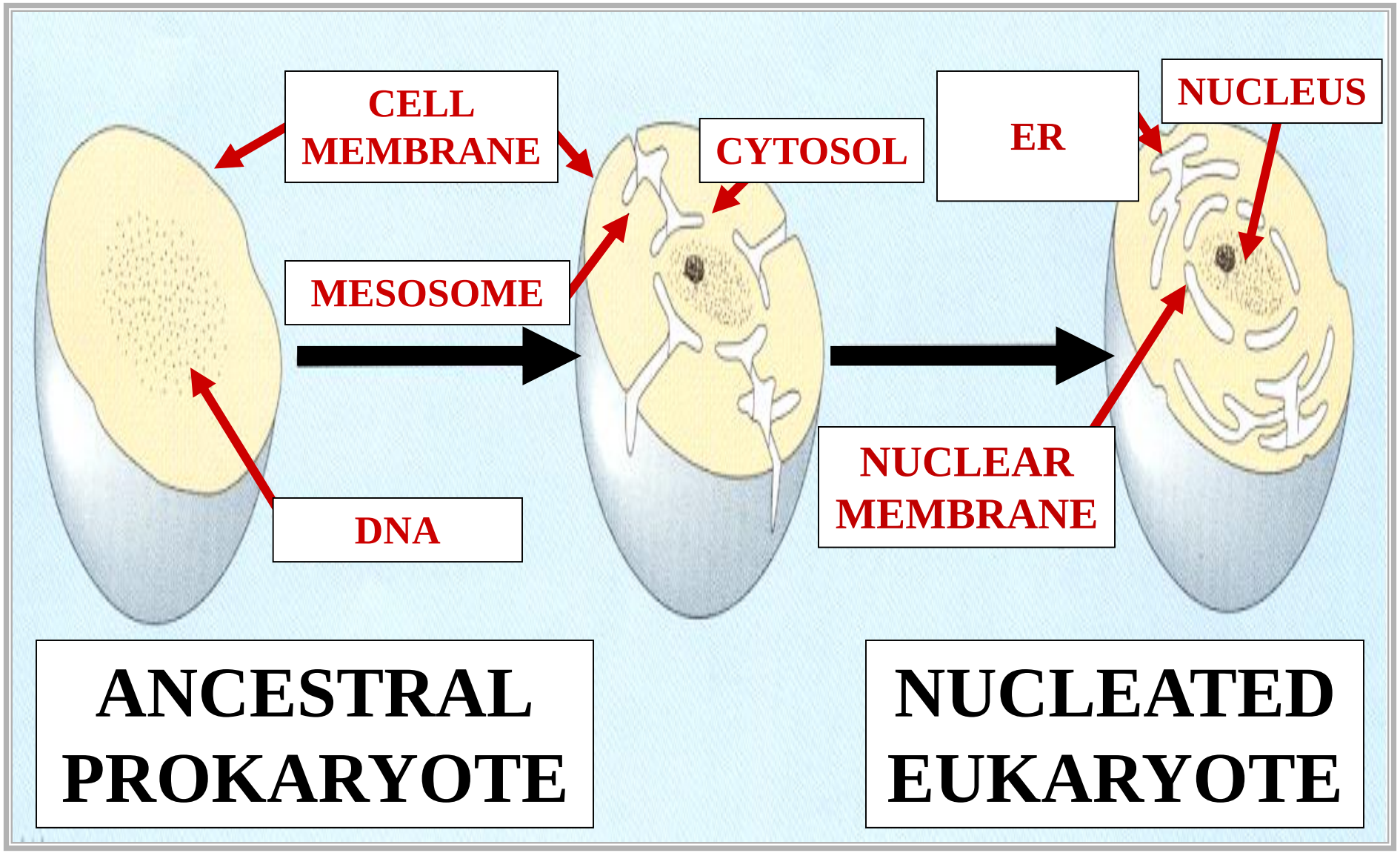
AUTOGENOUS THEORY



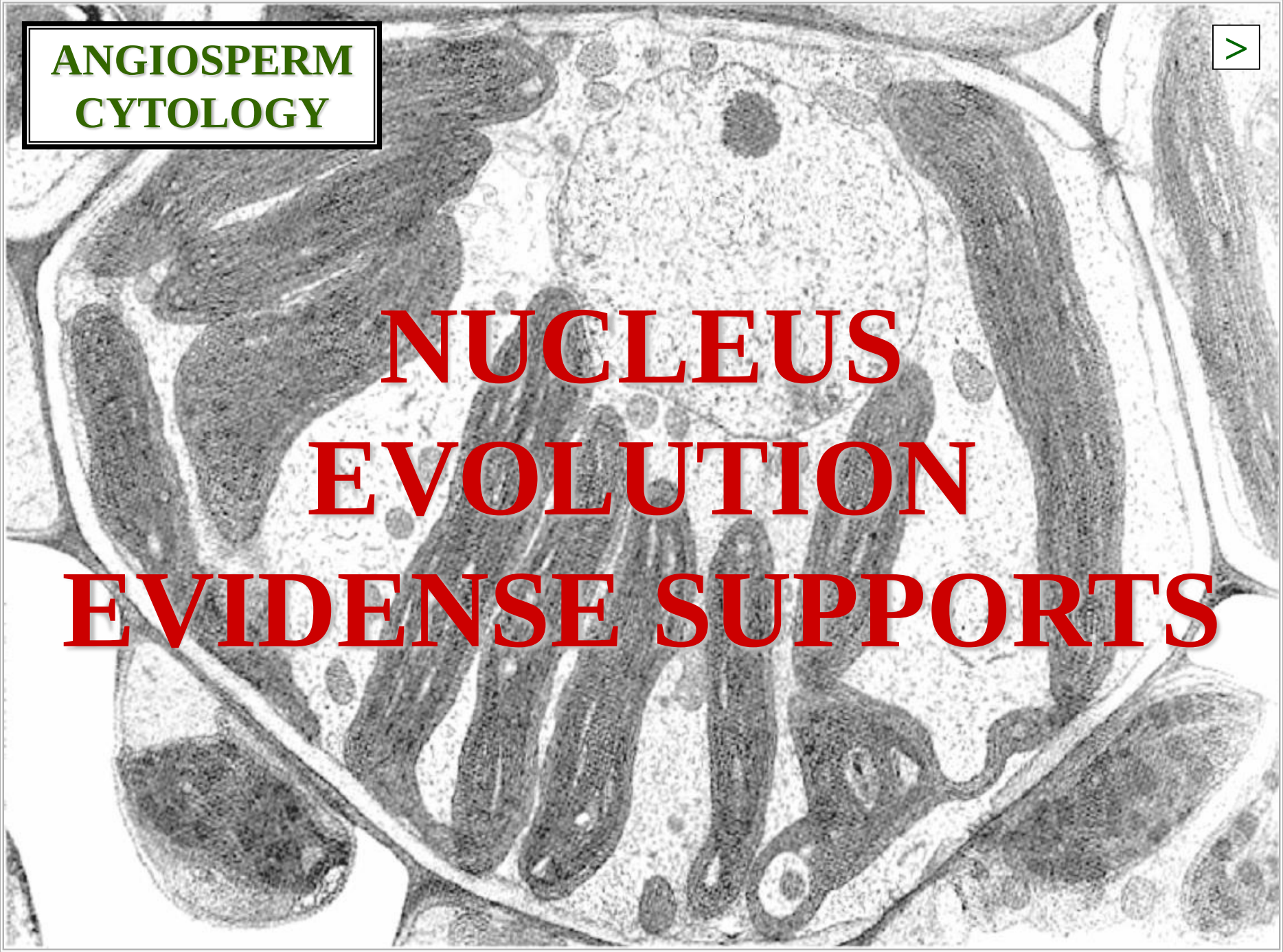
AUTOGENOUS THEORY



AUTOGENOUS THEORY



ANGIOSPERM CYTOLOGY



NUCLEUS EVOLUTION EVIDENSE SUPPORTS

ANGIOSPERM CYTOLOGY

NUCLEUS

AUTOGENOUS THEORY

E

ENDOSYMBIOTIC THEORY

ENDOSYMBIOTIC THEORY

ENDOSYMBIOTIC THEORY

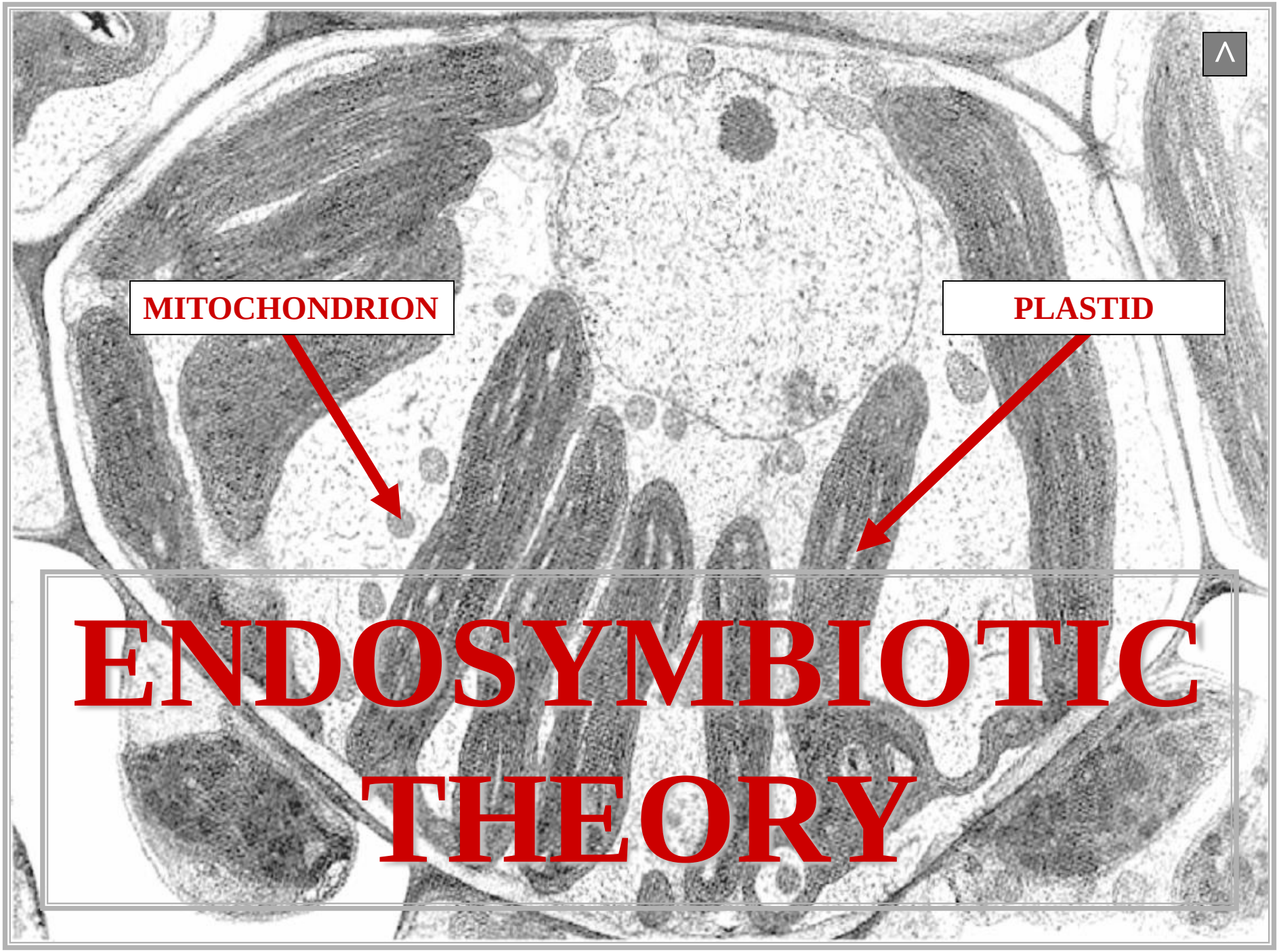
PLASTID & MITOCHONDRION EVOLUTION

ENDOSYMBIOTIC THEORY

ENDOSYMBIOTIC THEORY

VIA PROKARYOTE SYMBIOSIS

ENDOSYMBIOTIC THEORY



ENDOSYMBIOTIC THEORY

S

SYMBIOSIS

SYMBIOSIS

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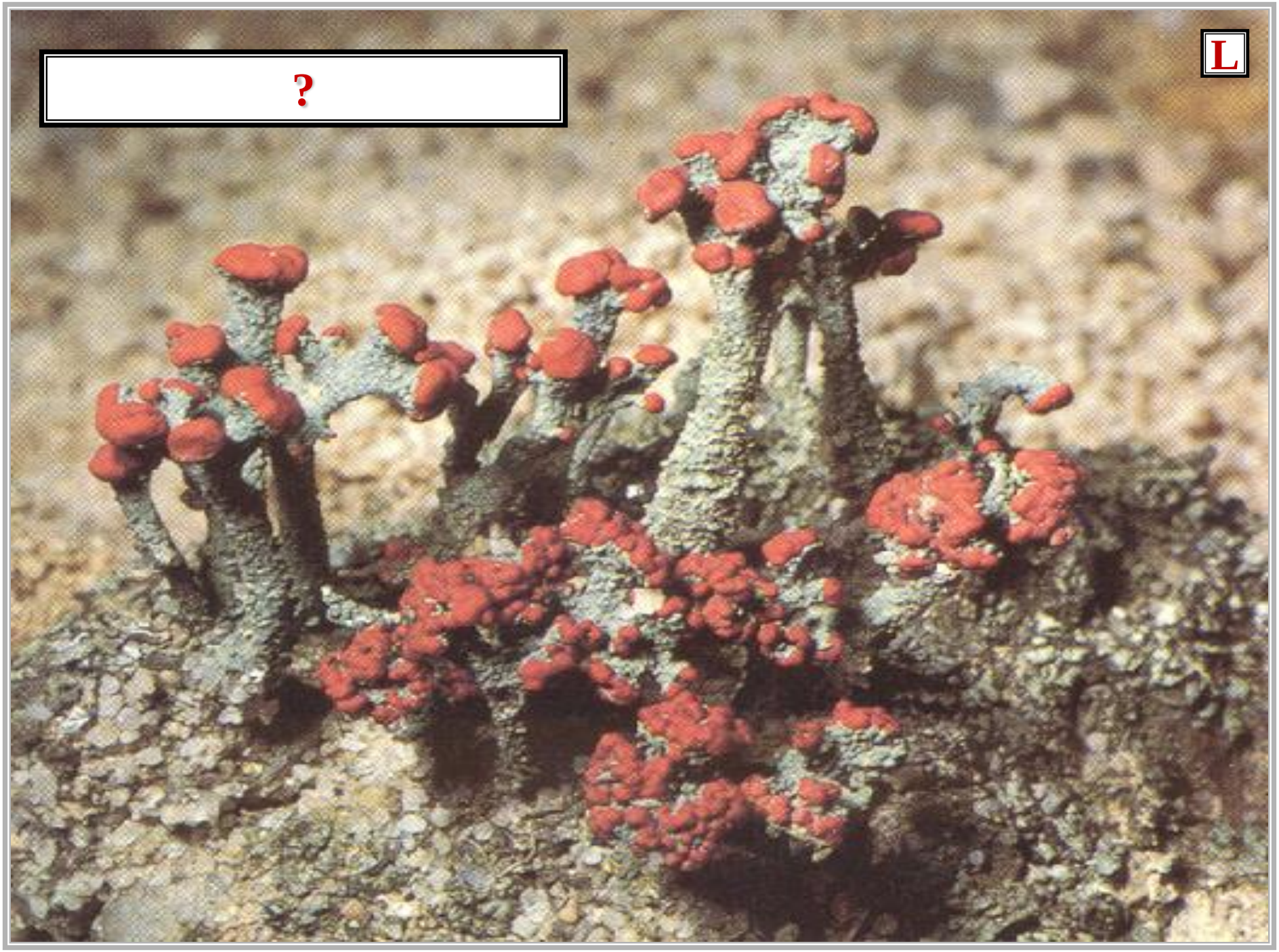
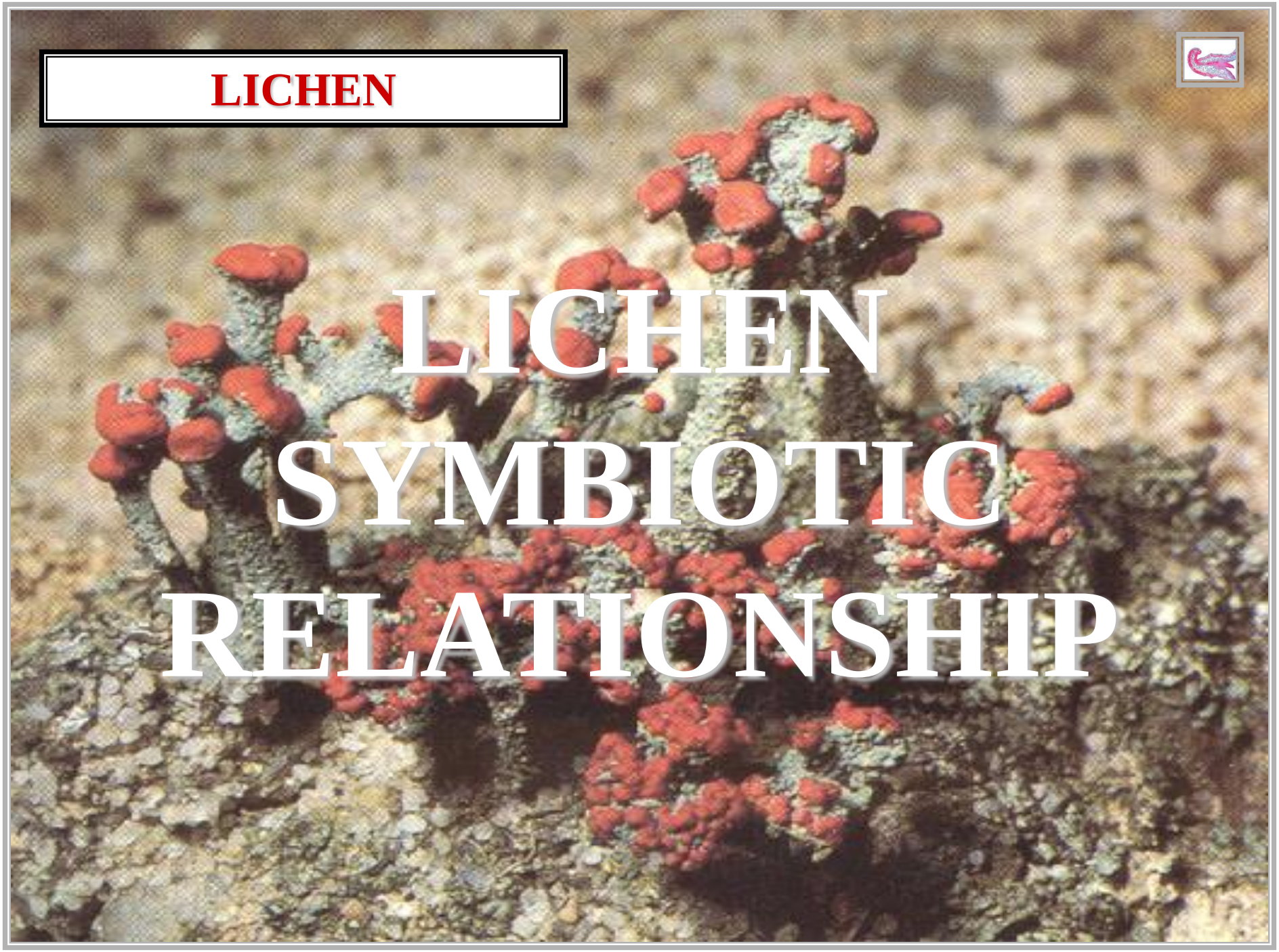
SYMBIOSIS

TWO DIFFERENT SPECIES EXIST IN AN INTRICATE ASSOCIATION

SYMBIOSIS

?





LICHEN SYMBIOTIC RELATIONSHIP

LICHEN THALLUS

SYMBIOSIS

L.S.

FS

LICHEN THALLUS

SYMBIOSIS

L.S.

BS

LICHEN THALLUS

FUNGUS SYMBIONT

L.S.

SYMBIOSIS

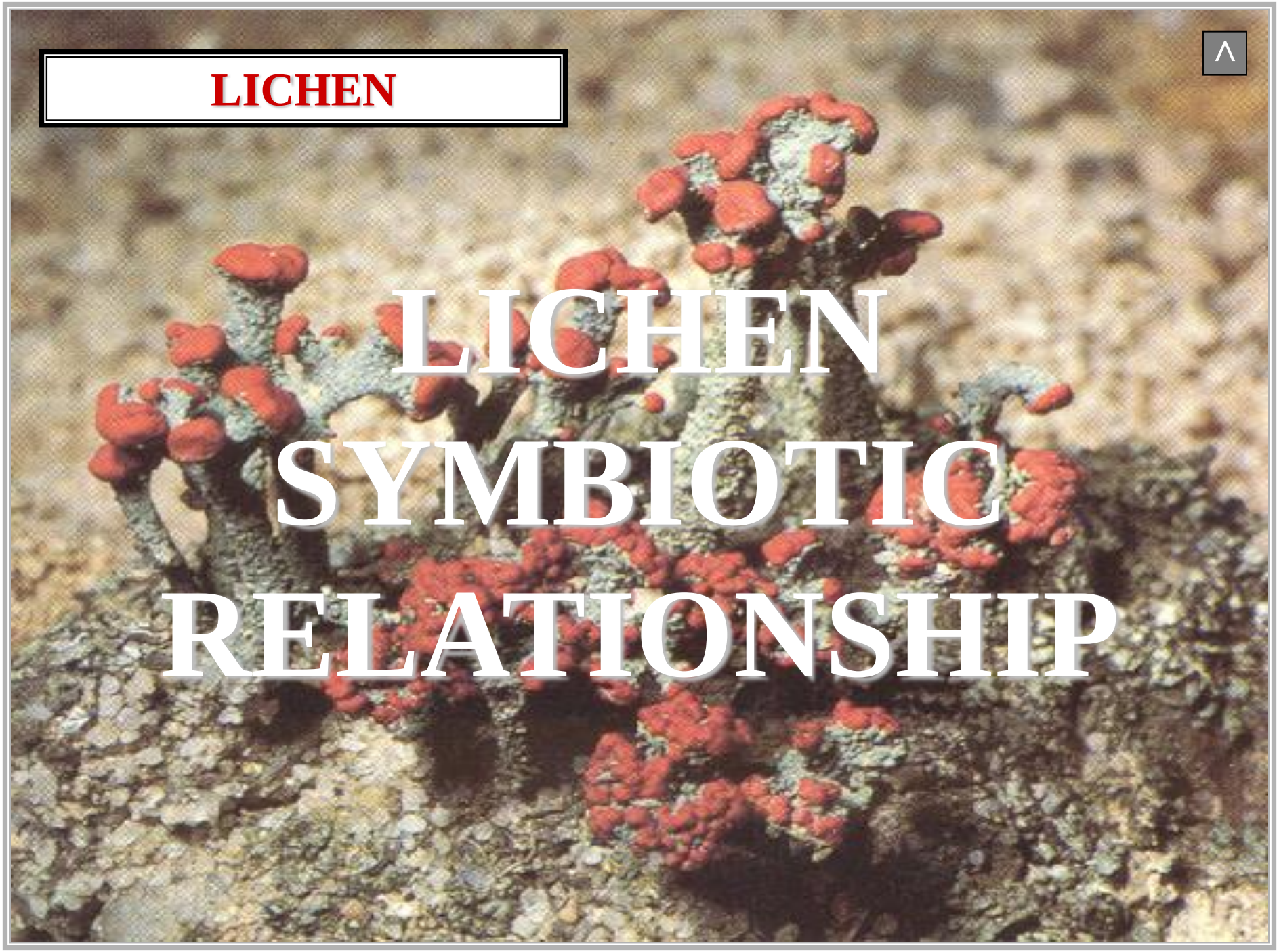
LICHEN THALLUS

BACTERIA SYMBIONT

FUNGUS SYMBIONT

L.S.

SYMBIOSIS



LICHEN SYMBIOTIC RELATIONSHIP

MUTUALISM

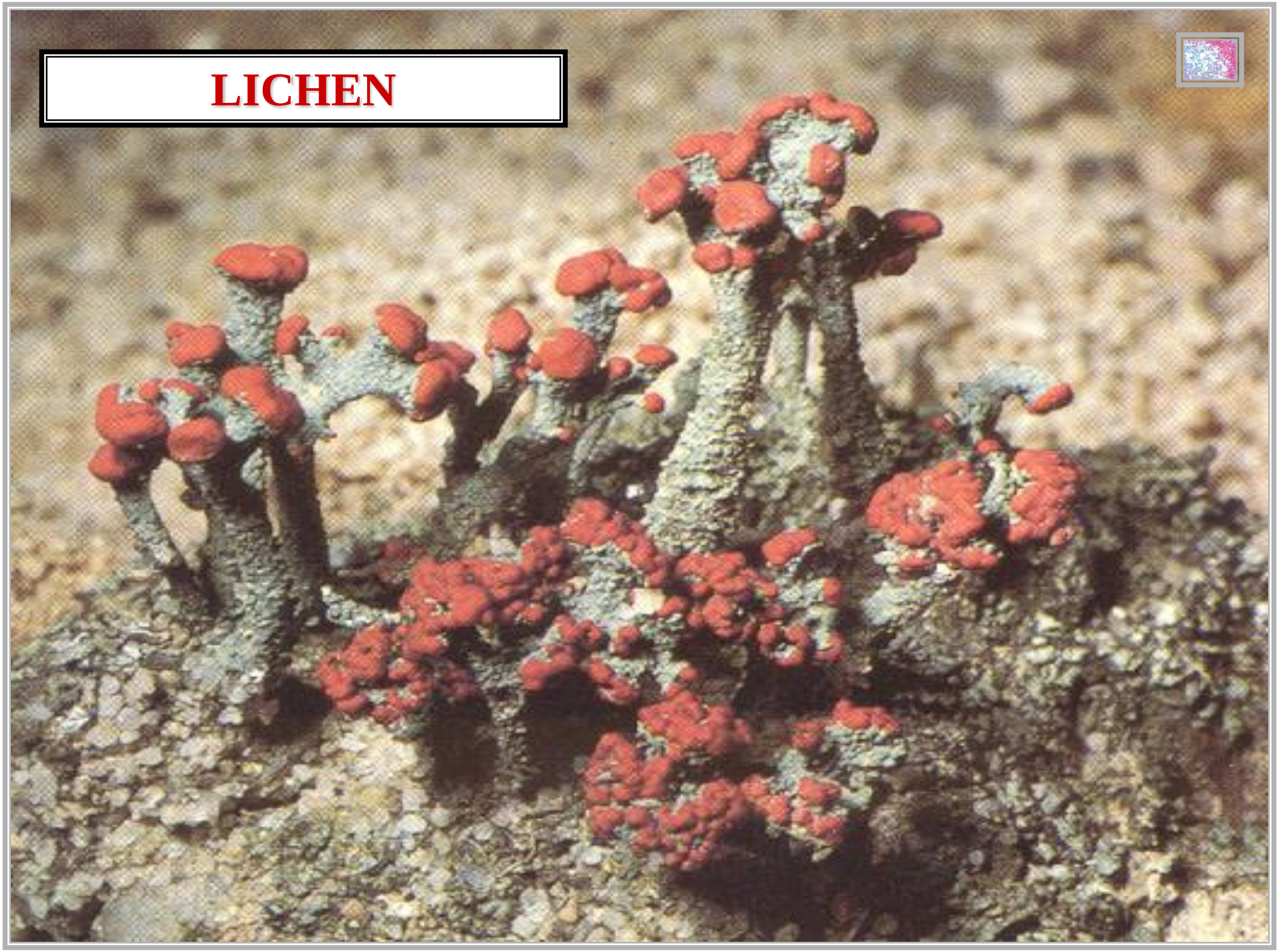
MUTUALISM

SYMBIOSIS
MUTUALISM

BOTH SPECIES BENEFIT

SYMBIOSIS
MUTUALISM

LICHEN



FS

LICHEN THALLUS

SYMBIOSIS

L.S.

BS

LICHEN THALLUS

FUNGUS SYMBIONT

SYMBIOSIS

L.S.

LICHEN THALLUS

BACTERIA SYMBIONT

FUNGUS SYMBIONT

L.S.

SYMBIOSIS

LICHEN THALLUS

BACTERIA SYMBIONT
PHOTOSYNTHESIS

FUNGUS SYMBIONT

L.S.

SYMBIOSIS

LICHEN THALLUS

FS

BACTERIA SYMBIONT
PROVIDES: FUNGUS
WITH GLUCOSE

FUNGUS SYMBIONT
GLUCOSE

L.S.

SYMBIOSIS

LICHEN THALLUS

BACTERIA SYMBIONT

FUNGUS SYMBIONT

L.S.

SYMBIOSIS

LICHEN THALLUS

BACTERIA SYMBIONT
SECURITY

FUNGUS SYMBIONT
PROVIDES: BACTERIA
WITH SECURITY

L.S.

SYMBIOSIS

LICHEN THALLUS

BACTERIA SYMBIONT
PROVIDES: FUNGUS
WITH GLUCOSE

FUNGUS SYMBIONT
PROVIDES: BACTERIA
WITH SECURITY

L.S.

SYMBIOSIS

LICHEN THALLUS

BACTERIA SYMBIONT
PROVIDES: FUNGUS WITH GLUCOSE

FUNGUS SYMBIONT
PROVIDES: BACTERIA WITH SECURITY

MUTUALISM

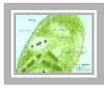
SYMBIOSIS

L.S.

E

ENDOSYMBIOSIS

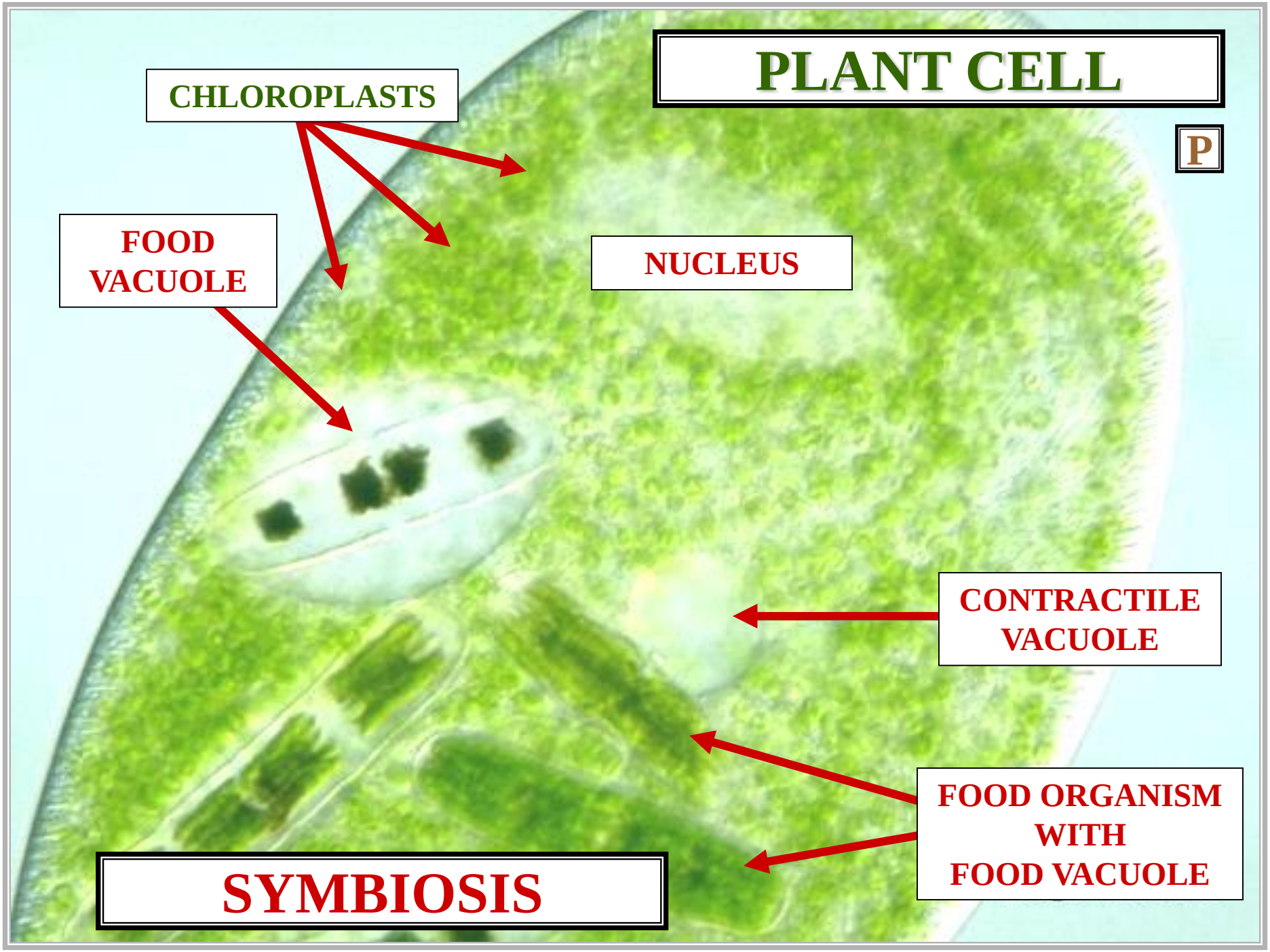
ENDOSYMBIOSIS

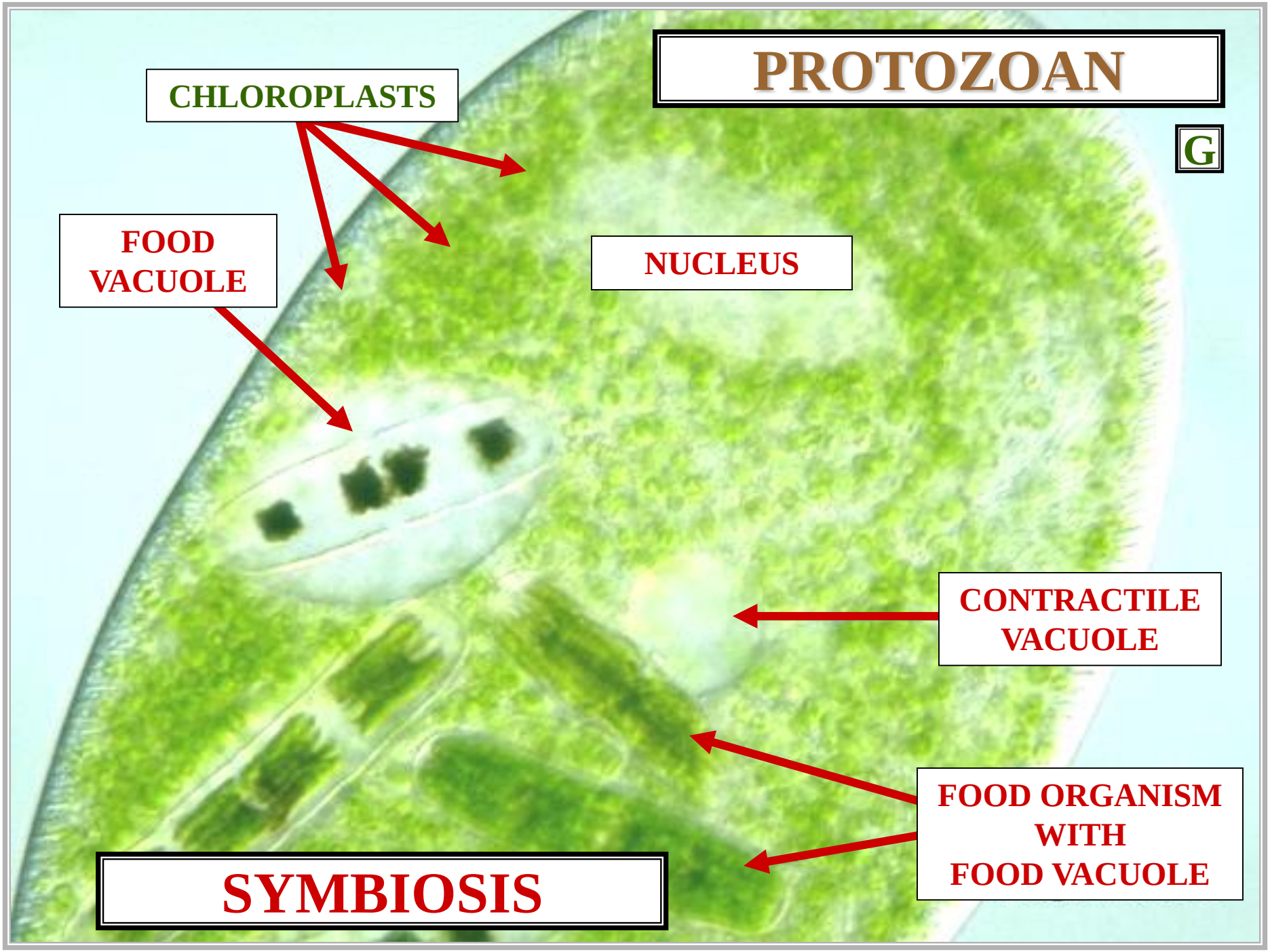


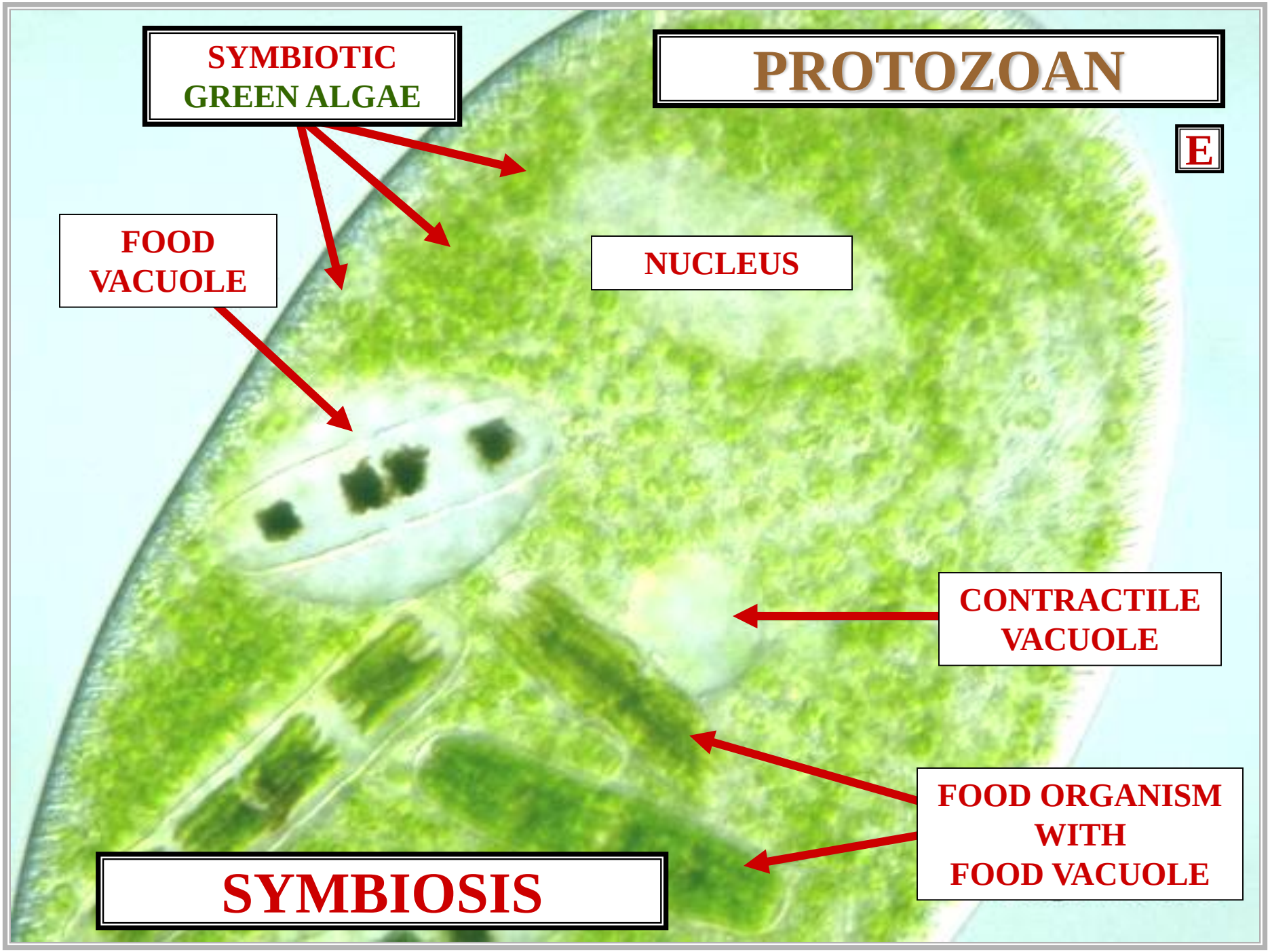
ENDOSYMBIOSIS

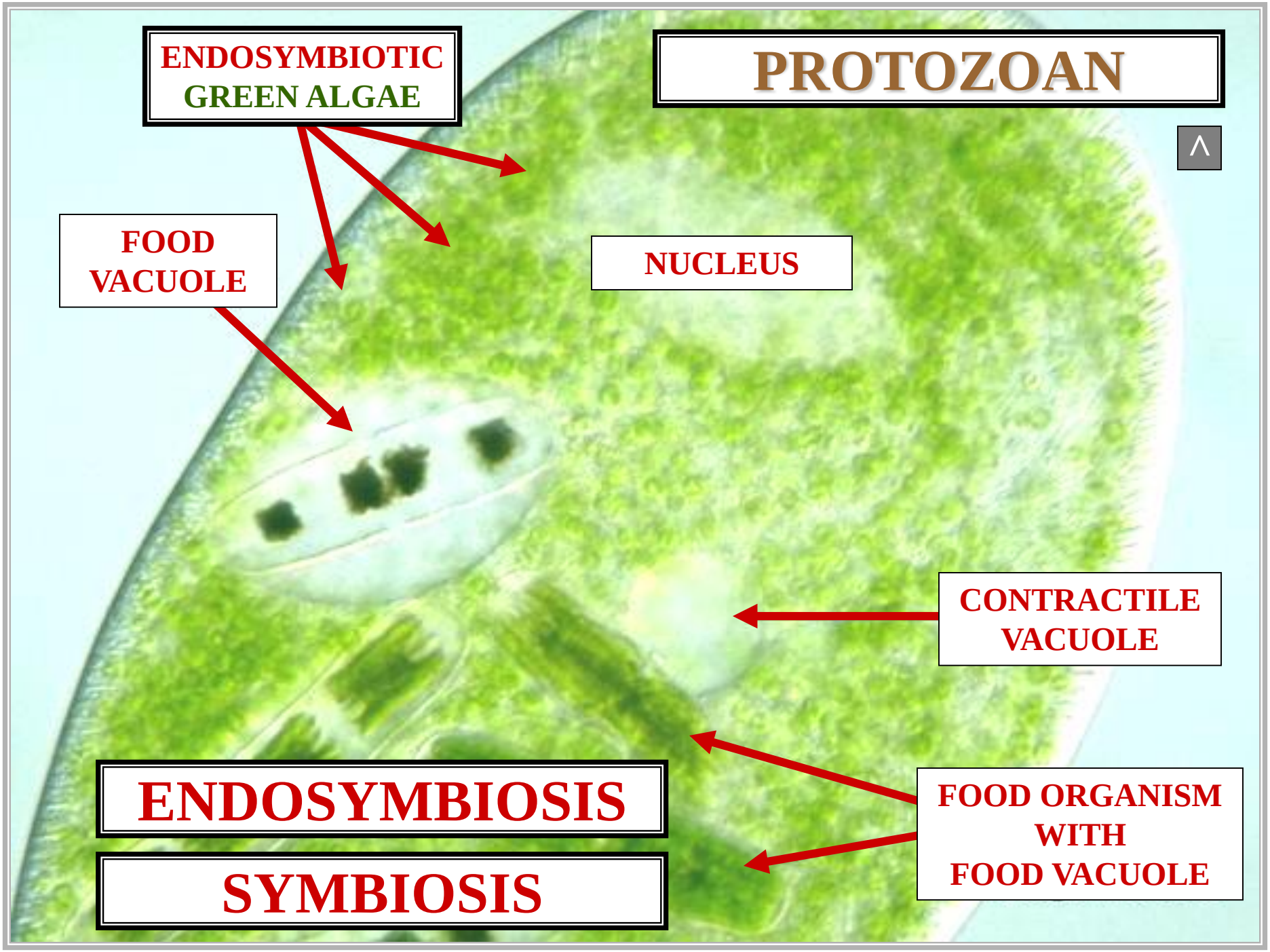
ONE SPECIES EXISTS WITHIN A SECOND HOST SPECIES

ENDOSYMBIOSIS


PLANT CELL
P
CHLOROPLASTS
FOOD VACUOLE
NUCLEUS
CONTRACTILE VACUOLE
FOOD ORGANISM WITH FOOD VACUOLE
SYMBIOSIS


PROTOZOAN
G
CHLOROPLASTS
FOOD VACUOLE
NUCLEUS
CONTRACTILE VACUOLE
FOOD ORGANISM WITH FOOD VACUOLE
SYMBIOSIS


SYMBIOTIC GREEN ALGAE
PROTOZOAN
E
FOOD VACUOLE
NUCLEUS
CONTRACTILE VACUOLE
FOOD ORGANISM WITH FOOD VACUOLE
SYMBIOSIS


ENDOSYMBIOTIC GREEN ALGAE
PROTOZOAN
FOOD VACUOLE
NUCLEUS
CONTRACTILE VACUOLE
FOOD ORGANISM WITH FOOD VACUOLE
ENDOSYMBIOSIS
SYMBIOSIS

PLASTID EVOLUTION

PLASTID EVOLUTION HYPOTHETICAL SCENARIO

S

HETEROTROPHIC
HOST CELL

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

AUTOTROPHIC
PROKARYOTE

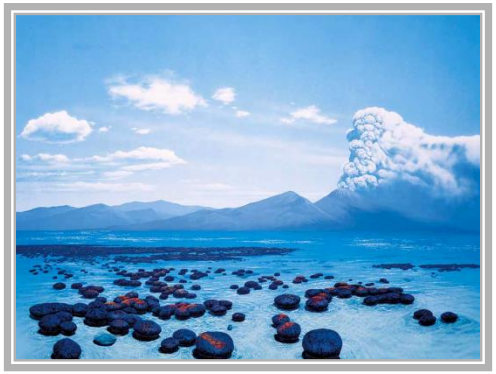
DNA W\OUT HISTONE PROTEINS

SMALL RIBOSOMES

HETEROTROPHIC HOST CELL

DNA W\ HISTONE PROTEINS

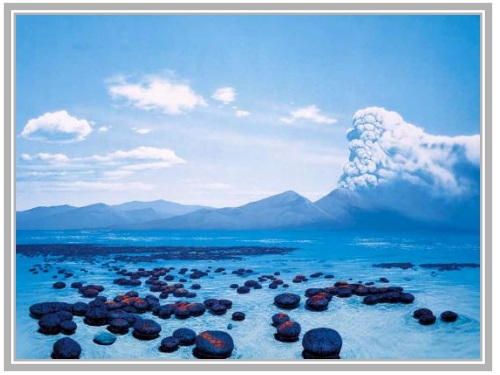
LARGE RIBOSOMES



AUTOTROPHIC PROKARYOTE

DNA W\OUT HISTONE PROTEINS

SMALL RIBOSOMES



HETEROTROPH & AUTOTROPH: SAME HABITAT