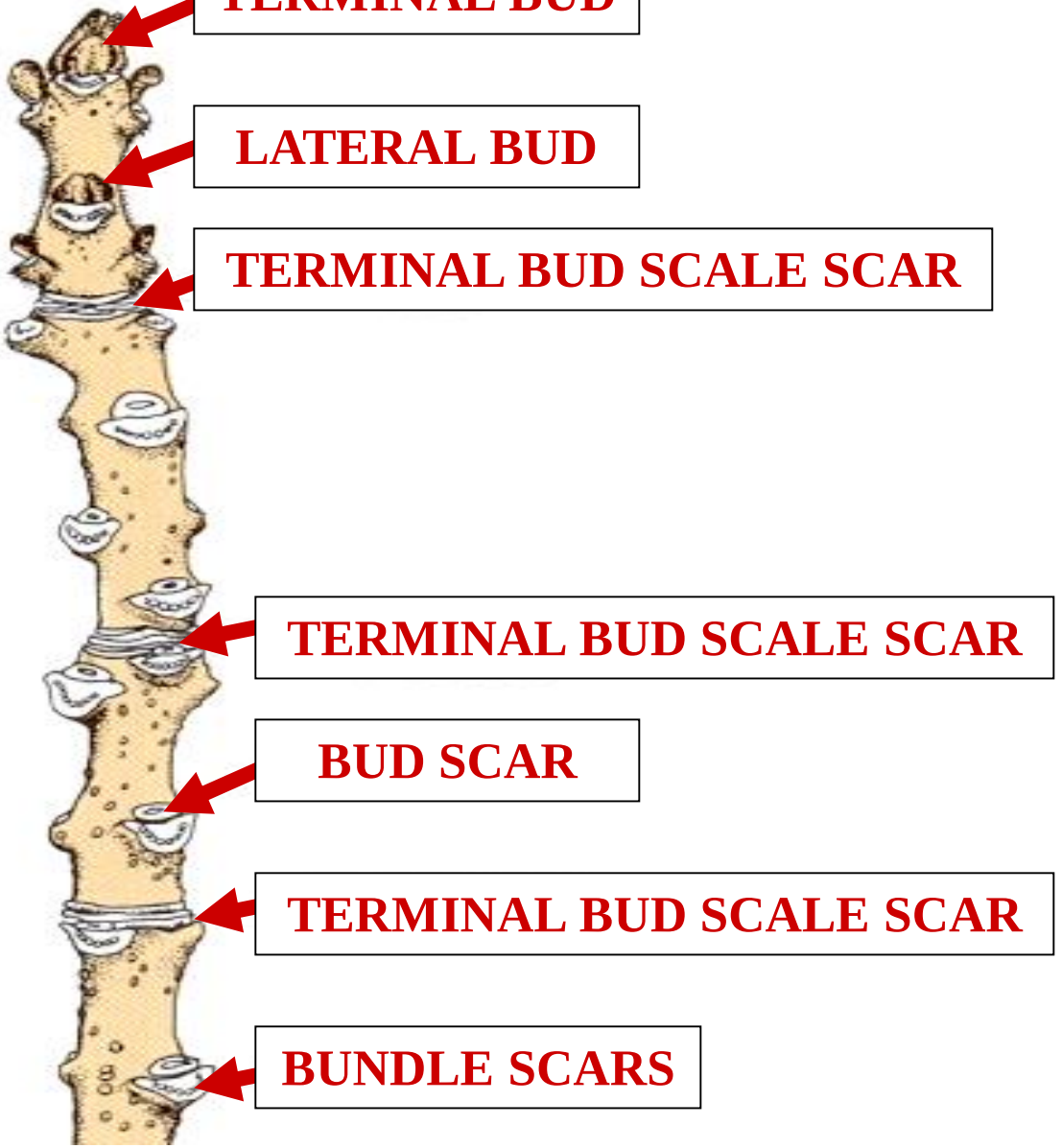
MORPHIOLOGY

STUDY PLANT EXTERNAL STRUCTURE

MORPHOLOGY

MORPHOLOGY STUDY EXTERNAL PLANT STRUCTURE

ANGIOSPERM TWIG MORPHOLOGY



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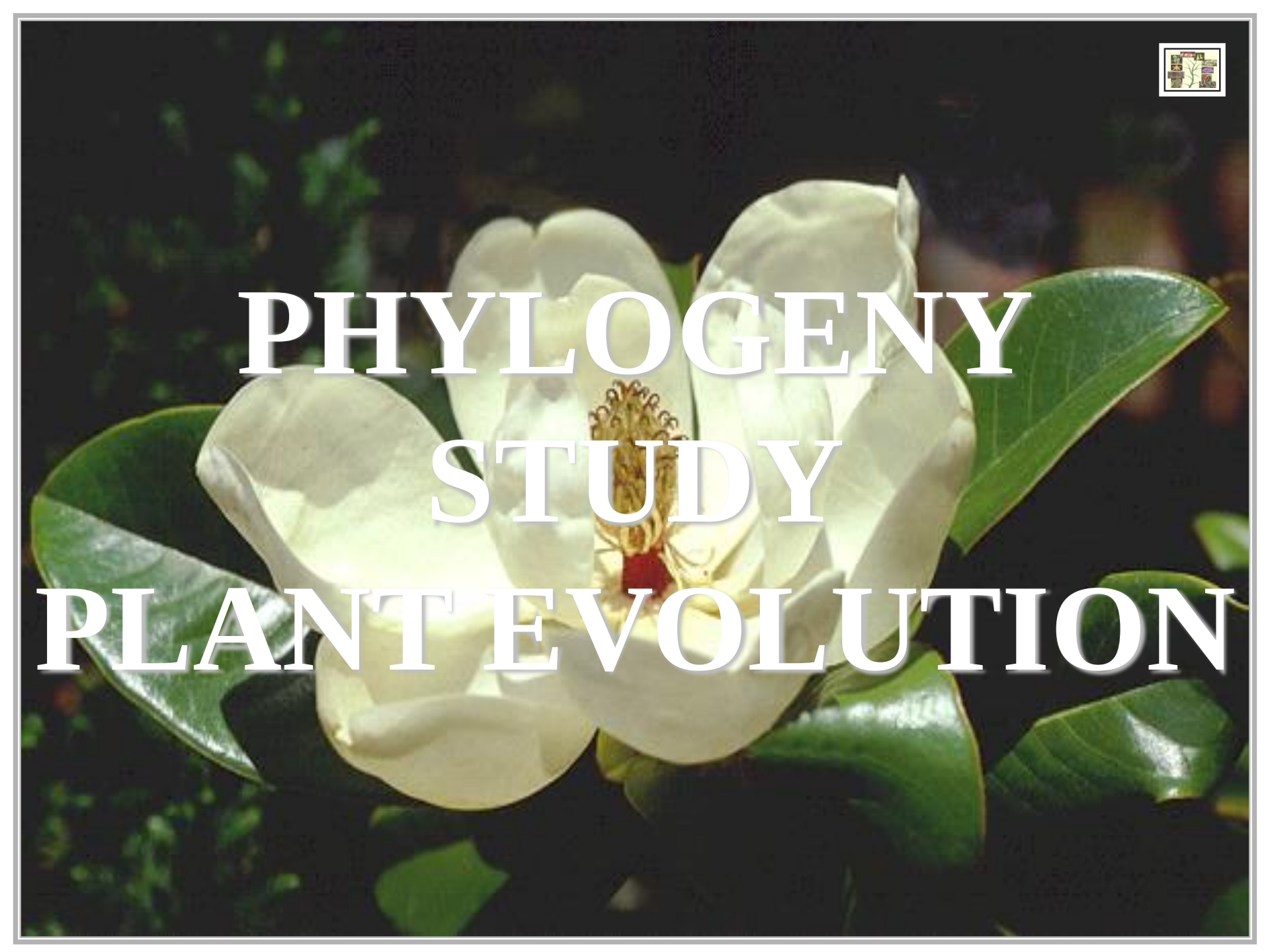
P

PHYLOGENY

PHYLOGENY

STUDY PLANT EVOLUTION

PHYLOGENY


PHYLOGENY
STUDY
PLANT EVOLUTION

PLANT PHYLOGENY

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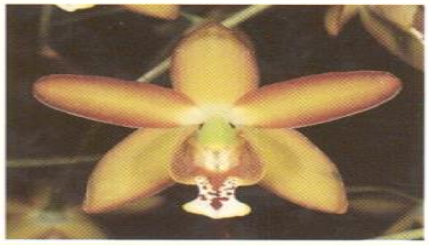


TRACHEOPHYTES

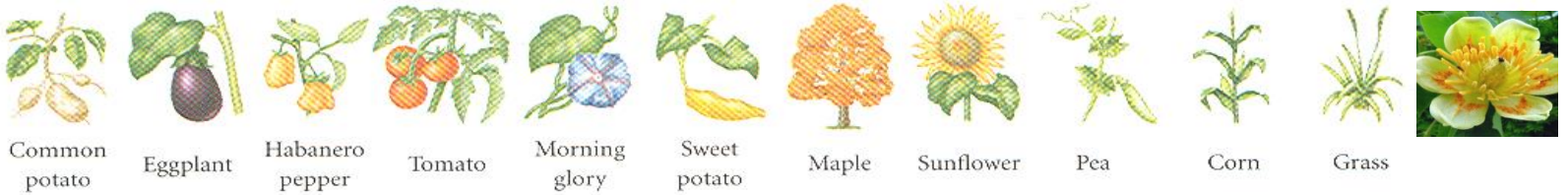
TAXONOMY

TAXONOMY

STUDY PLANT CLASSIFICATION

TAXONOMY

TAXONOMY STUDY PLANT CLASSIFICATION



PLANTAE

MAGNOLIOPHYTA

MAGNOLIOPSIDA

MAGNOLIALES

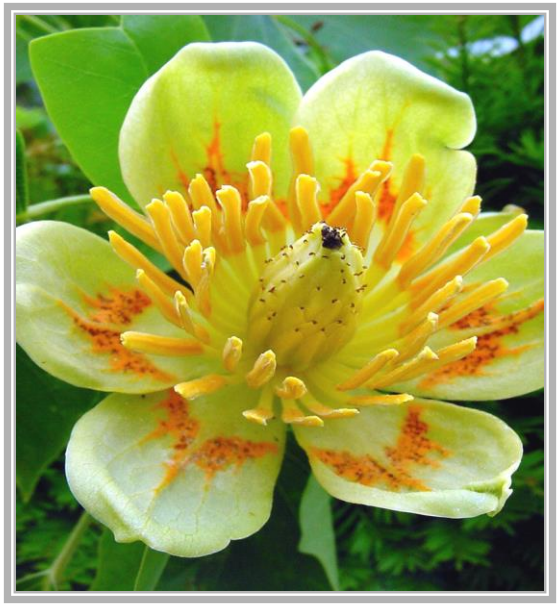
MAGNOLIACEAE

LIRIODENDRON

TULIP POPLAR

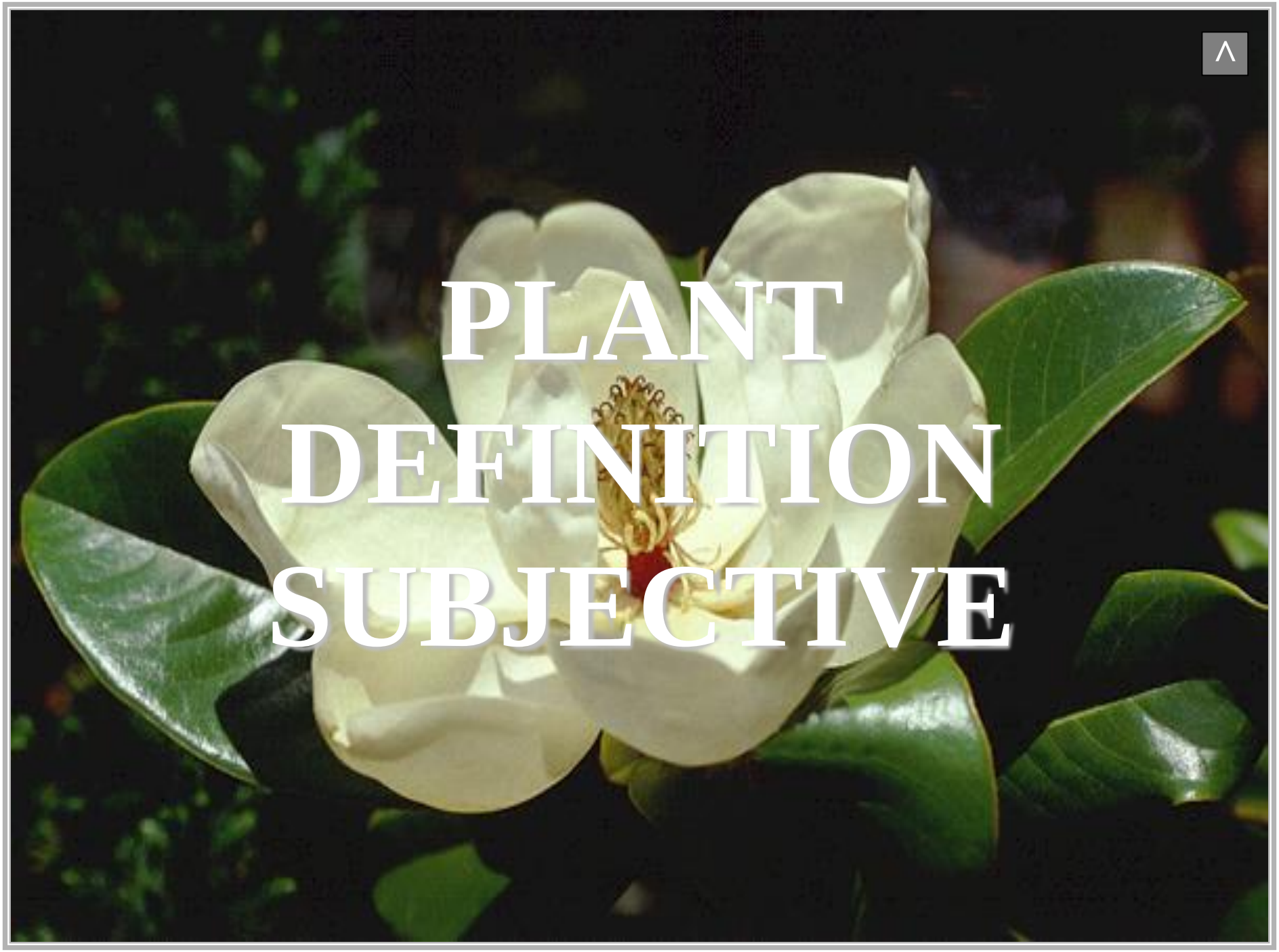
TULIPIFERA

TAXONOMIC CLASSIFICATION



PLANT DEFINITION


PLANT DEFINTION
NO
COMMON DEFINITION
AMONGST BOTANISTS


PLANT
DEFINITION
SUBJECTIVE

PLANT
CLASS DEFINITION

PLANT

PLANT

ORGANISM THAT POSSESSES PLASTIDS

PLANT

PLANT CELL

P

PLASTID

C.S.

PLASTID

PLASTID

PLANT ORGANELLE ASSOCIATED WITH:

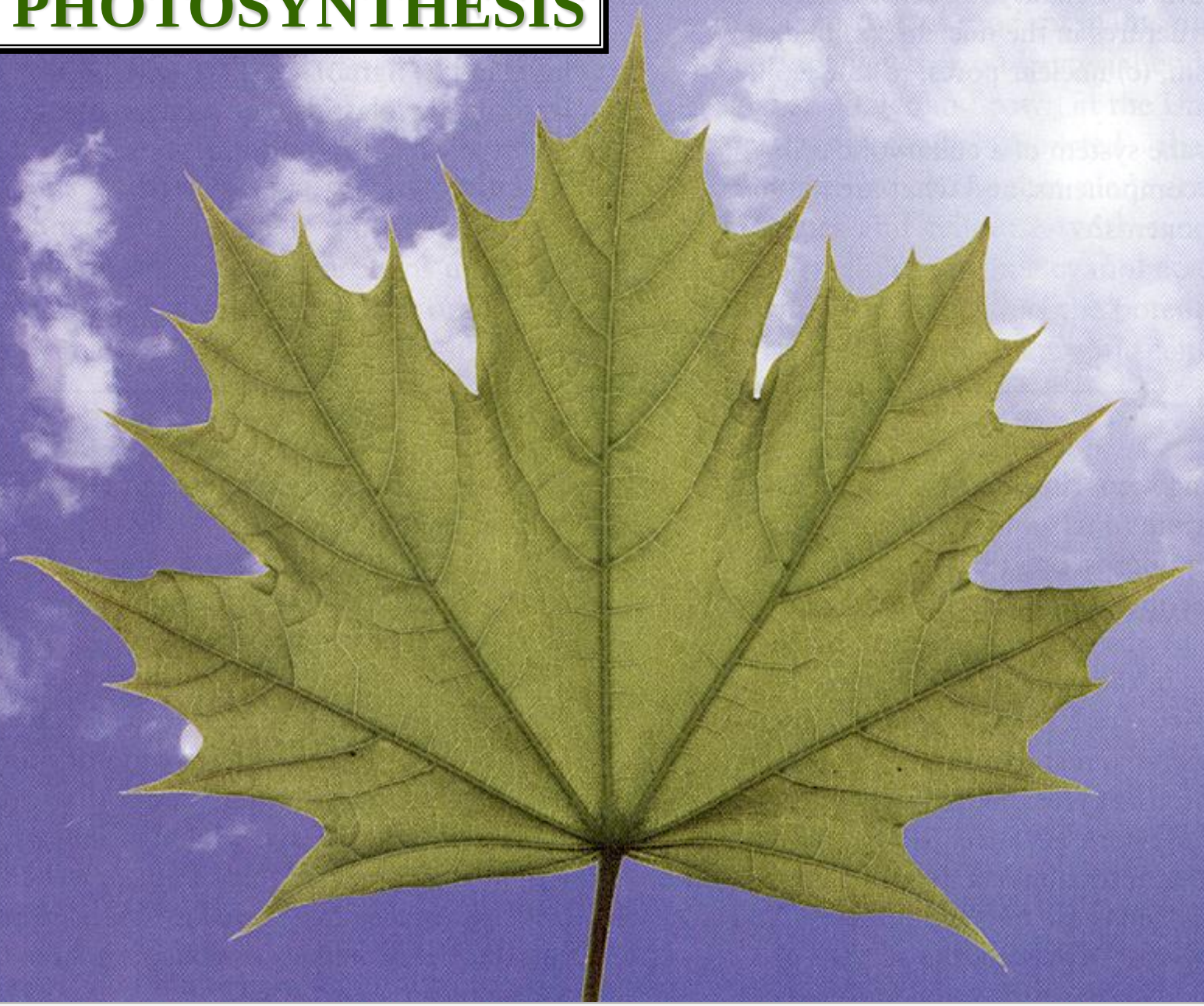
PLASTID

PLASTID

PLANT ORGANELLE ASSOCIATED WITH: PHOTOSYNTHESIS

PLASTID

PHOTOSYNTHESIS



PLANT CELL

C

PLASTID

C.S.

PLANT CELL

P

CHLOROPLAST

C.S.

PHOTOSYNTHESIS

Λ
P

WATER

CO2

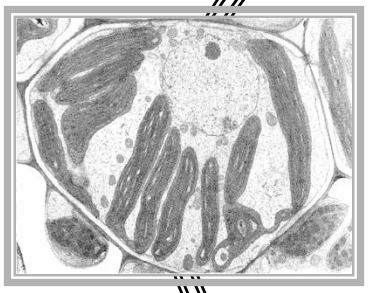
LIGHT EGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT

THYLAKOID

ATP

DK RXT

STROMA

CHEM EGY INPUT

SYNTHESIS

CHLOROPLAST

ATMOSPHERE

OXYGEN

GLUOSE

PLASTID

PLANT ORGANELLE ASSOCIATED WITH:

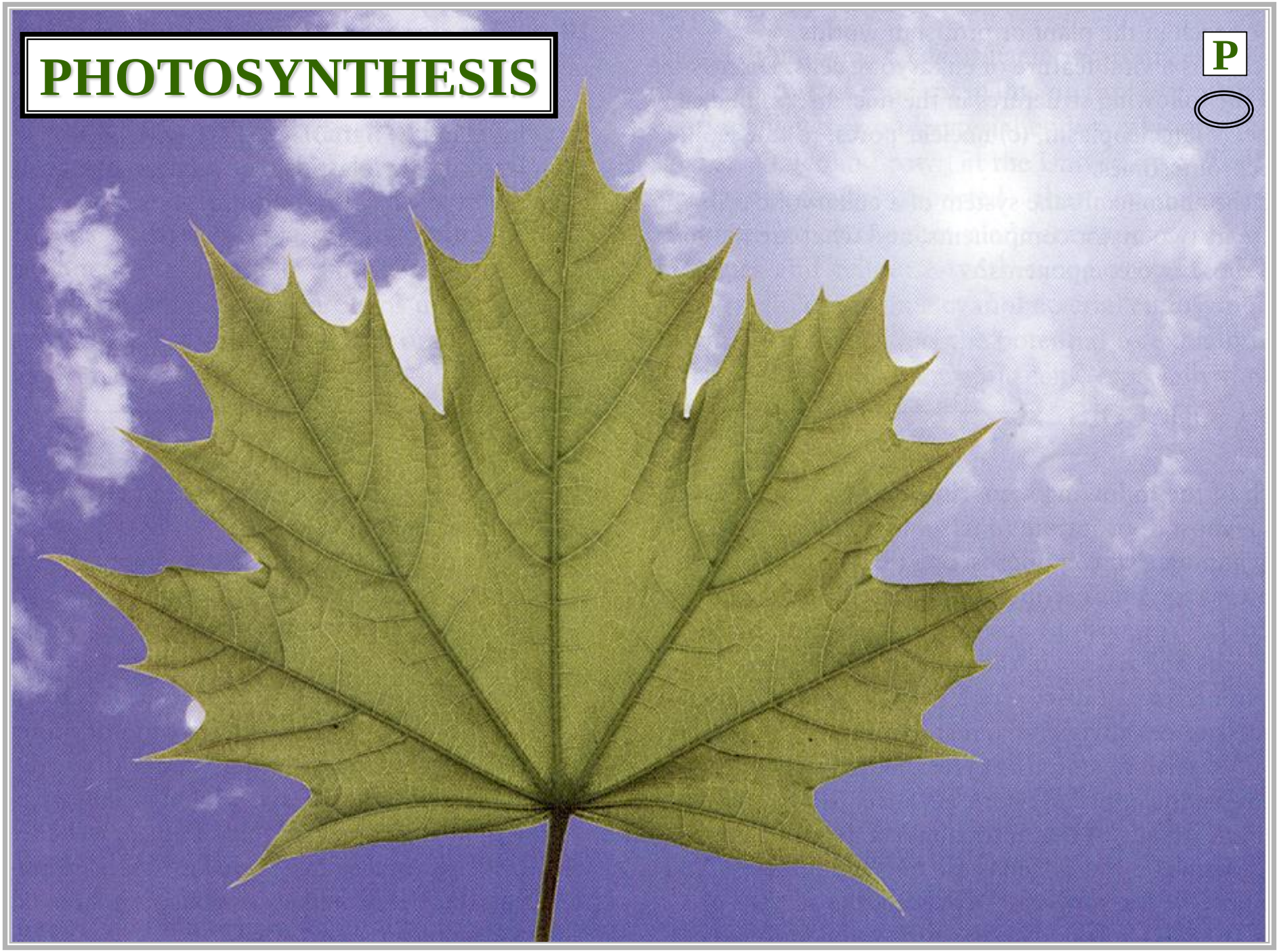
PLASTID

PLASTID

PLANT ORGANELLE ASSOCIATED WITH: STARCH STORAGE

PLASTID

PHOTOSYNTHESIS



PHOTOSYNTHESIS

S

WATER

CO2

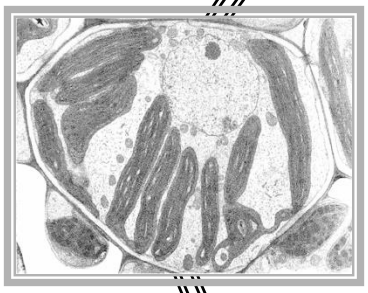
LIGHT EGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT

THYLAKOID

ATP

DK RXT

STROMA

SYNTHESIS

CHEM EGY INPUT

CHLOROPLAST

ATMOSPHERE

OXYGEN

GLUOSE

PHOTOSYNTHESIS

WATER

CO2

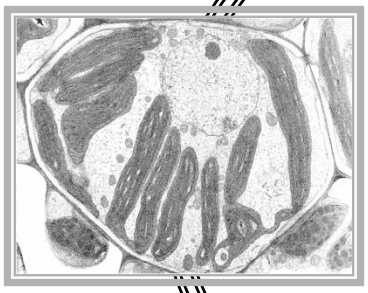
LIGHT EGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT

THYLAKOID

ATP

DK RXT

STROMA

SYNTHESIS

CHEM EGY INPUT

CHLOROPLAST

ATMOSPHERE

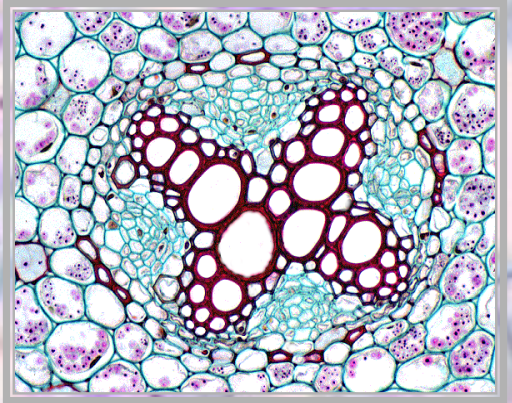
OXYGEN

STARCH

STARCH STORAGE

P

STARCH GRAINS



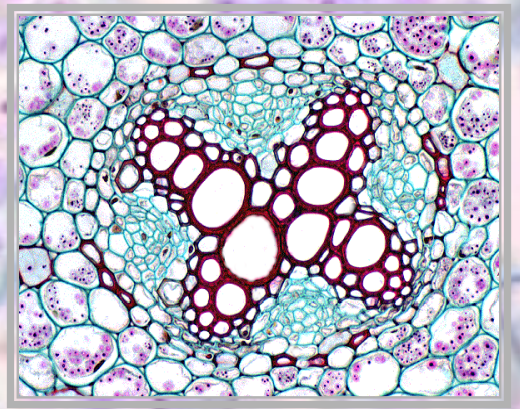
ROOT

C.S.

STARCH STORAGE

L

PLASTIDS



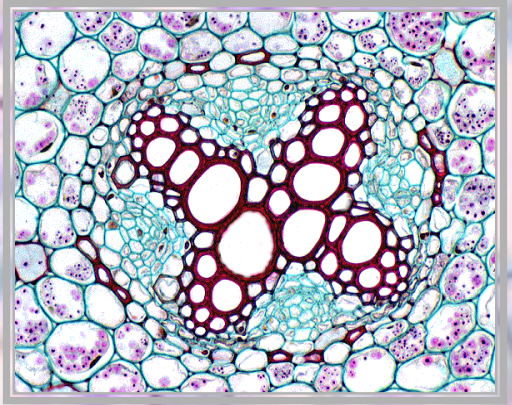
ROOT

C.S.

STARCH STORAGE

$

LEUCOPLASTS



ROOT

C.S.

^
T

PLANT

ORGANISM THAT POSSESSES PLASTIDS

PLANT

TRUE PLANT

TRUE PLANT

POSSESSES CHLOROPLASTS WITH:

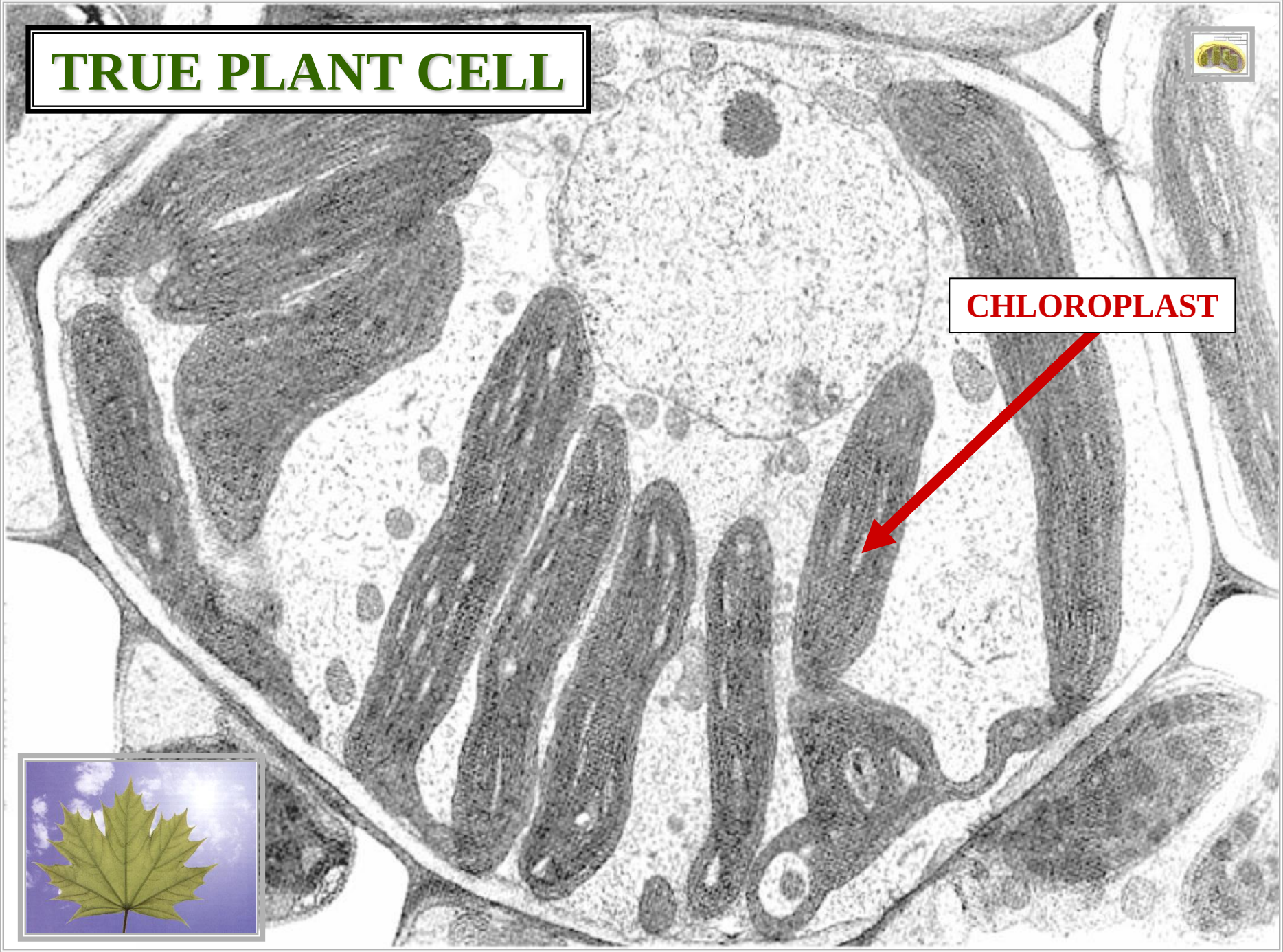
TRUE PLANT

TRUE PLANT

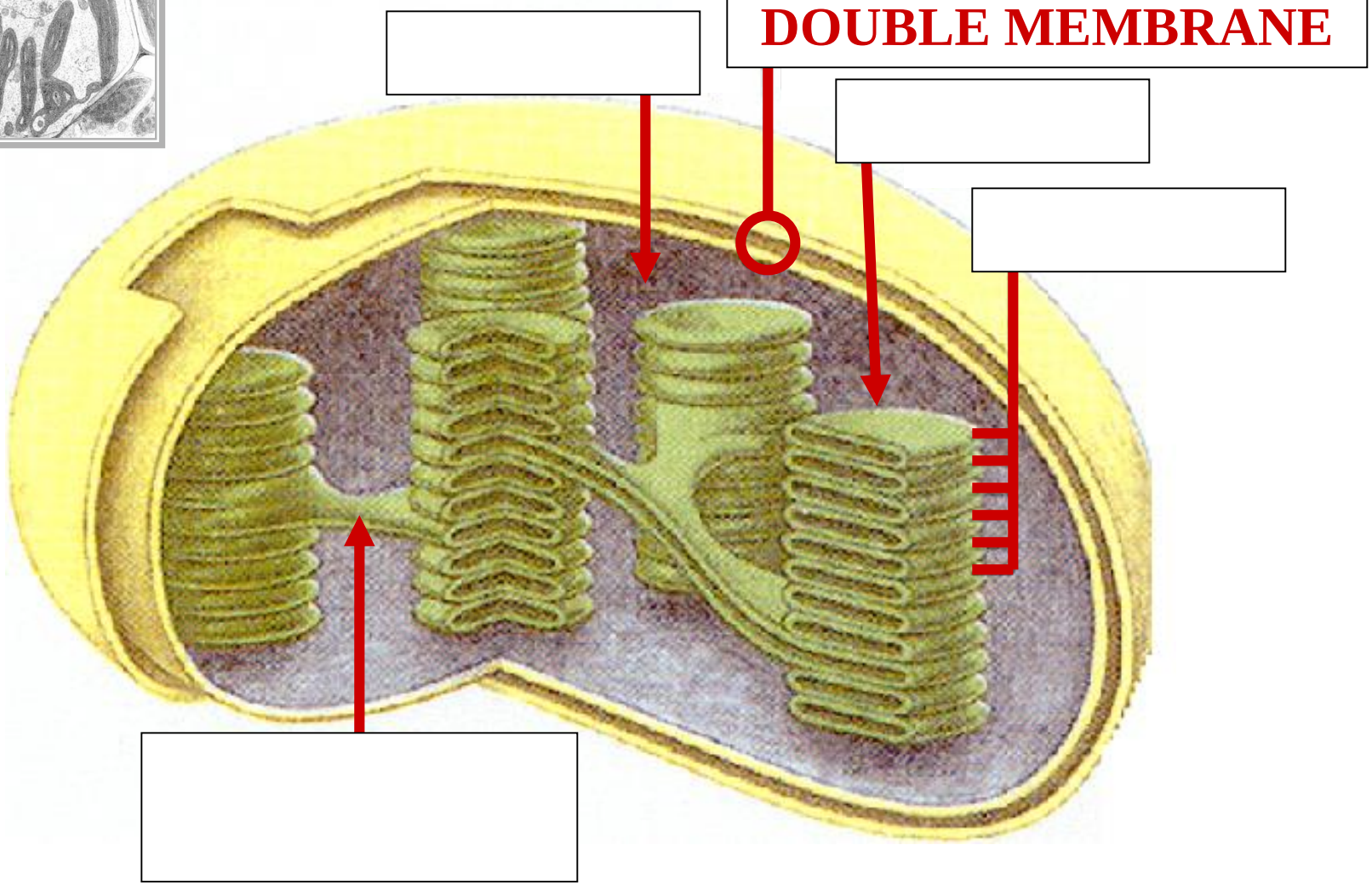
POSSESSES CHLOROPLASTS WITH: DOUBLE MEMBRANE

TRUE PLANT

TRUE PLANT CELL



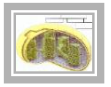
TRUE PLANT CHLOROPLAST ULTRASTRUCTURE



TRUE PLANT

POSSESSES CHLOROPLASTS WITH:

TRUE PLANT

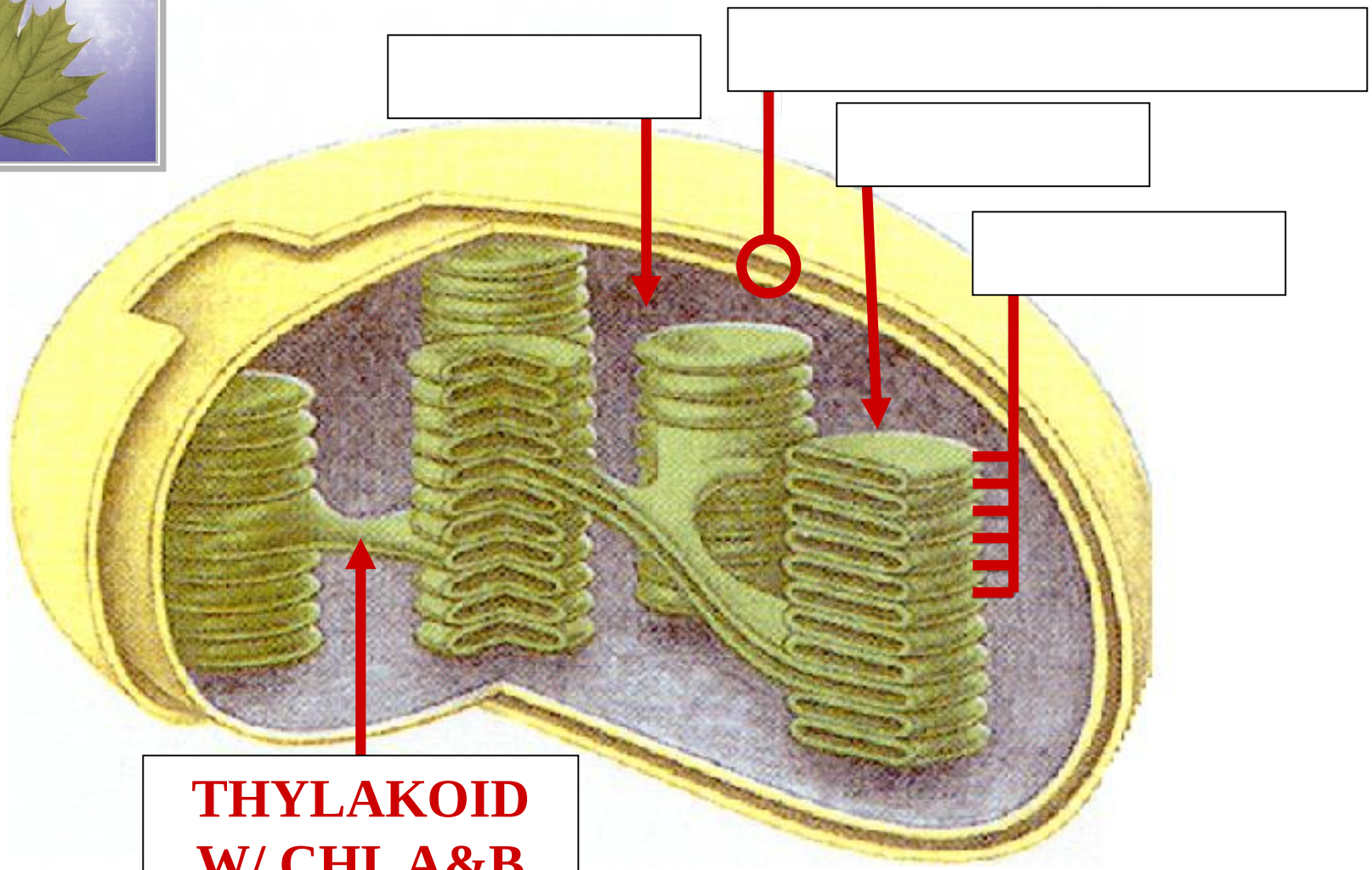


TRUE PLANT

POSSESSES CHLOROPLASTS WITH: CHLOROPHYLL A&B

TRUE PLANT

TRUE PLANT CHLOROPLAST ULTRASTRUCTURE



THYLAKOID W/ CHL A&B

TRUE PLANT

POSSESSES CHLOROPLASTS WITH: DOUBLE MEMBRANE CHLOROPHYLL A&B

TRUE PLANT


M
?


P
MAGNOLIA

PLANT

TRUE PLANT

PLASTID EVOLUTION

E

ENDOSYMBIOTIC THEORY

ENDOSYMBIOTIC THEORY

ENDOSYMBIOTIC THEORY

PLASTID EVOLUTION VIA SYMBIOSIS

ENDOSYMBIOTIC THEORY

SYMBIOSIS

SYMBIOSIS

SYMBIOSIS

2 SPECIES LIVING INTRICATE ASSOCIATION

SYMBIOSIS


L

LICHEN

LICHEN SYMBIOTIC RELATIONSHIP

LICHEN THALLUS

SYMBIOSIS

L.S.

LICHEN THALLUS

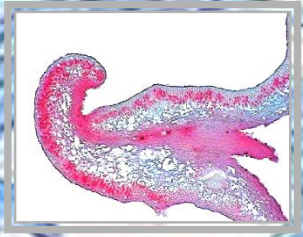
F

SYMBIOSIS

L.S.

LICHEN THALLUS

B



FUNGUS SYMBIONT

L.S.

SYMBIOSIS

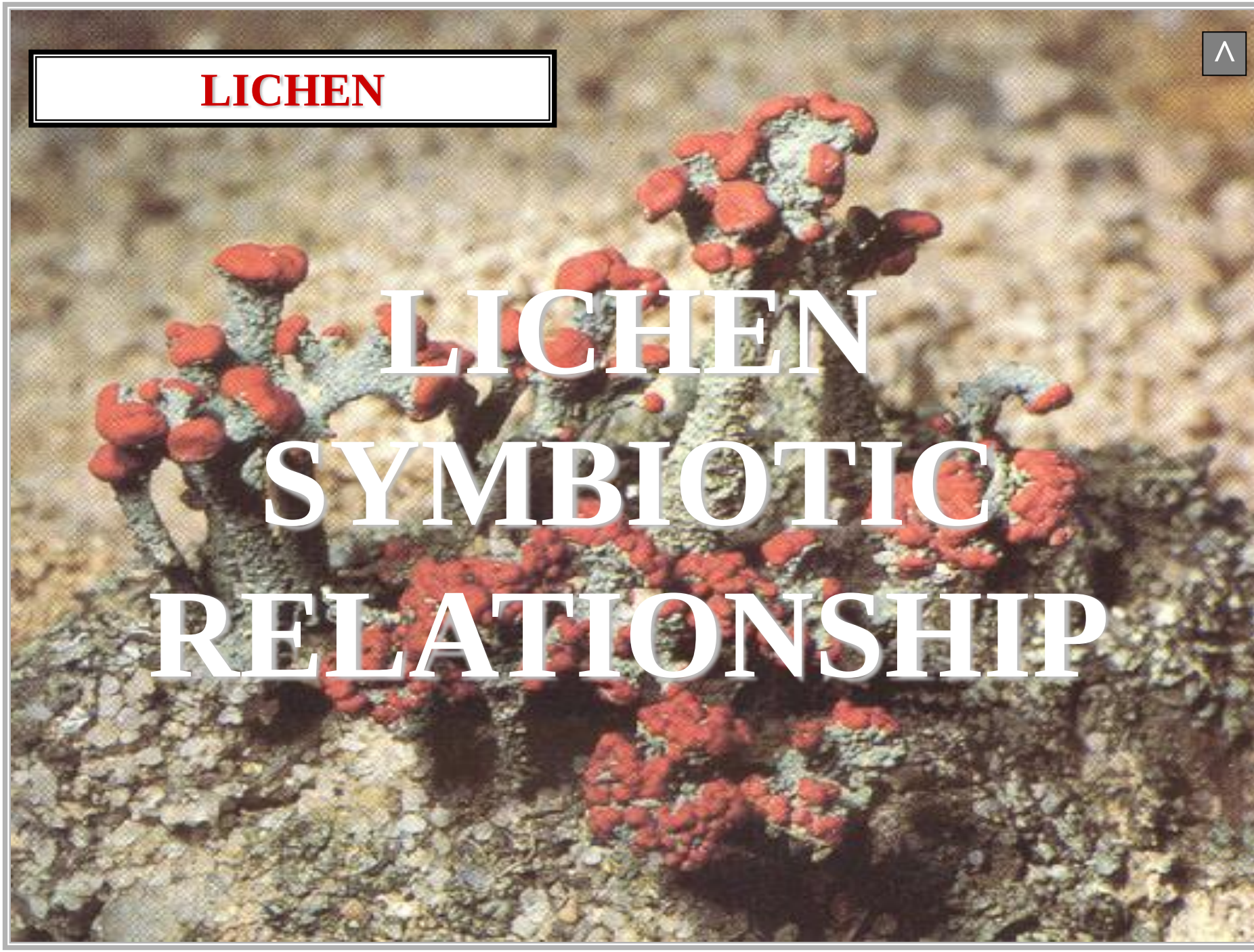
LICHEN THALLUS

BACTERIA SYMBIONT

FUNGUS SYMBIONT

L.S.

SYMBIOSIS


LICHEN
LICHEN
SYMBIOTIC
RELATIONSHIP

SYMBIOSIS TYPES

SYMBIOSIS TYPES

PARASITISM

SYMBIOSIS TYPES

SYMBIOSIS TYPES

PARASITISM
COMMENSALISM

SYMBIOSIS TYPES

P

SYMBIOSIS TYPES

PARASITISM
COMMENSALISM
MUTUALISM

SYMBIOSIS TYPES

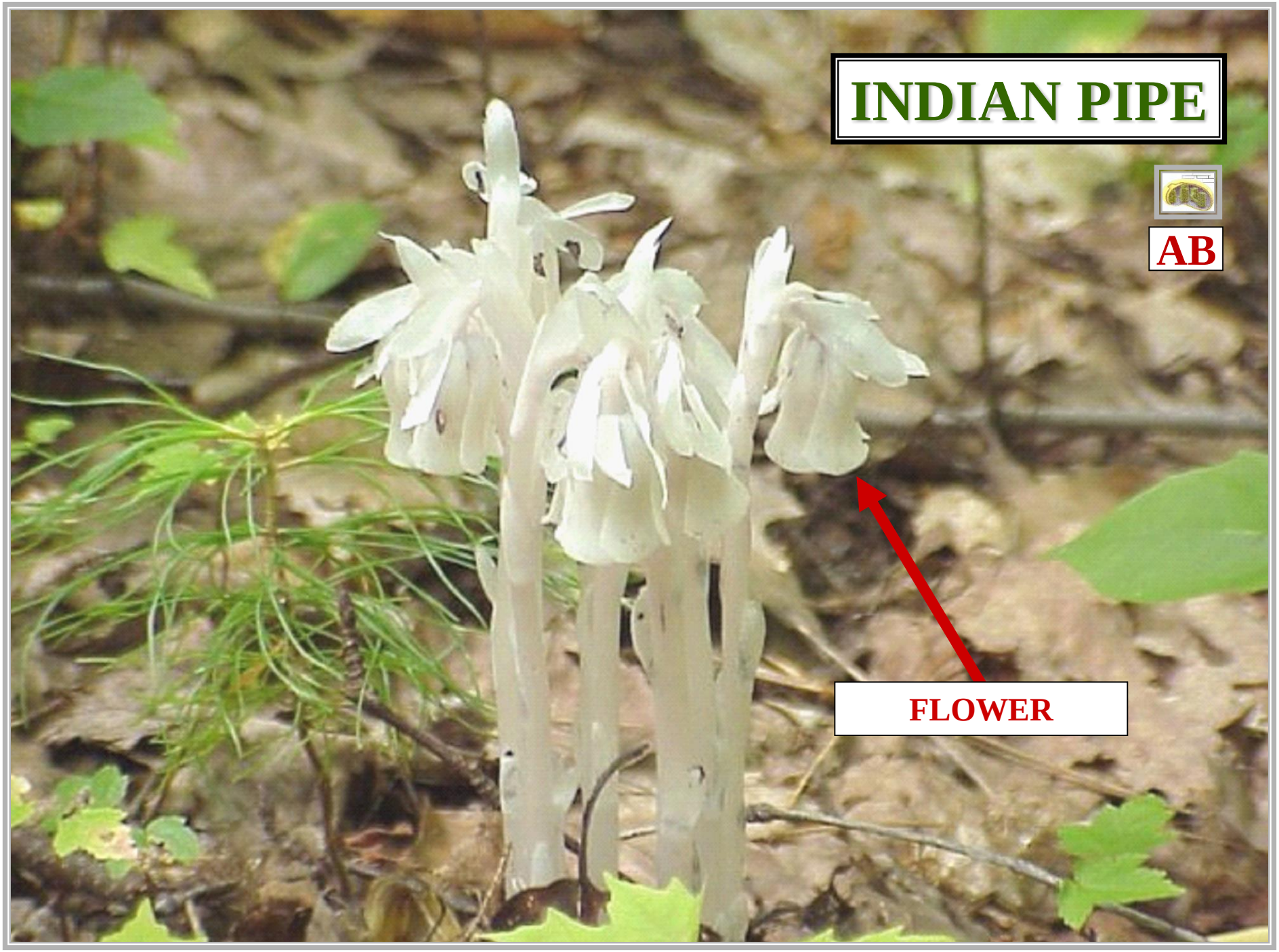
PARASITISM

SYMBIOSIS
PARASITISM

ONE SPECIES BENEFITS
ONE SPECIES ADVERSELY AFFECTED

SYMBIOSIS
PARASITISM

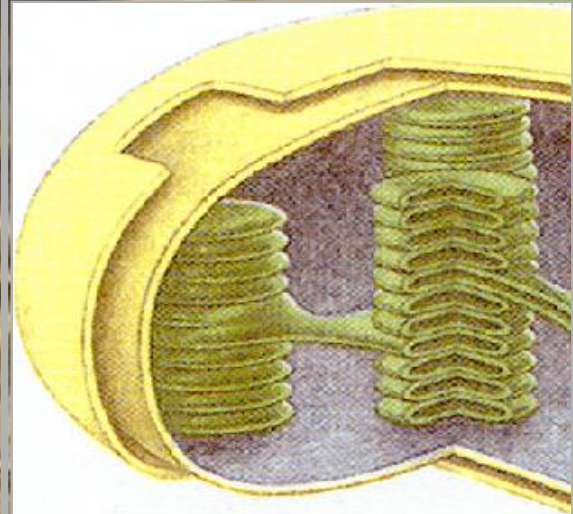

INDIAN PIPE
F


INDIAN PIPE
AB
FLOWER

INDIAN PIPE

P

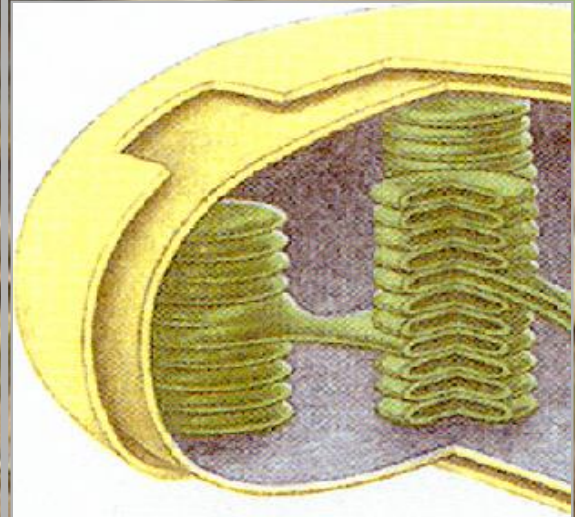
AB



CHLOROPLASTS ABSENT

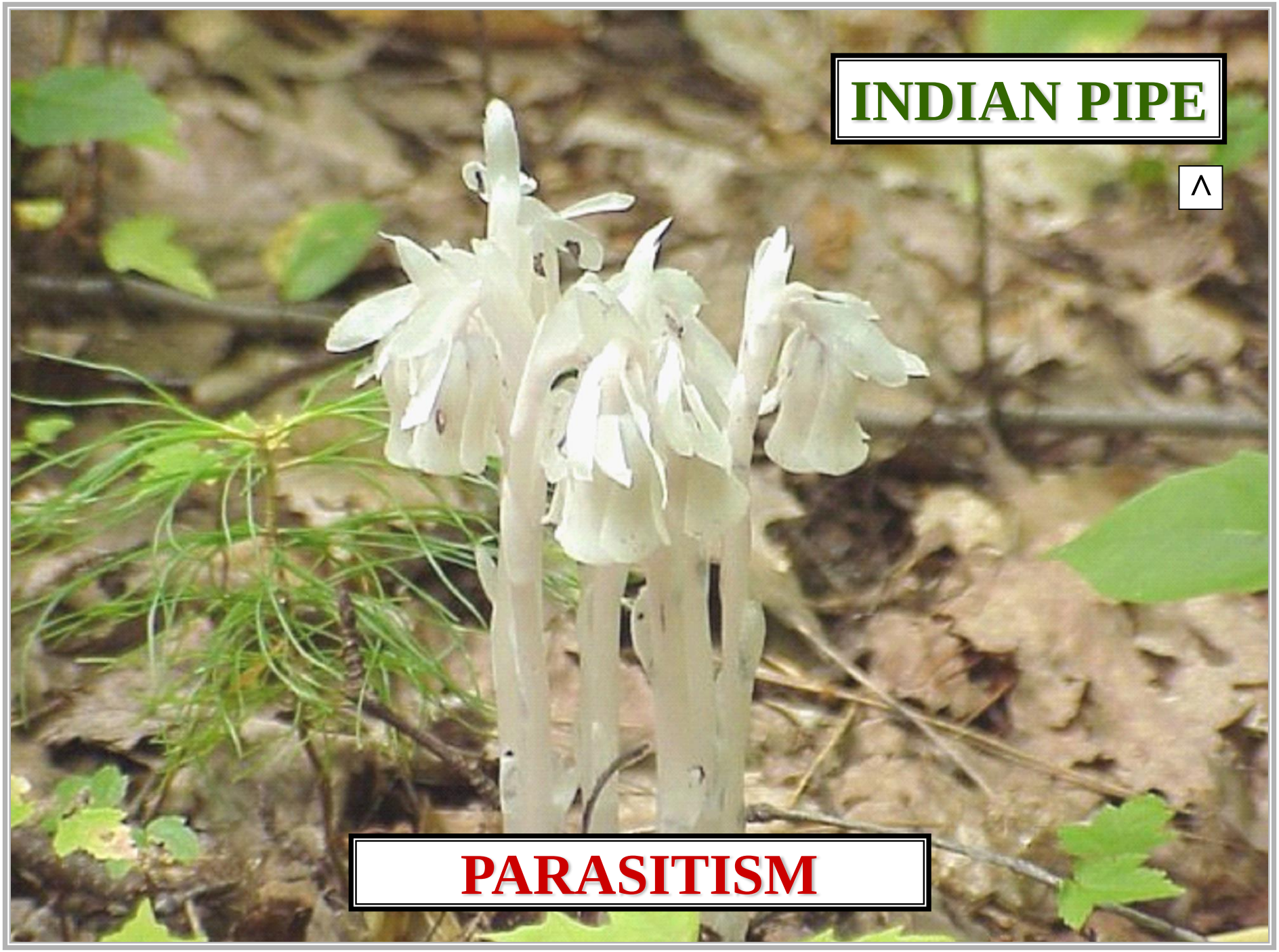
INDIAN PIPE

N



PHOTOSYNTHESIS ABSENT


INDIAN PIPE
P
NON-PSYN PLANT


INDIAN PIPE
PARASITISM

COMMENSALISM

SYMBIOSIS
COMMENSALISM

ONE SPECIES BENEFITS
ONE SPECIES UNAFFECTED

SYMBIOSIS
COMMENSALISM

AFRICAN SAVANNA

C

SYMBIOSIS

^

COMMENSALISM

SYMBIOSIS

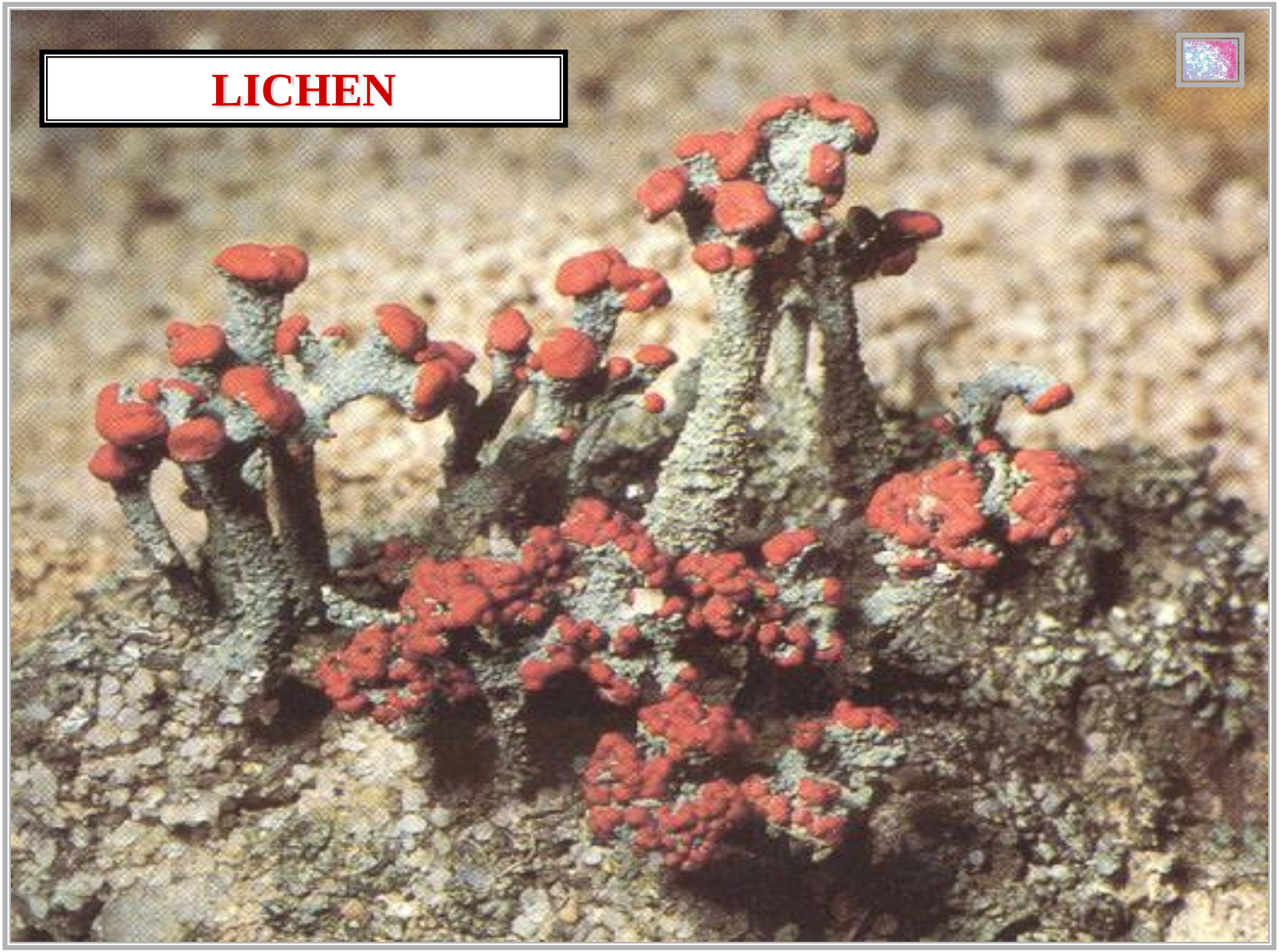
MUTUALISM

SYMBIOSIS TYPES MUTUALISM

BOTH/TWO SPECIES BENEFIT

SYMBIOSIS TYPES MUTUALISM

LICHEN



LICHEN THALLUS

F

SYMBIOSIS

L.S.

LICHEN THALLUS

B

FUNGUS SYMBIONT

L.S.

SYMBIOSIS

LICHEN THALLUS

BACTERIA SYMBIONT

FUNGUS SYMBIONT

L.S.

SYMBIOSIS

LICHEN THALLUS

BACTERIA SYMBIONT
PHOTOSYNTHETIC

FUNGUS SYMBIONT

L.S.

SYMBIOSIS

LICHEN THALLUS

F

BACTERIA SYMBIONT
PHOTOSYNTHETIC
PROVIDES: GLUCOSE

FUNGUS SYMBIONT
GLUCOSE

L.S.

SYMBIOSIS

LICHEN THALLUS

BACTERIA SYMBIONT
PHOTOSYNTHETIC
PROVIDES: GLUCOSE
SECURITY

FUNGUS SYMBIONT
GLUCOSE
PROVIDES: SECURITY

L.S.

SYMBIOSIS

LICHEN THALLUS

BACTERIA SYMBIONT
PHOTOSYNTHETIC
PROVIDES: GLUCOSE
SECURITY

FUNGUS SYMBIONT
GLUCOSE
PROVIDES: SECURITY

L.S.

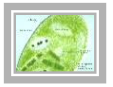
MUTUALISM

SYMBIOSIS

E

ENDOSYMBIOSIS

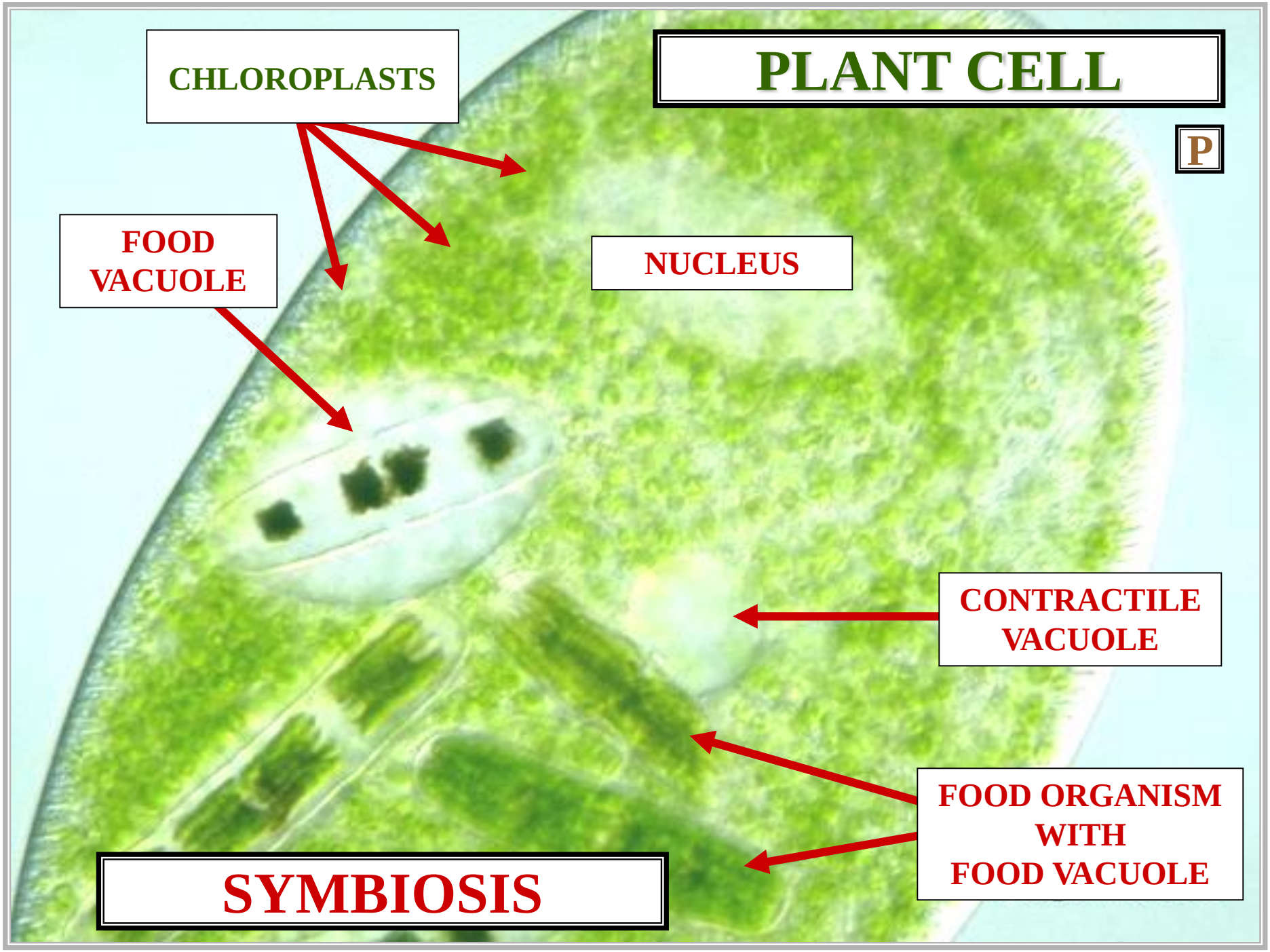
ENDOSYMBIOSIS

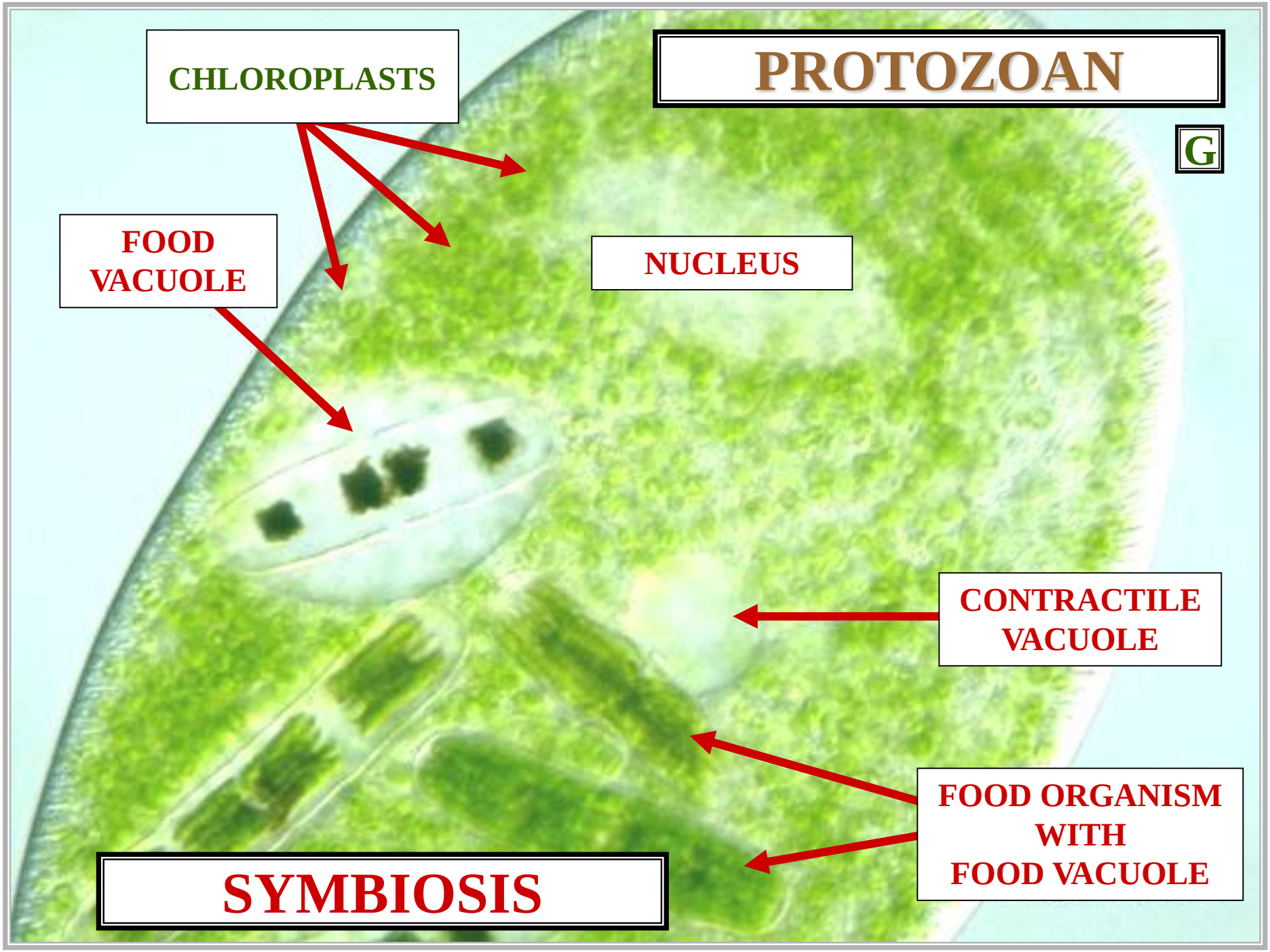


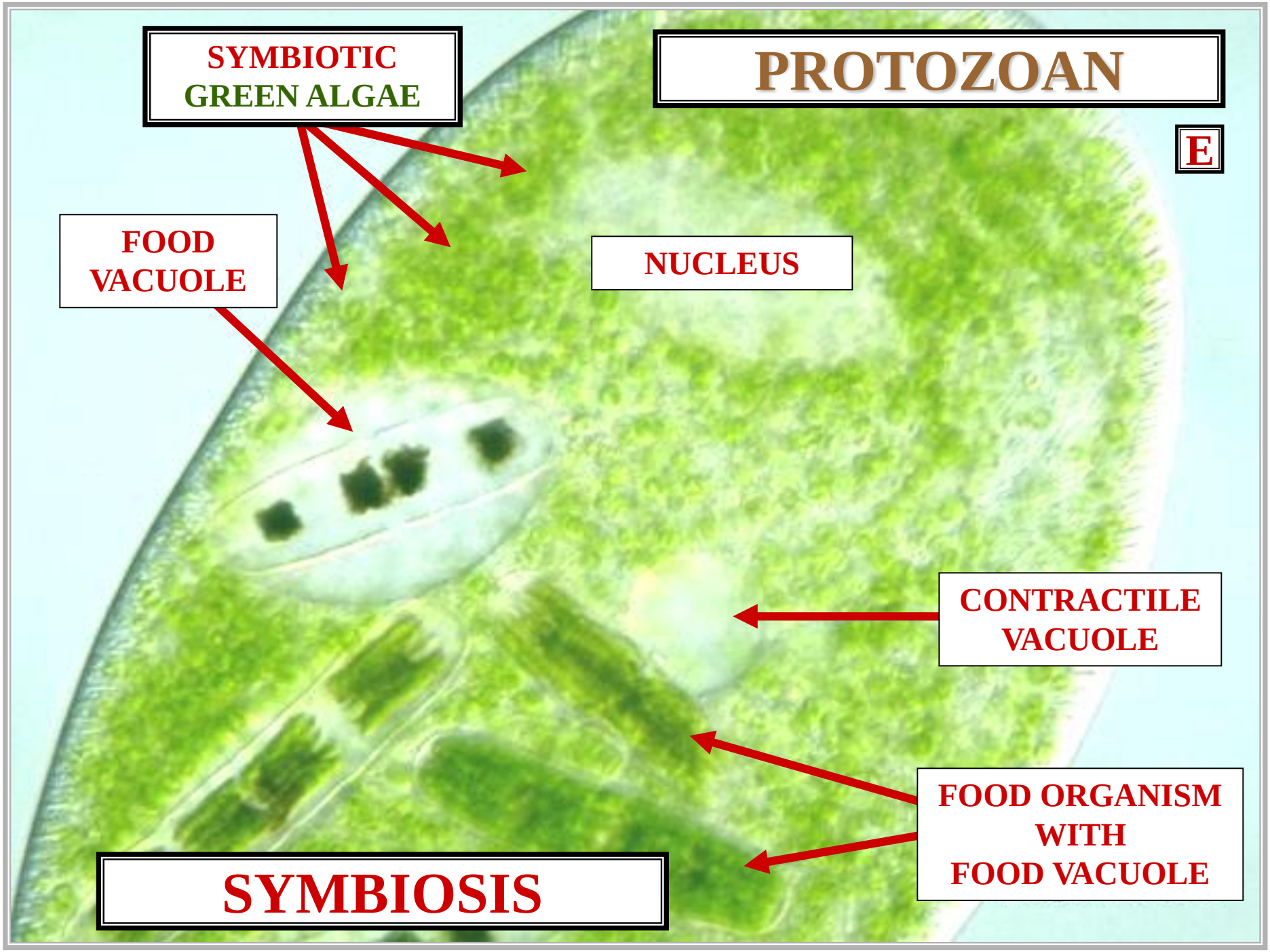
ENDOSYMBIOSIS

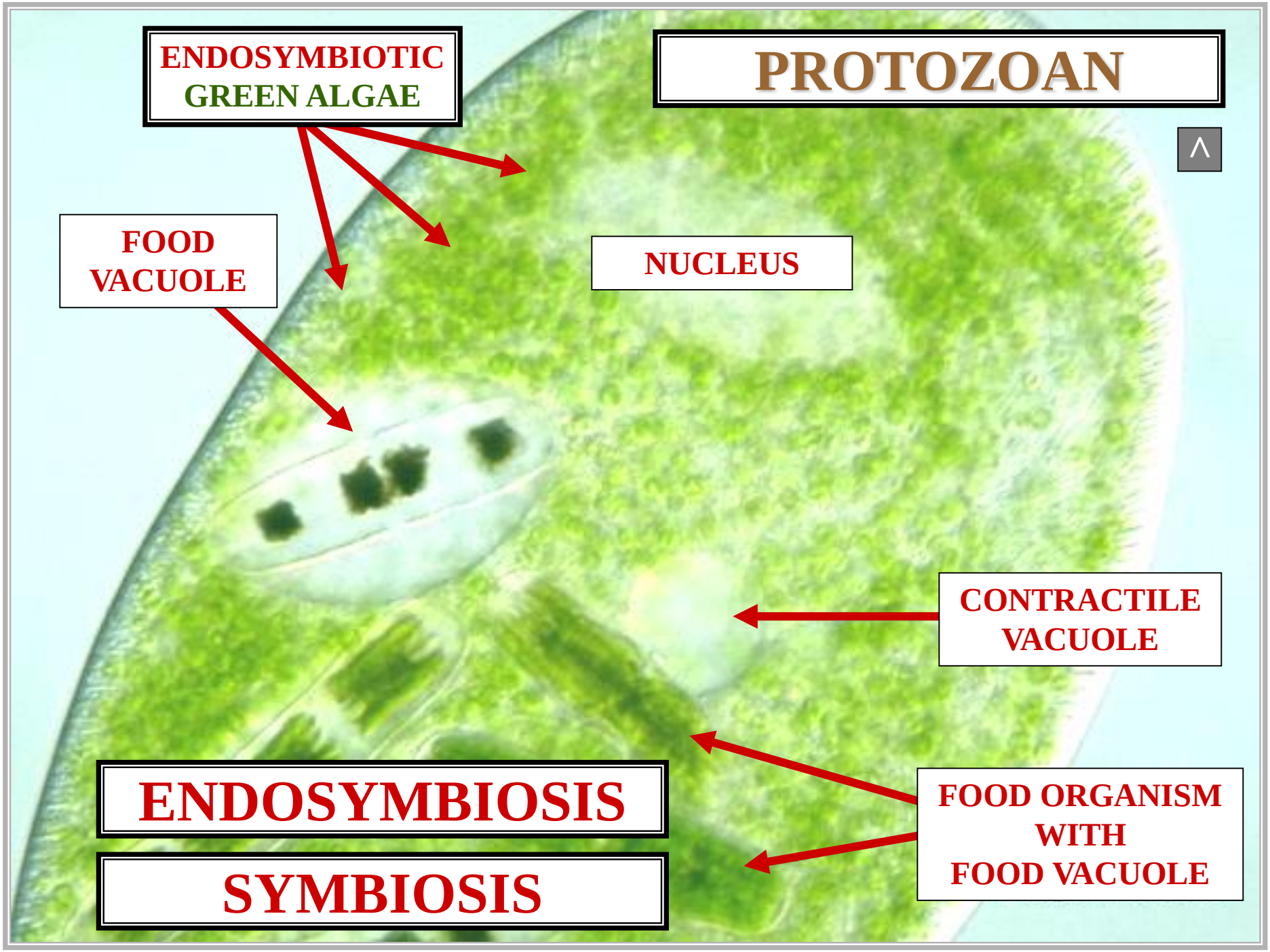
ONE SPECIES LIVING WITHIN SECOND HOST SPECIES

ENDOSYMBIOSIS


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


CHLOROPLASTS
PROTOZOAN
G
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

HYPOTHETICAL SCENARIO

S

HETEROTROPHIC
HOST CELL

DNA W\ HISTONE PROTEINS

LARGE RIBOSOMES

AUTOTROPHIC
PROKARYOTE

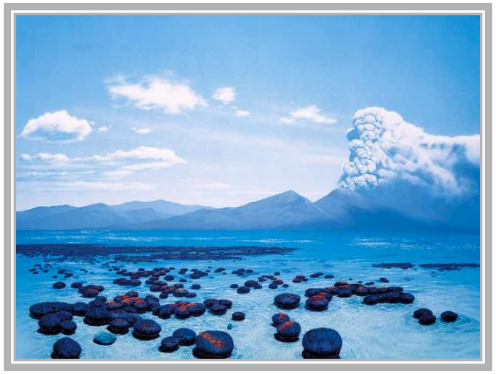
DNA W\OUT HISTONE PROTEINS

SMALL RIBOSOMES

HETEROTROPHIC HOST CELL

DNA W\ HISTONE PROTEINS

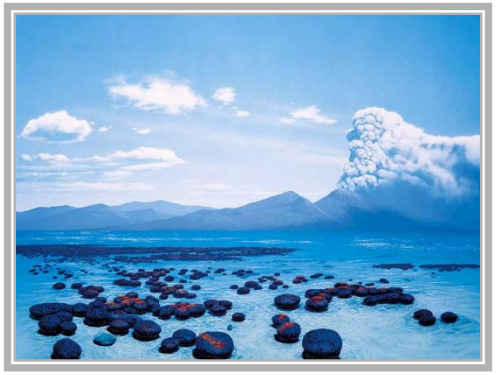
LARGE RIBOSOMES



AUTOTROPHIC PROKARYOTE

DNA W\OUT HISTONE PROTEINS

SMALL RIBOSOMES



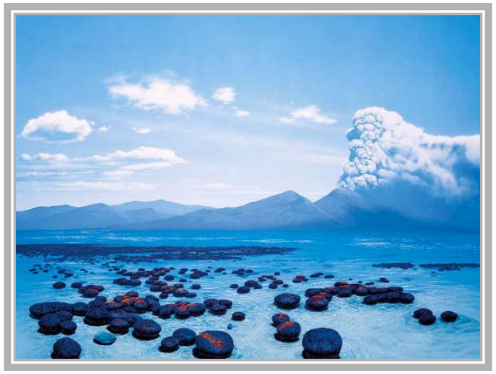
HETEROTROPH & AUTOTROPH: SAME HABITAT

C

HETEROTROPHIC
HOST CELL

DNA W\ HISTONE PROTEINS

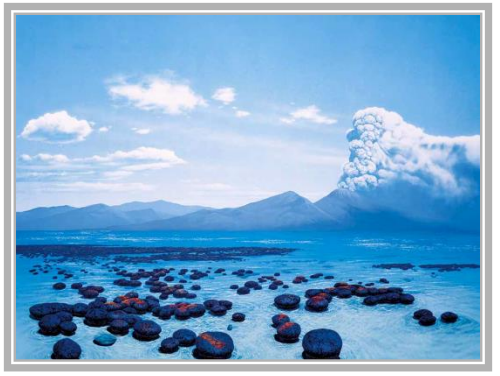
LARGE RIBOSOMES



AUTOTROPHIC
PROKARYOTE

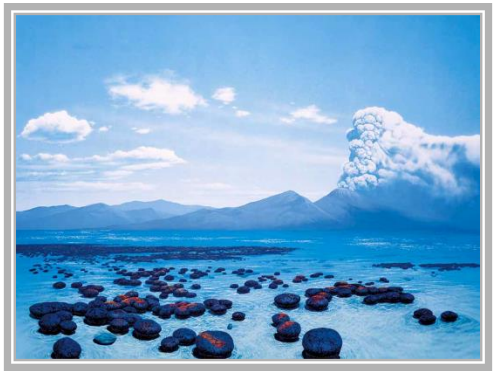
PHOTOSYNTHESIS

GLUCOSE



HETEROTROPHIC
HOST CELL

CONSUMES OTHER ORGANISMS
CONSUMES AUTOTROPH



AUTOTROPHIC
PROKARYOTE

PHOTOSYNTHESIS

GLUCOSE