



LIGHT ENERGY

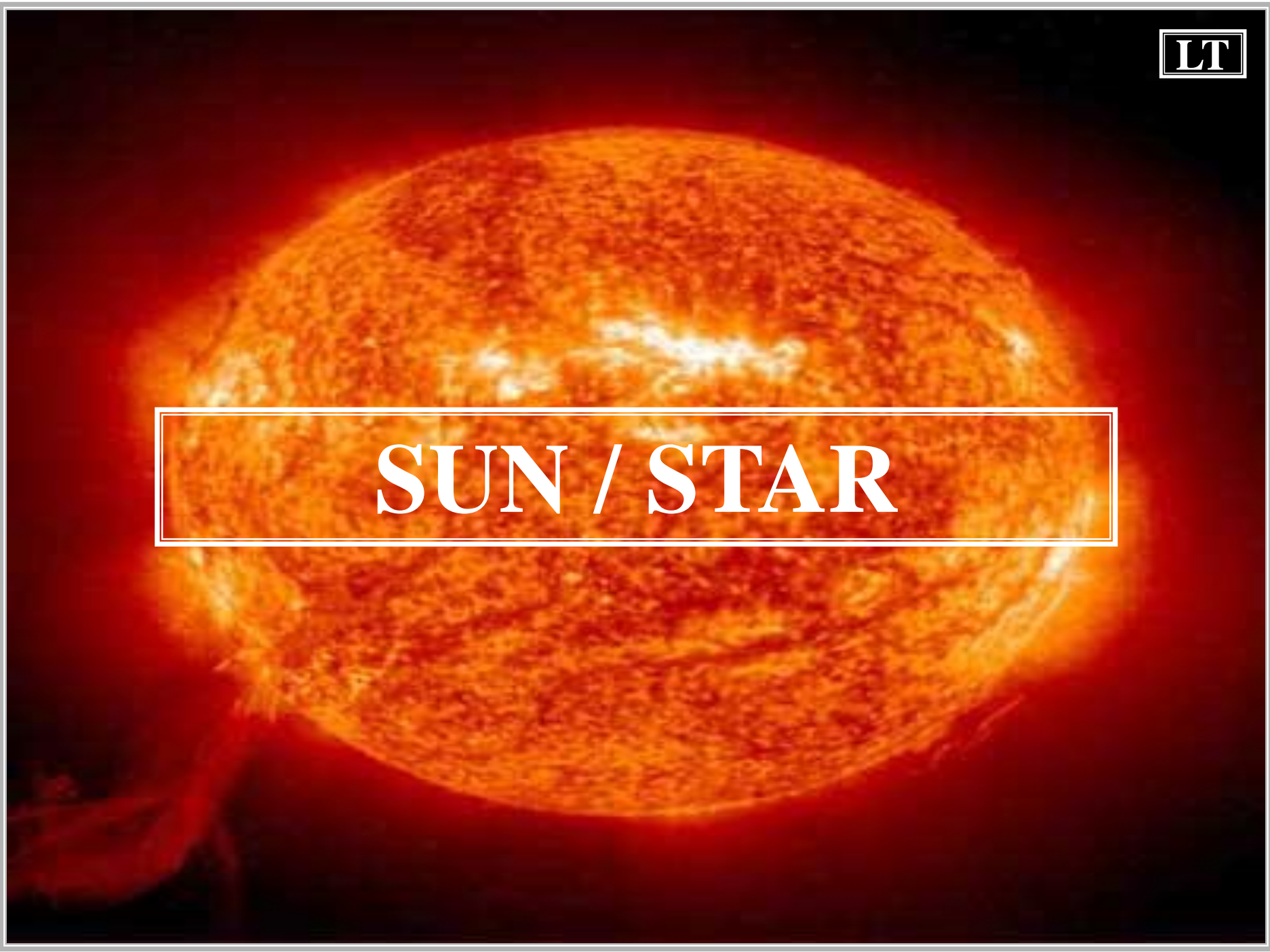


QUESTION

WHAT IS THE
SOURCE OF THE
LIGHT ENERGY?

QUESTION

SUN / STAR



SFR

LIGHT ENERGY SOURCE

SUN / STAR



SOLAR FUSION REACTIONS

SUN / STAR



SOLAR FUSION REACTIONS



?

SUN / STAR

H

P

HYDROGEN

SUN / STAR

HEAT

HYDROGEN

PRESSURE

SUN / STAR

HE



HEAT

HYDROGEN FUSION REACTIONS

PRESSURE

SUN / STAR

HT

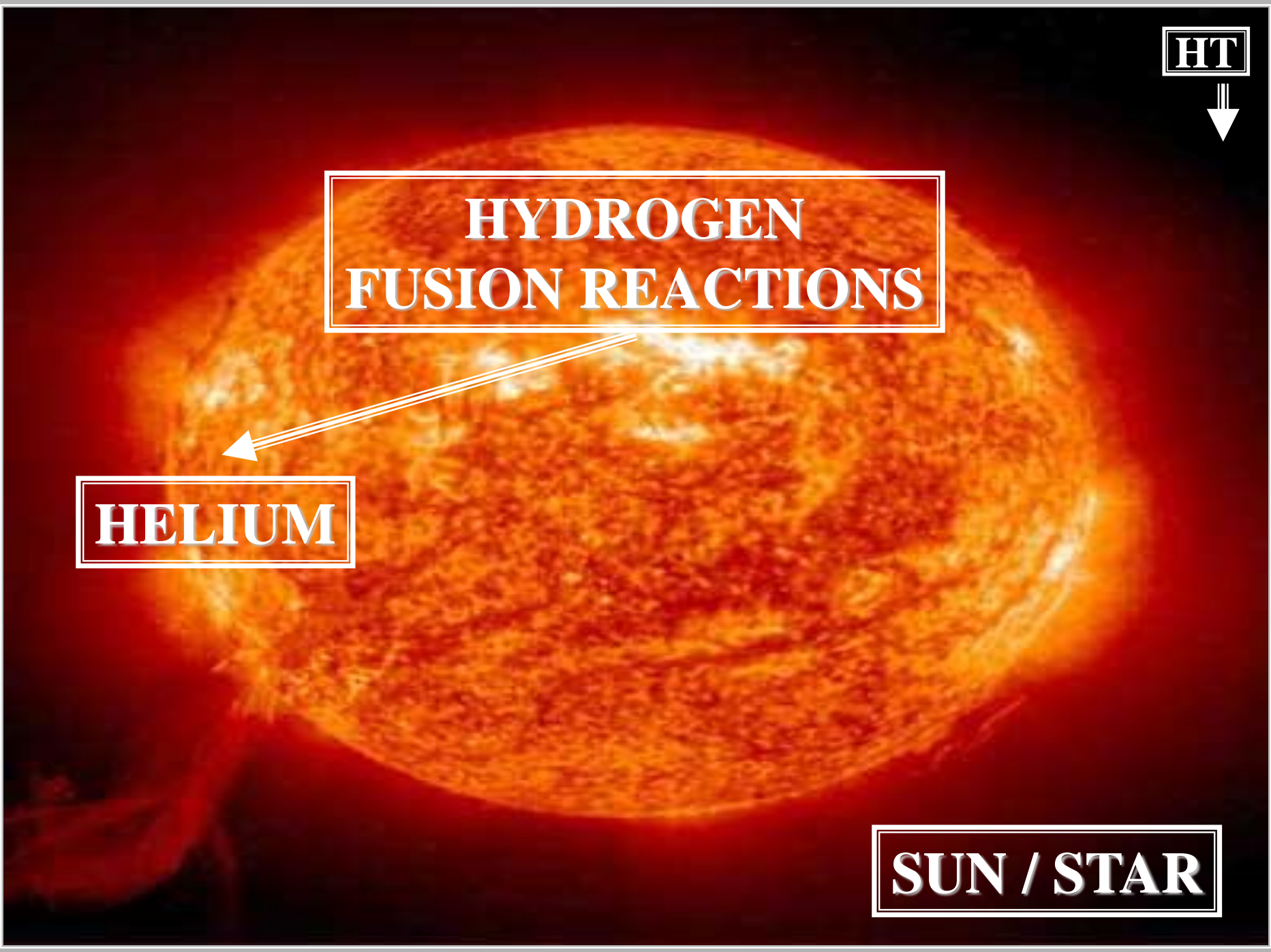


**HYDROGEN
FUSION REACTIONS**



HELIUM

SUN / STAR



**HYDROGEN
FUSION REACTIONS**



HELIUM

HEAT

SUN / STAR



HYDROGEN FUSION REACTIONS



HELIUM

HEAT

EM-EGY

SUN / STAR

**HYDROGEN
FUSION REACTIONS**

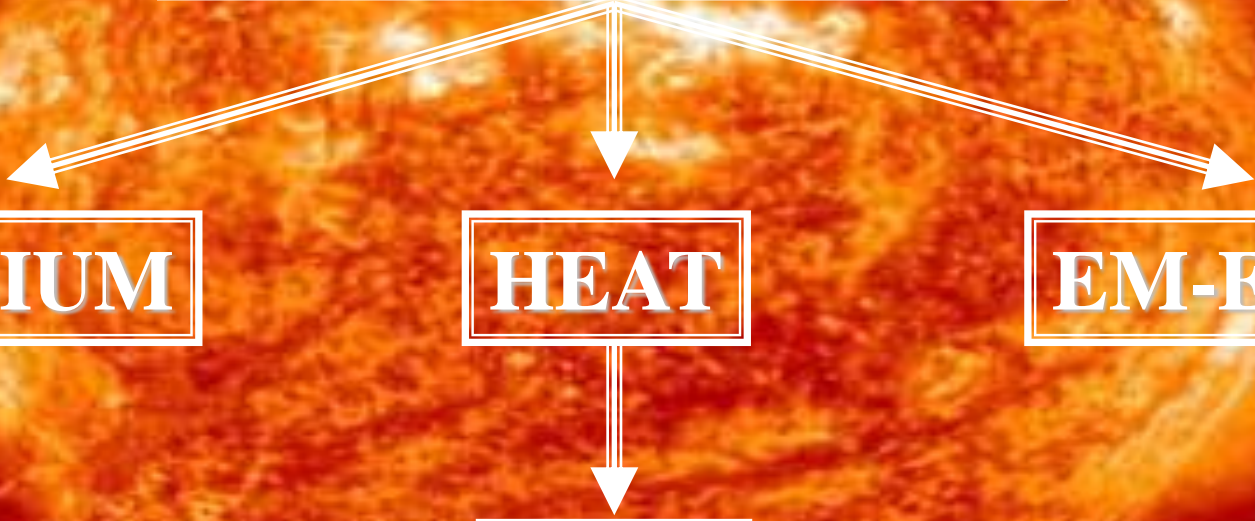
HELIUM

HEAT

EM-EGY



SUN / STAR





EM

HYDROGEN FUSION REACTIONS

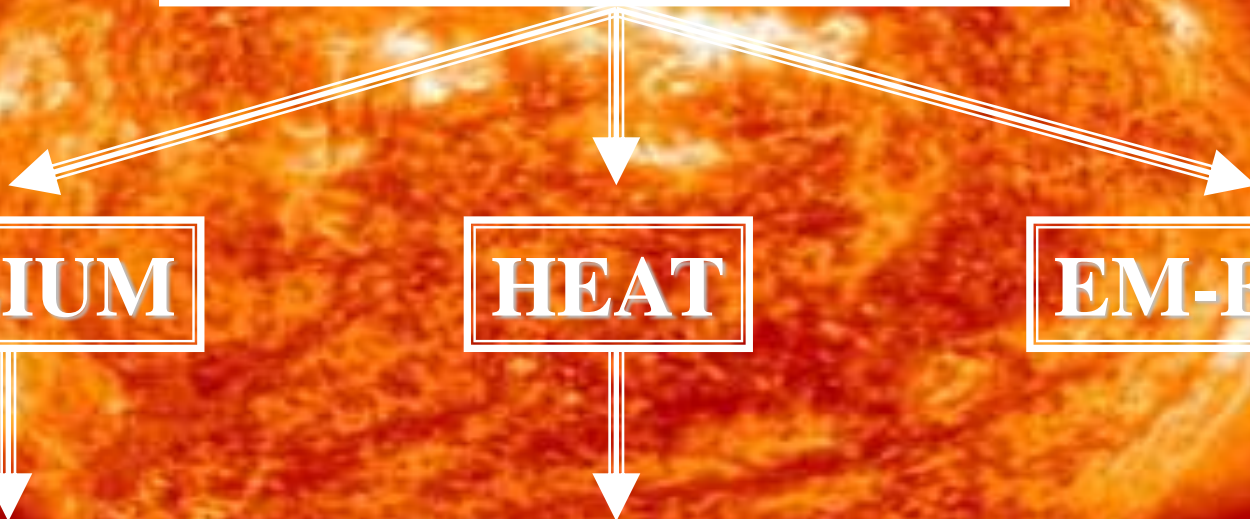
HELIUM

HEAT

EM-EGY

DISSIPATES INTO SPACE

SUN / STAR



HYDROGEN FUSION REACTIONS

HELIUM

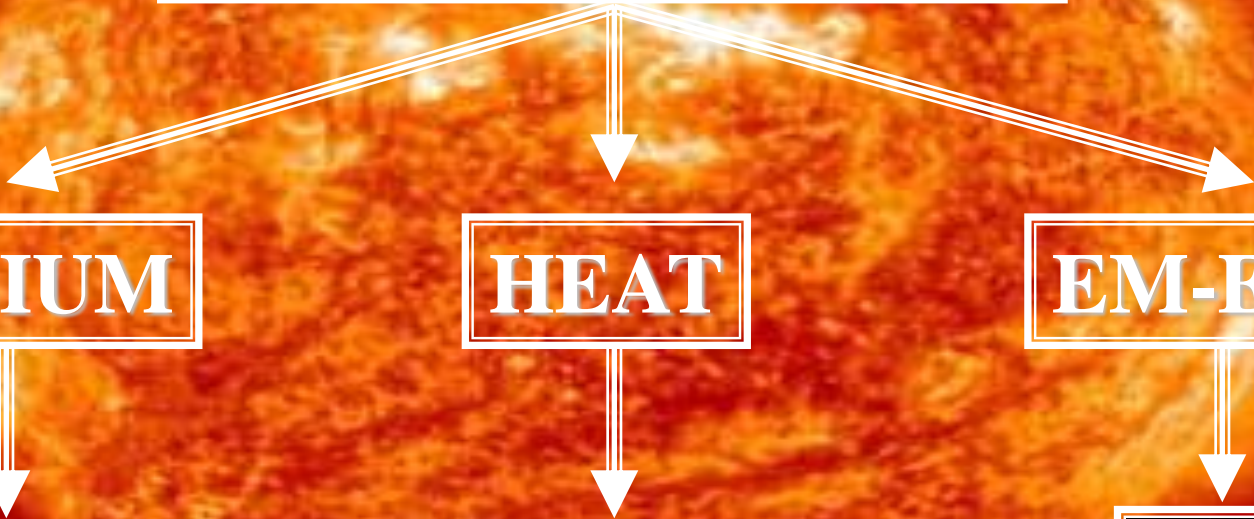
HEAT

EM-EGY

DISSIPATES INTO SPACE



EARTH



ELECTROMAGNETIC ENERGY

EARTH



EM



HEAT ENERGY

EARTH



HYDROGEN FUSION REACTIONS



HELIUM

HEAT

EM-EGY



DISSIPATES INTO SPACE



EARTH

ELECTROMAGNETIC ENERGY

**ELECTROMAGNETIC
ENERGY
(RADIATION)**

ELECTROMAGNETIC ENERGY / RADIATION

CONSISTS PHOTONS

ELECTROMAGNETIC ENERGY / RADIATION

PHOTON



E

+

PHOTON

**UNIT
ELECTROMAGNETIC
ENERGY**

PHOTON

A satellite photograph of the Earth showing the Western Hemisphere, including North and South America, the Atlantic Ocean, and the Pacific Ocean. The image is framed by a thin gray border.

**ELECTROMAGNETIC
ENERGY
PHOTONS**

EARTH

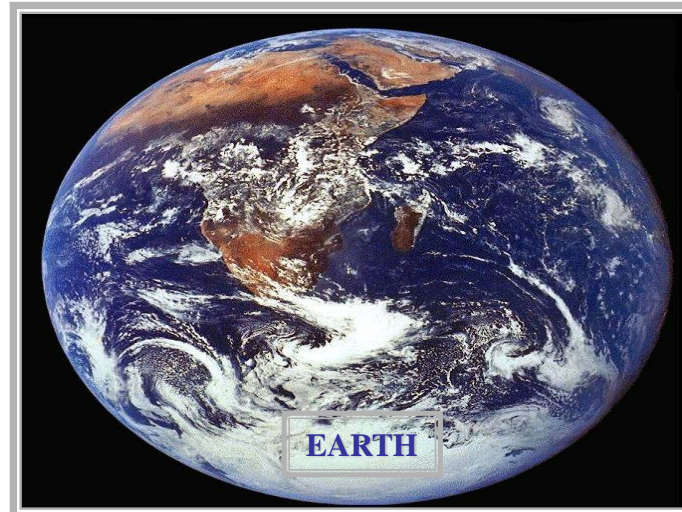


ELECTROMAGNETIC ENERGY SPECTRUM

ELECTROMAGNETIC SPECTRUM



FR



ELECTROMAGNETIC SPECTRUM

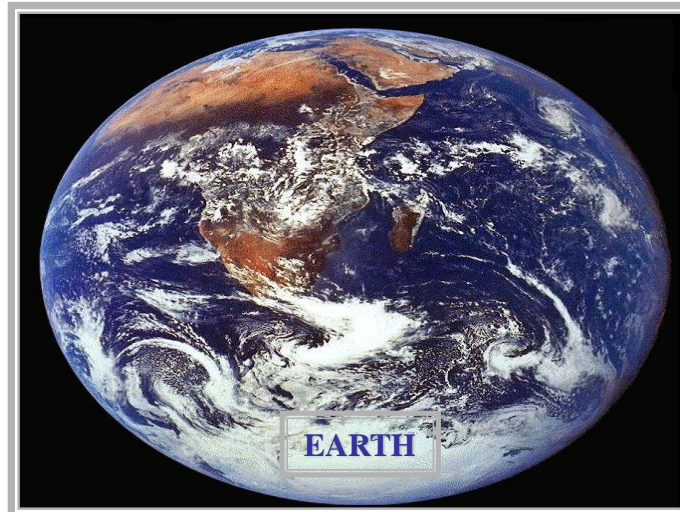
**HYDROGEN
FUSION REACTIONS**



SUN

**HYDROGEN
FUSION REACTIONS**

E



ELECTROMAGNETIC SPECTRUM

**HYDROGEN
FUSION REACTIONS**

SUN

**HYDROGEN
FUSION REACTIONS**

**ELECTROMAGNETIC SPECTRUM
PHOTONS**

*

**HIGH
ENERGY**

**LOW
ENERGY**

Gamma
rays

X rays

Ultraviolet

Visible

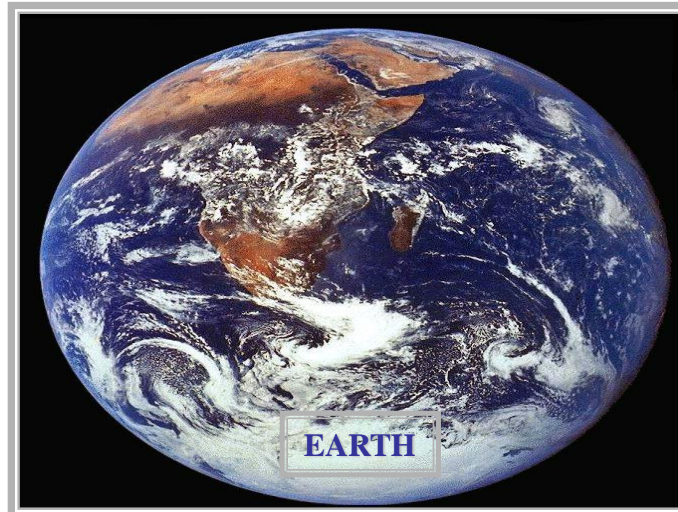
Near
infrared

Infrared

Radio
waves

SHORT WAVELENGTH

LONG WAVELENGTH



ELECTROMAGNETIC SPECTRUM

HYDROGEN
FUSION REACTIONS

SUN

HYDROGEN
FUSION REACTIONS

ELECTROMAGNETIC SPECTRUM
PHOTONS

P

HIGH
ENERGY

LOW
ENERGY

Gamma
rays

X rays

Ultraviolet

Visible

Near
infrared

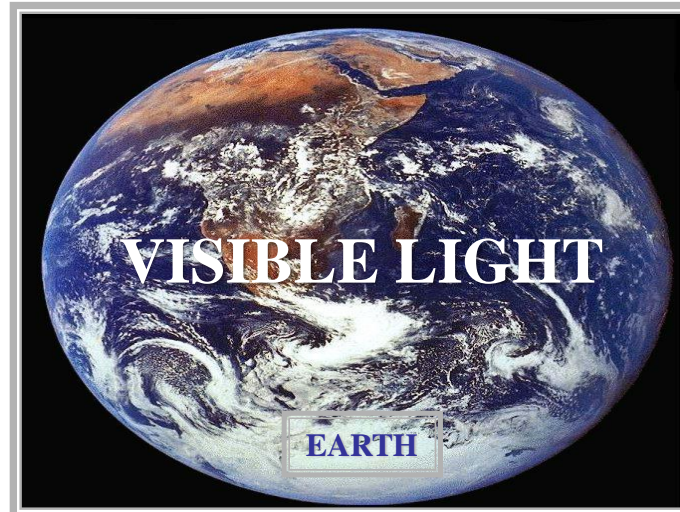
Infrared

Radio
waves

SHORT WAVELENGTH



LONG WAVELENGTH



ELECTROMAGNETIC SPECTRUM

**HYDROGEN
FUSION REACTIONS**

SUN

**HYDROGEN
FUSION REACTIONS**

**ELECTROMAGNETIC SPECTRUM
PHOTONS**

>

**HIGH
ENERGY**

**LOW
ENERGY**

Gamma
rays

X rays

Ultraviolet

Visible

Near
infrared

Infrared

Radio
waves

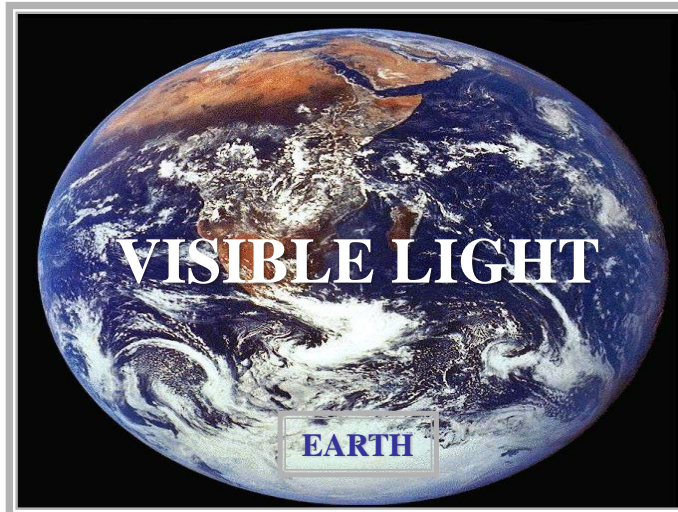
SHORT WAVELENGTH



LONG WAVELENGTH

PHOTOSYNTHESIS

PHOTOSYNTHESIS



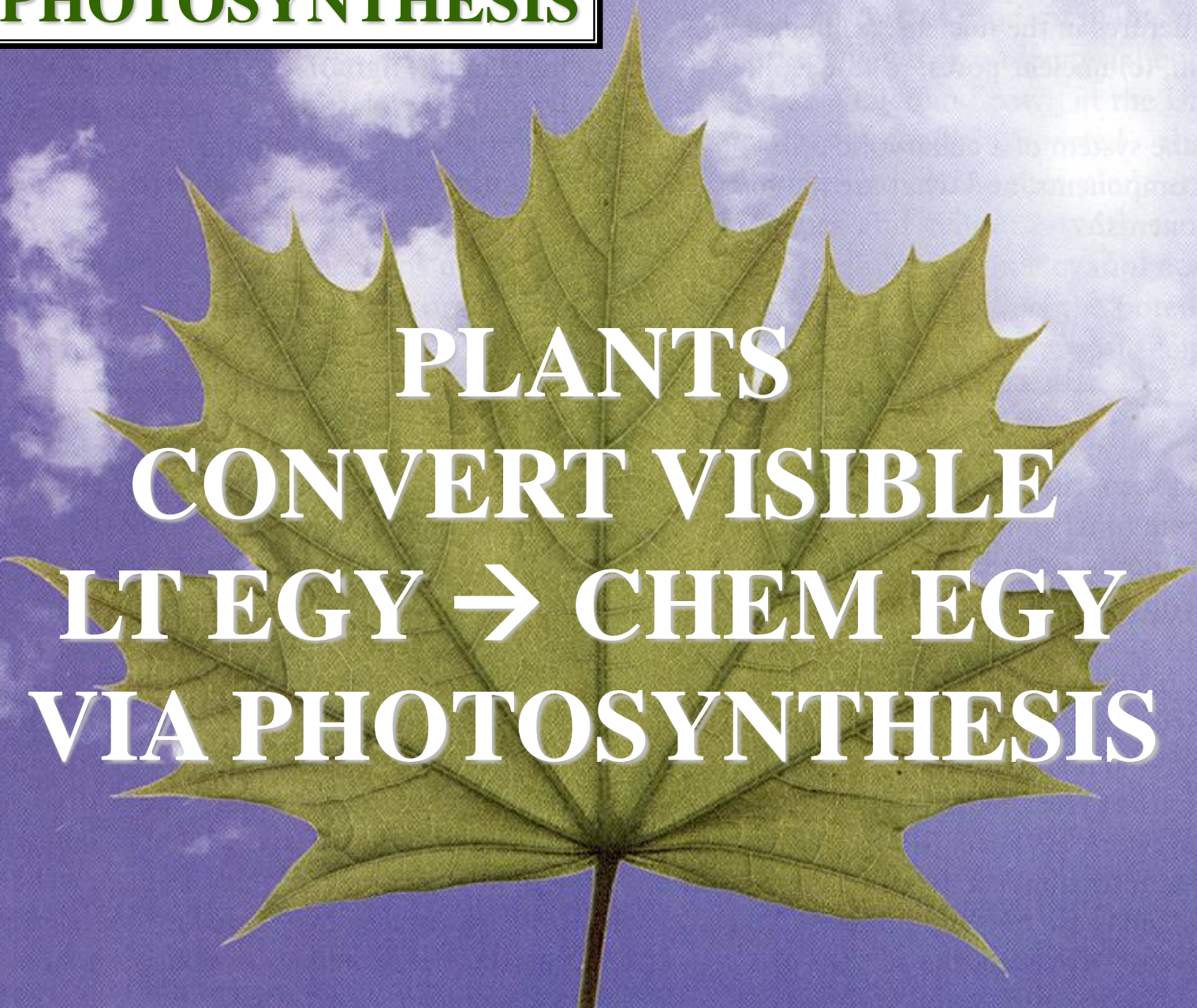
PHOTOSYNTHESIS

PHOTOSYNTHESIS

PHOTOSYNTHESIS

\$

P



PLANTS
CONVERT VISIBLE
LIGHT ENERGY → CHEMICAL ENERGY
VIA PHOTOSYNTHESIS

A vibrant green maple leaf is the central focus, set against a bright blue sky with scattered white clouds. The leaf's veins are clearly visible, and its lobes are pointed. The overall image has a fine, woven texture.

PHOTOSYNTHESIS SUMMARY

PHOTOSYNTHESIS



LEAF
PRINCIPLE
PHOTOSYNTHETIC
ORGAN



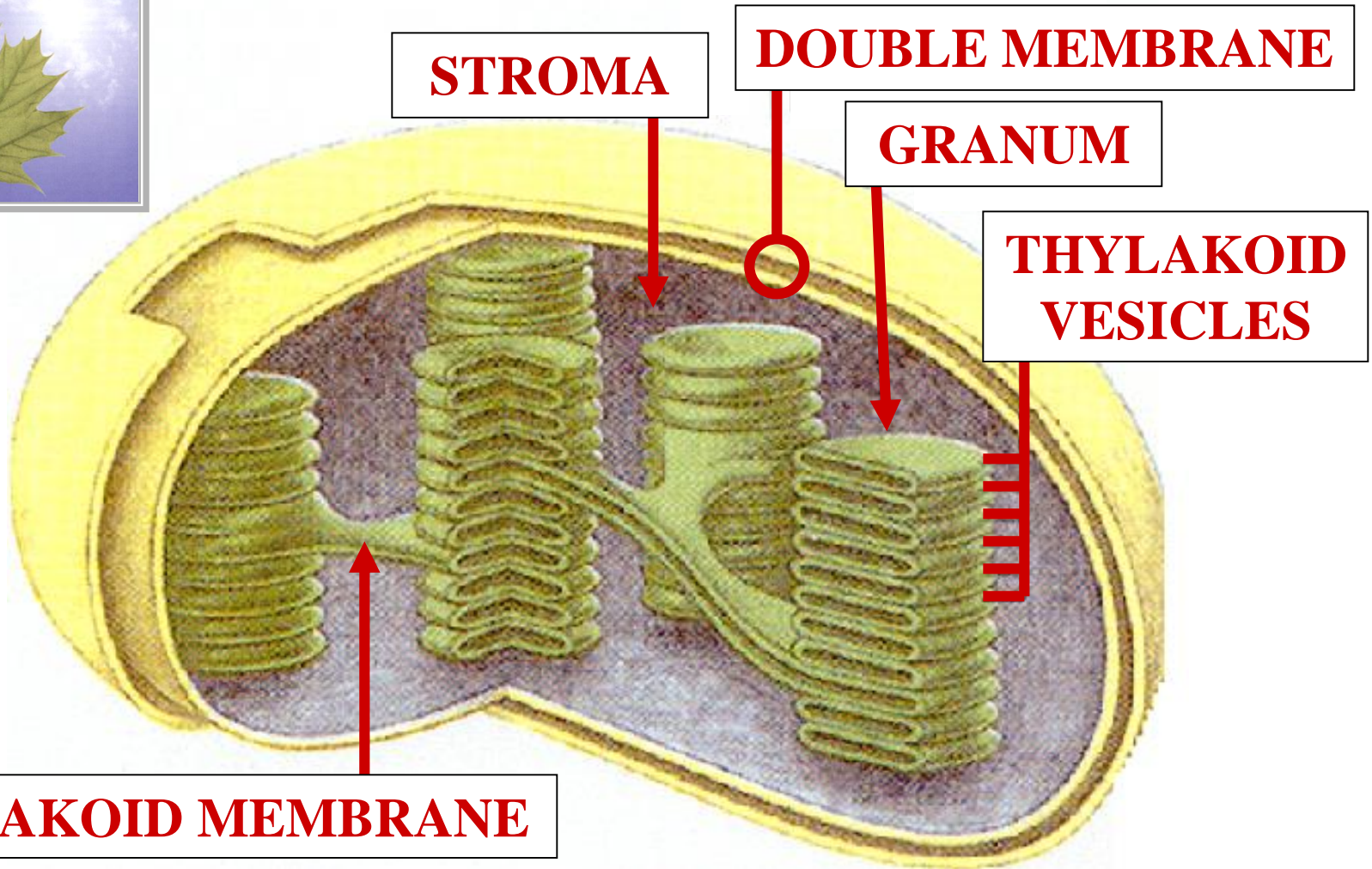
MESOPHYLL PHOTOSYNTHETIC TISSUE



LEAF

C.S.

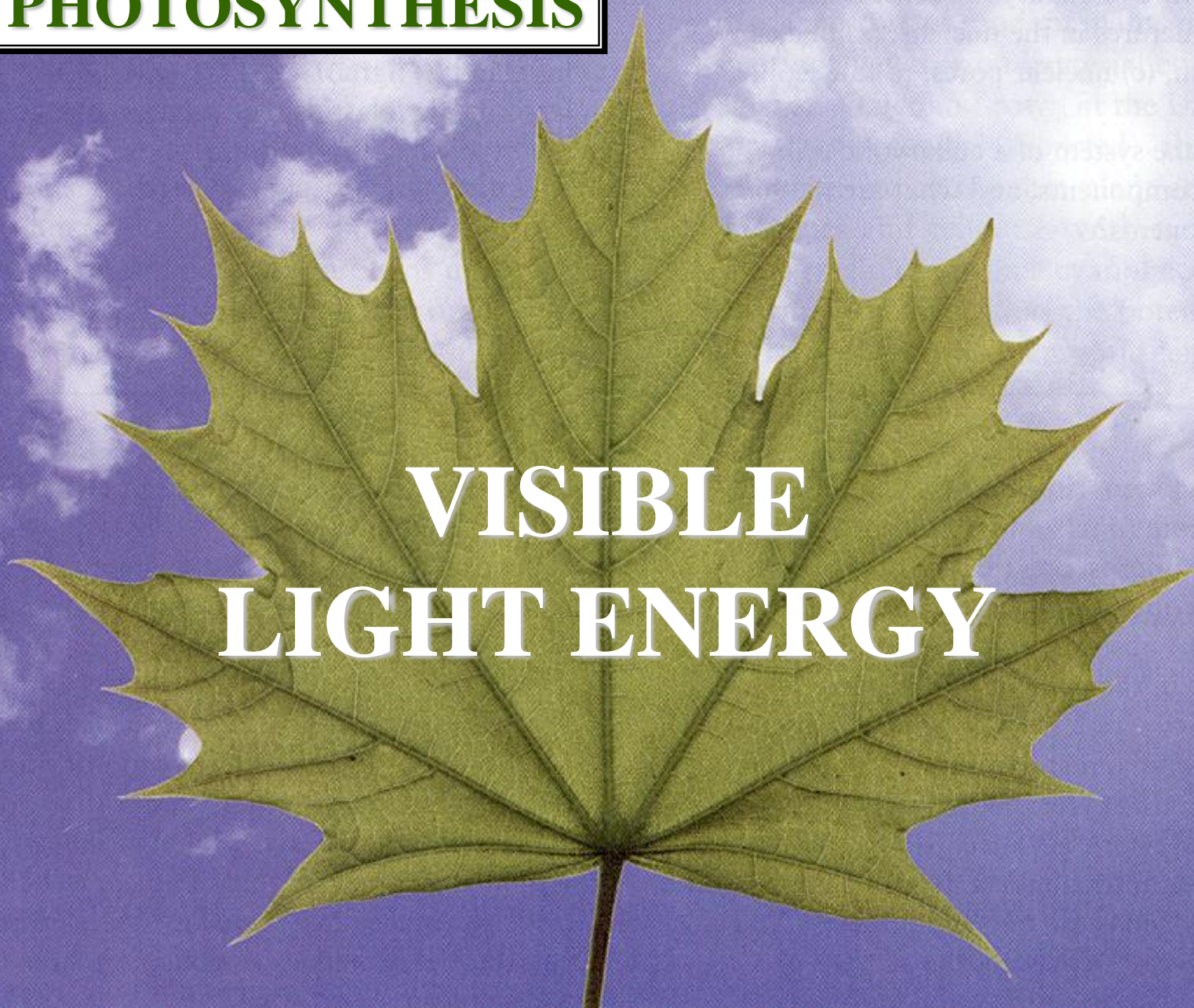
CHLOROPLAST ULTRASTRUCTURE



PHOTOSYNTHESIS



**VISIBLE
LIGHT ENERGY**



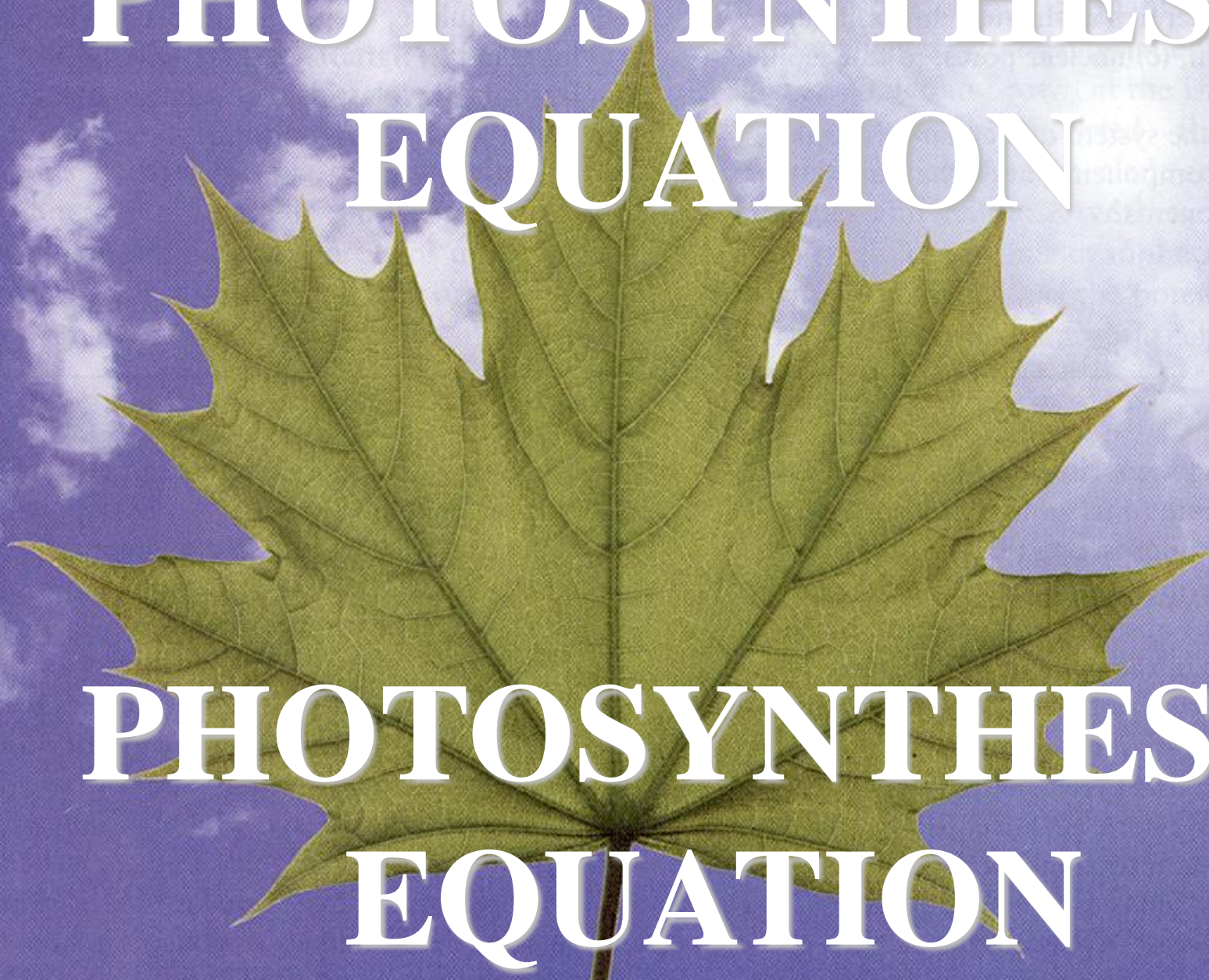


PHOTOSYNTHESIS CHEMISTRY



PHOTOSYNTHESIS EQUATION

PHOTOSYNTHESIS EQUATION



PHOTOSYNTHESIS EQUATION



PHOTOSYNTHESIS EQUATION

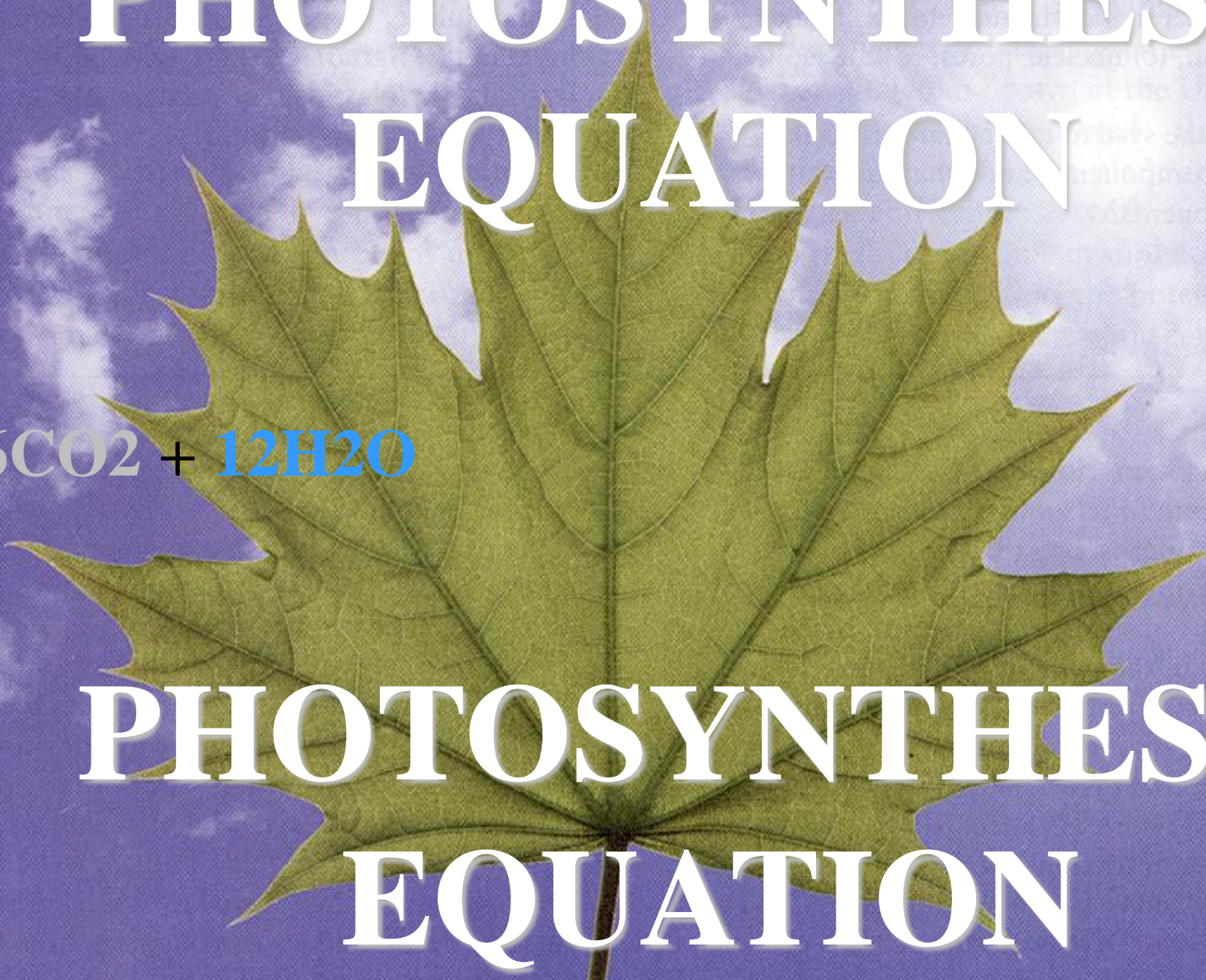
6CO_2

PHOTOSYNTHESIS EQUATION

PHOTOSYNTHESIS EQUATION



PHOTOSYNTHESIS EQUATION

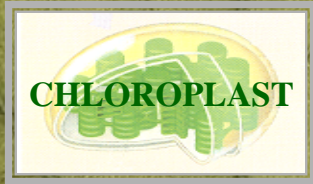


PHOTOSYNTHESIS EQUATION



PHOTOSYNTHESIS EQUATION

PHOTOSYNTHESIS EQUATION



CHEMICAL ENERGY INPUT

PHOTOSYNTHESIS EQUATION

PHOTOSYNTHESIS



EQUATION



CHEMICAL ENERGY INPUT

PHOTOSYNTHESIS

EQUATION

PHOTOSYNTHESIS



WATER

CO₂

LIGHT ENERGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



?

CHEMICAL ENERGY

?

CHLOROPLAST

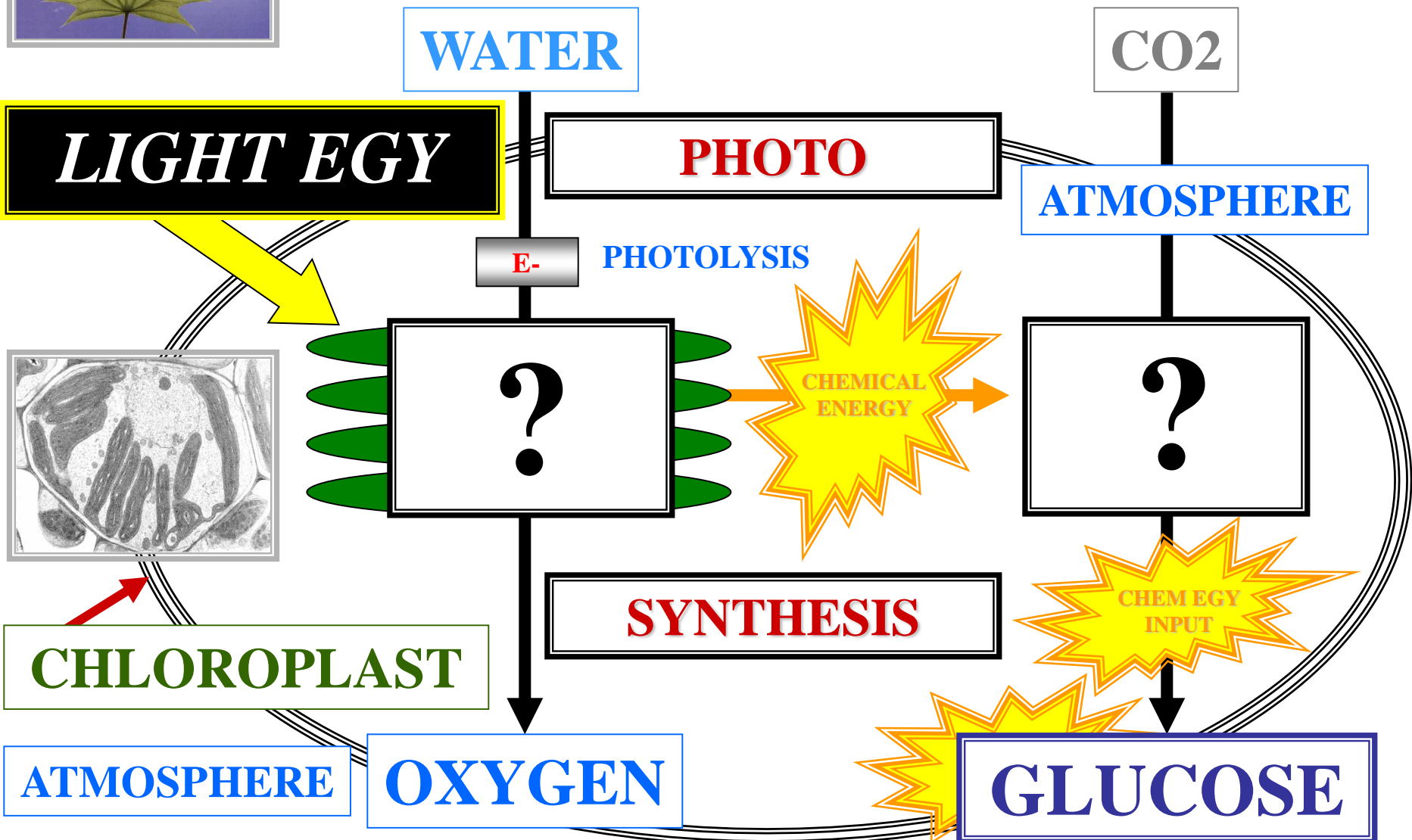
SYNTHESIS

CHEMICAL ENERGY INPUT

ATMOSPHERE

OXYGEN

GLUCOSE



PHOTOSYNTHESIS



WATER

CO₂

LIGHT ENERGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS

LIGHT REACTION

THYLAKOID GRANUM

CHEMICAL ENERGY

?

SYNTHESIS

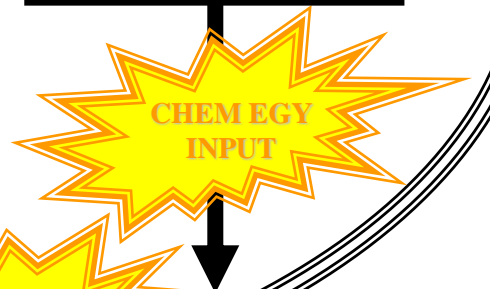
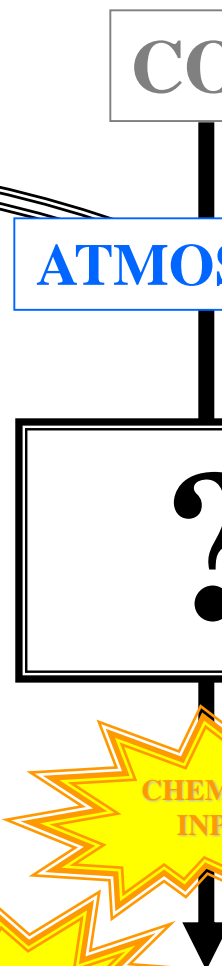
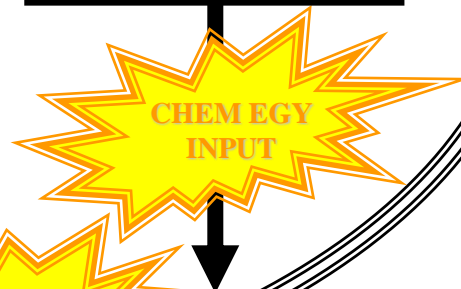
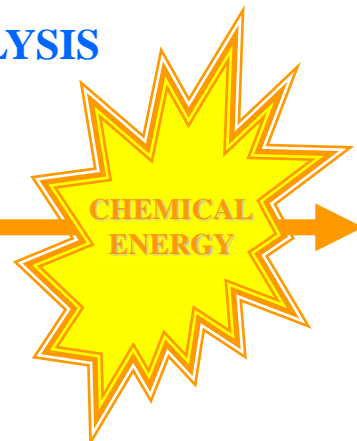
CHEMICAL ENERGY INPUT

CHLOROPLAST

ATMOSPHERE

OXYGEN

GLUCOSE



PHOTOSYNTHESIS



WATER

CO₂

LIGHT ENERGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS

LT RXT

THYLAKOID
GRANUM

CHEMICAL
ENERGY

DK RXT

STROMA

SYNTHESIS

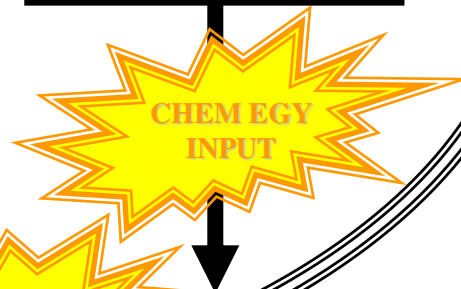
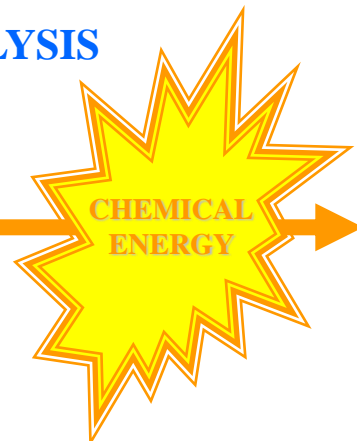
CHEMICAL
INPUT

CHLOROPLAST

ATMOSPHERE

OXYGEN

GLUCOSE





**LIGHT
REACTION
&
DARK
REACTION**

LIGHT REACTION OVERVIEW



LIGHT REACTION

PHOTOSYNTHESIS

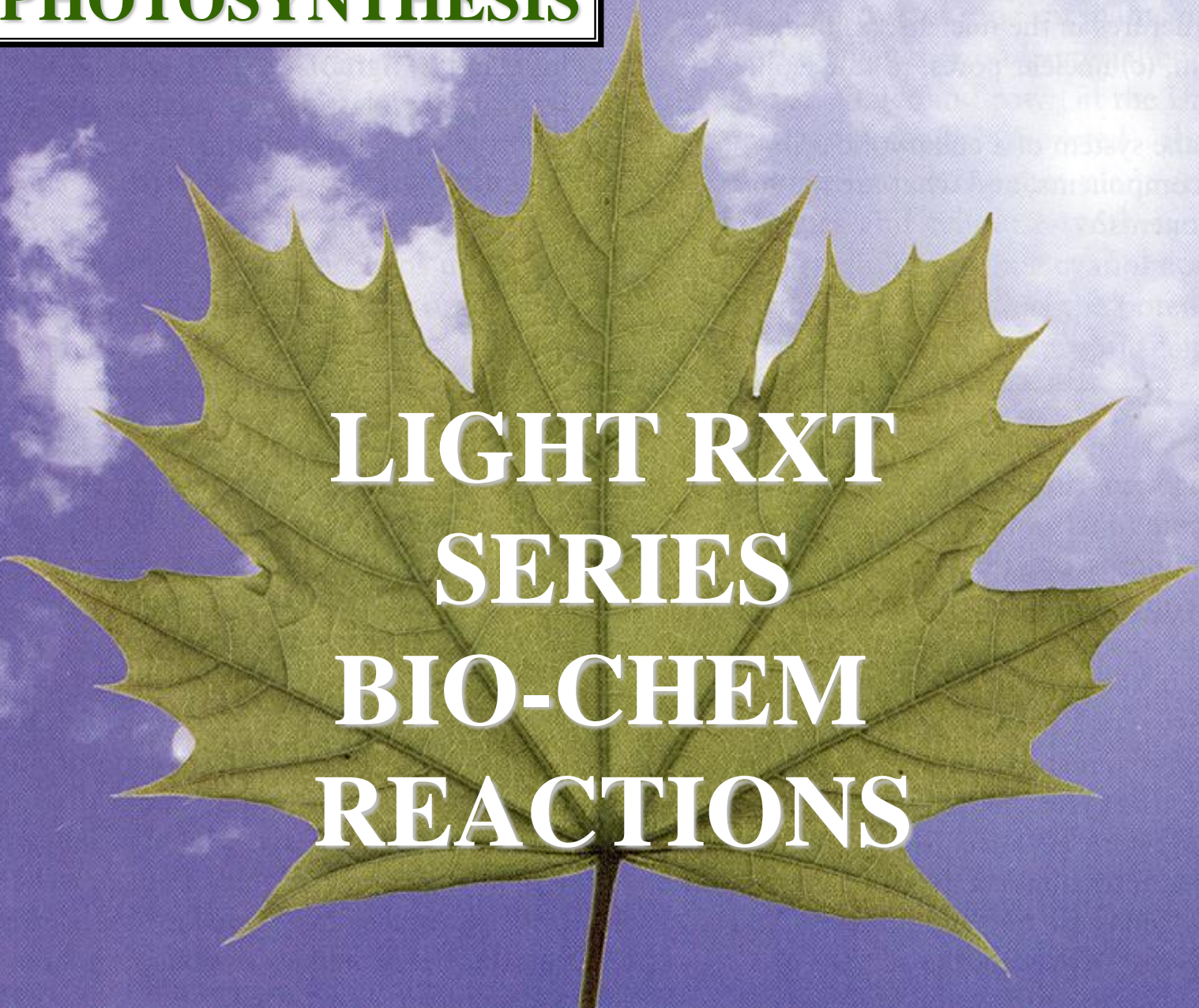
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LIGHT REACTION



PHOTOSYNTHESIS

L



LIGHT RXN
SERIES
BIO-CHEM
REACTIONS

PHOTOSYNTHESIS

E



LIGHT RXT
LIGHT
DEPENDENT
REACTION

PHOTOSYNTHESIS



LIGHT RXN
ENERGY
CAPTURING
REACTION

PHOTOSYNTHESIS

LR



CHLOROPLAST

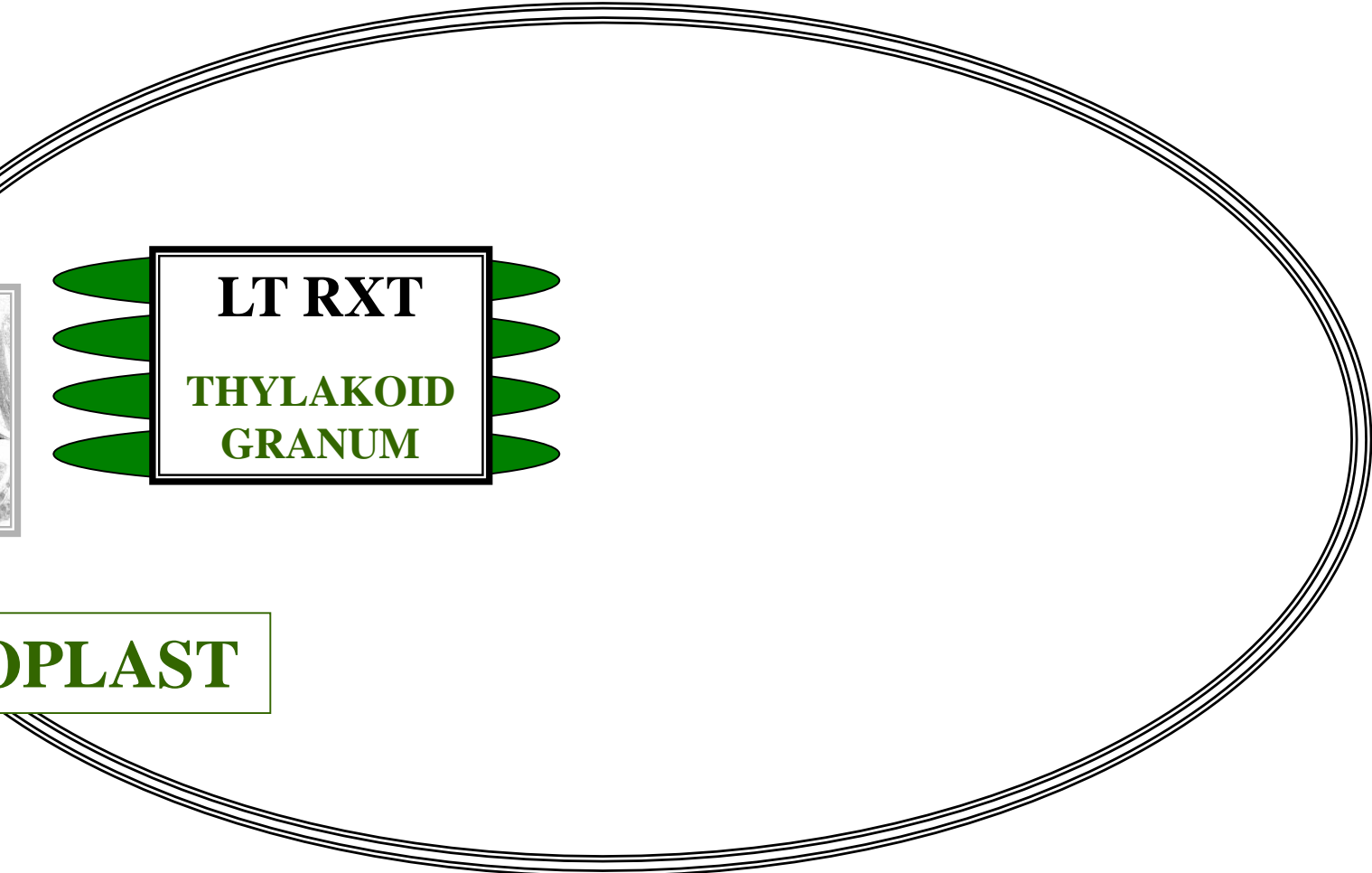


PHOTOSYNTHESIS

LT



CHLOROPLAST

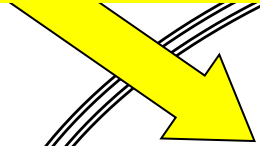


PHOTOSYNTHESIS

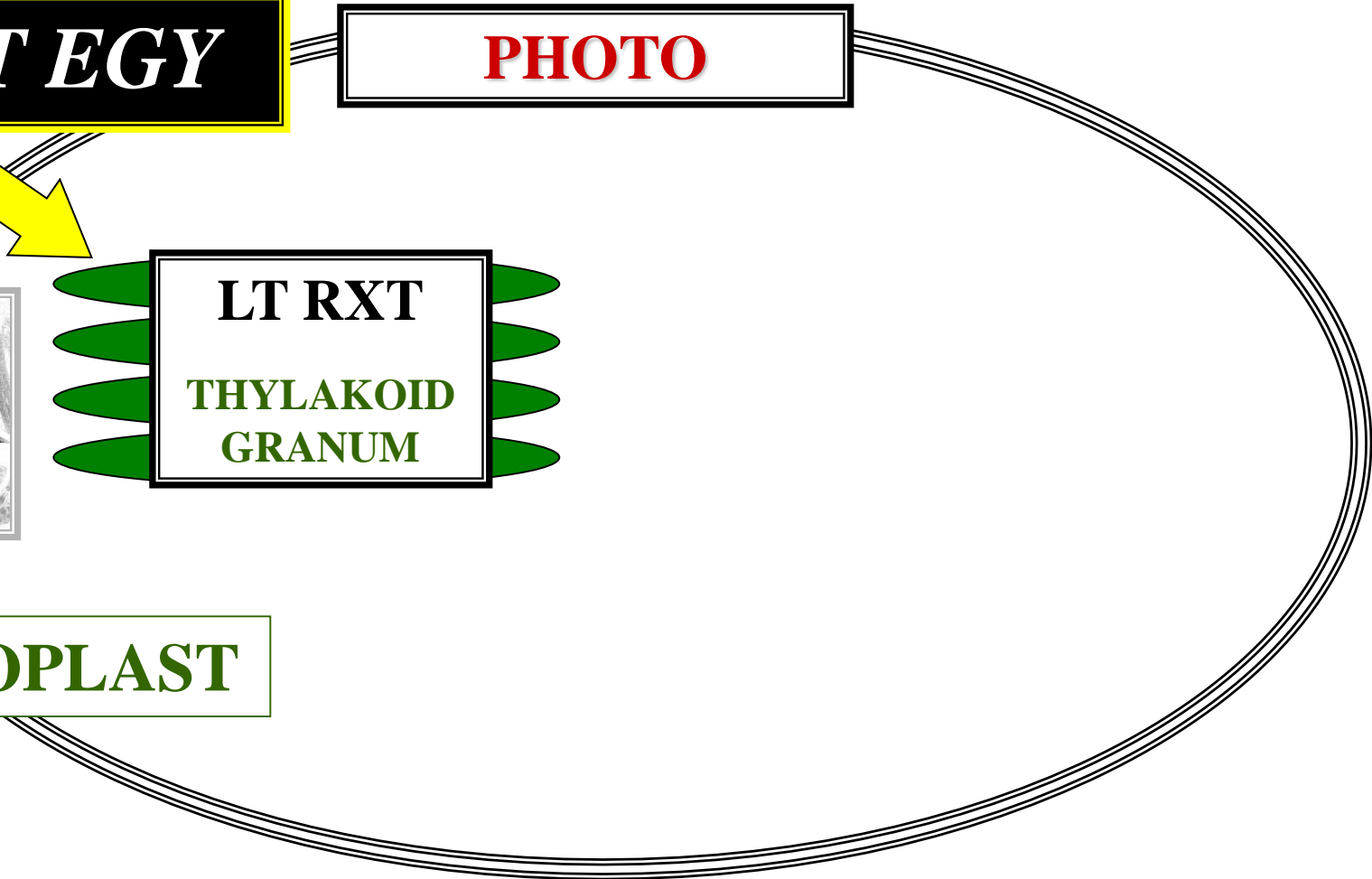


LIGHT ENERGY

PHOTO



CHLOROPLAST



PHOTOSYNTHESIS

C



WATER

LIGHT ENERGY

PHOTO

E-

PHOTOLYSIS

LT RXT

THYLAKOID
GRANUM

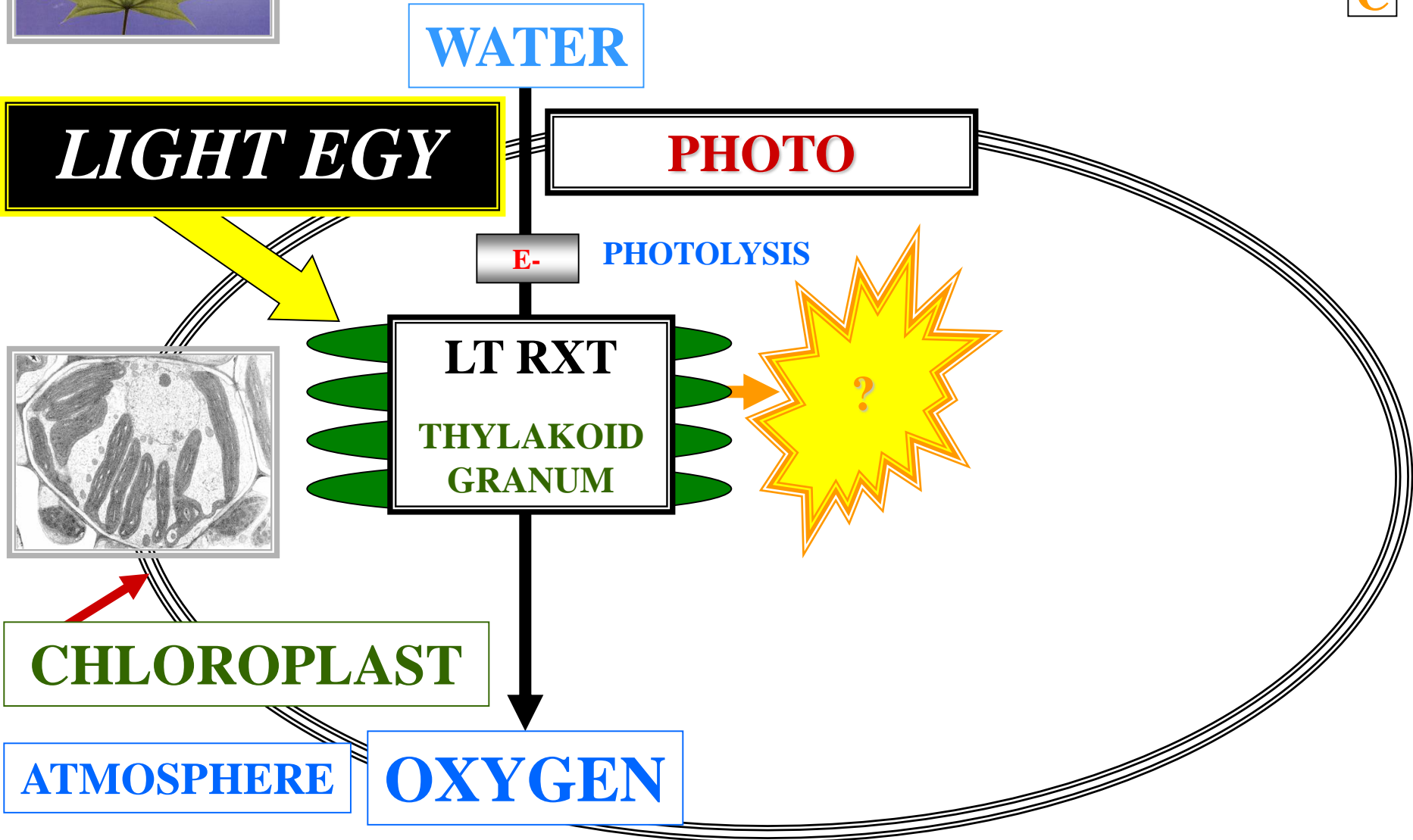
?



CHLOROPLAST

ATMOSPHERE

OXYGEN



PHOTOSYNTHESIS

A



WATER

LIGHT ENERGY

PHOTO

E-

PHOTOLYSIS

LT RXT

**THYLAKOID
GRANUM**

**CHEMICAL
ENERGY**

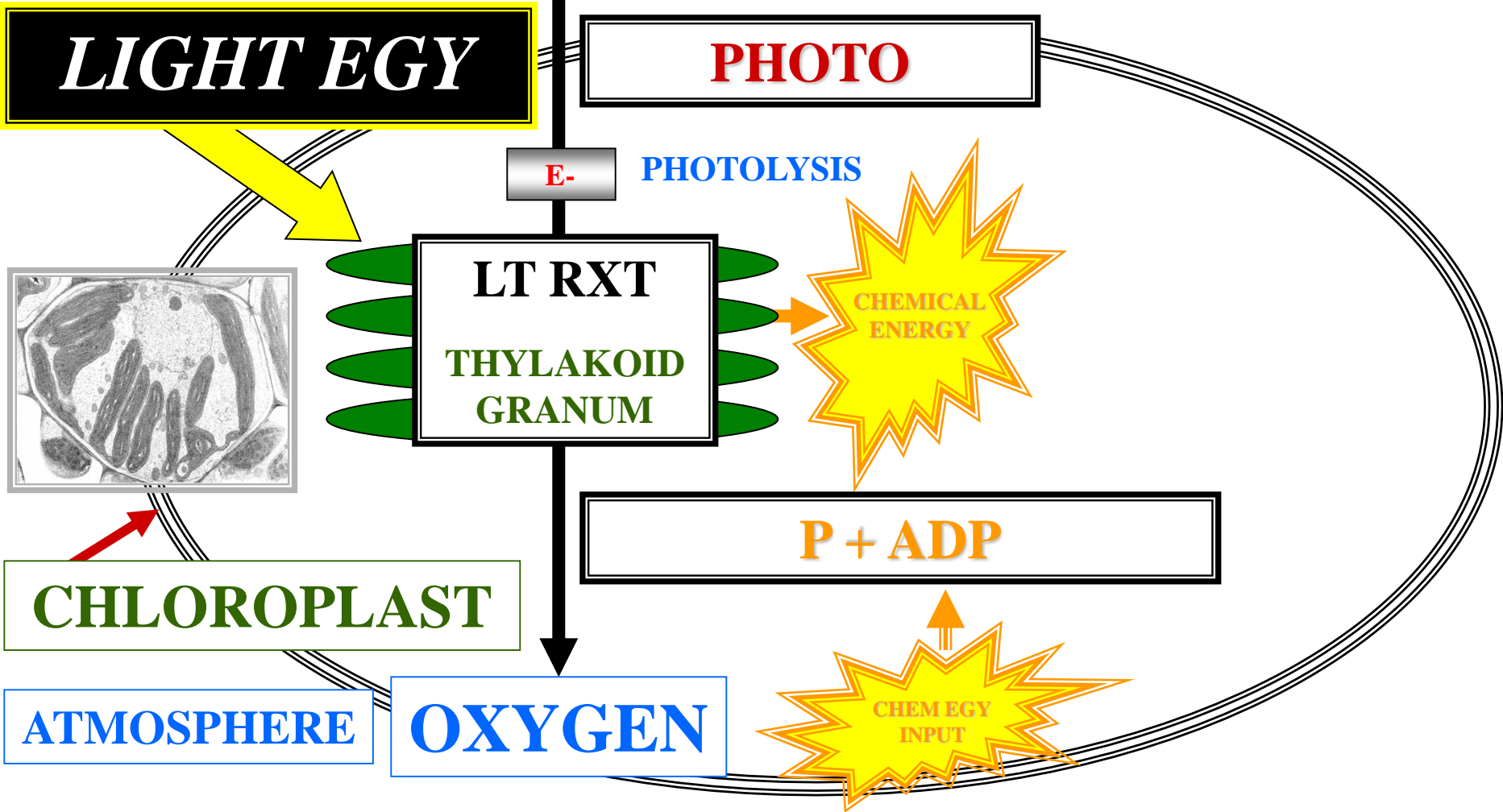
P + ADP

CHLOROPLAST

ATMOSPHERE

OXYGEN

**CHEMICAL
INPUT**



PHOTOSYNTHESIS

P



WATER

LIGHT ENERGY

PHOTO

E-

PHOTOLYSIS

LT RXT

**THYLAKOID
GRANUM**

ATP

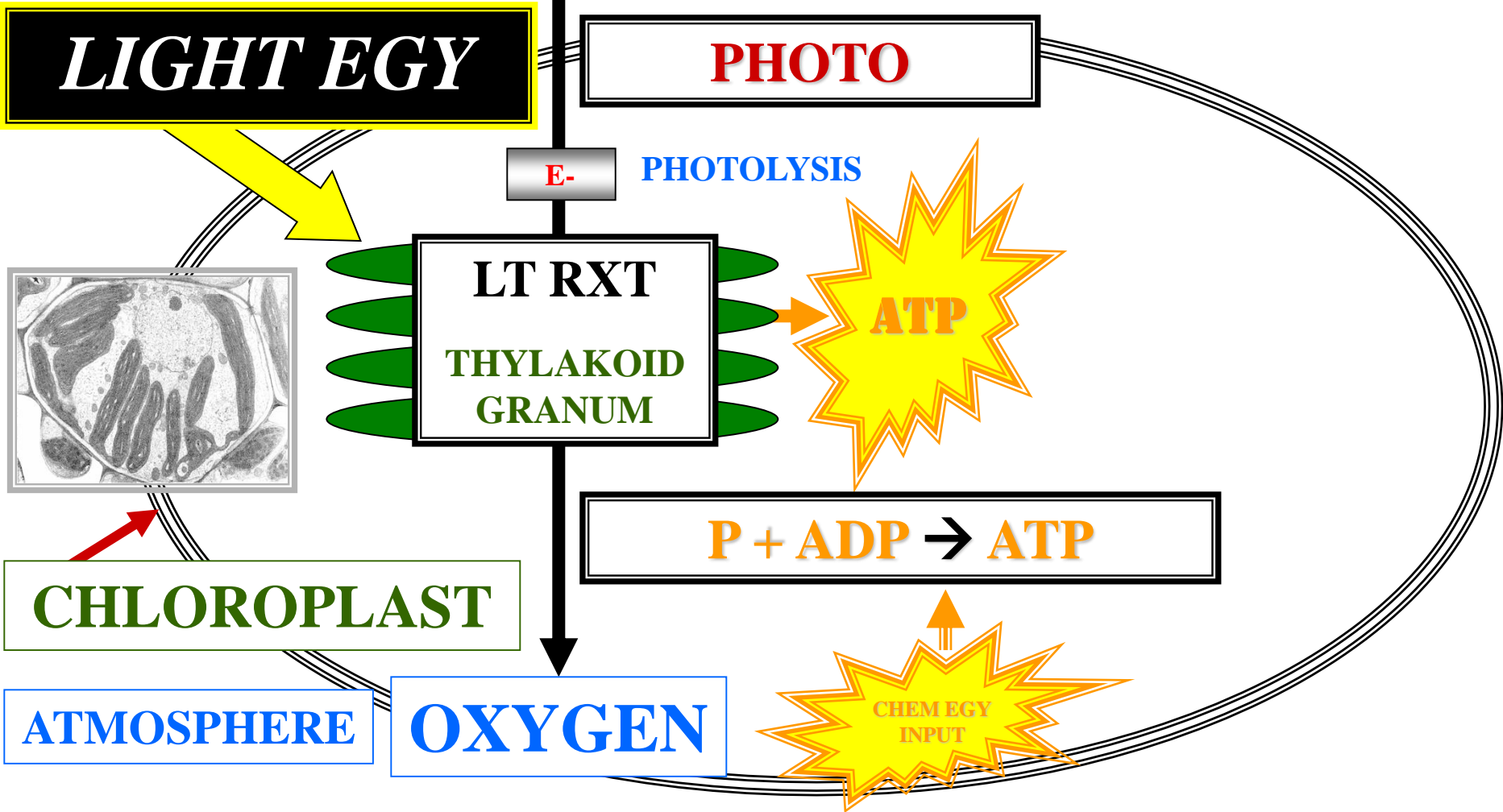
P + ADP → ATP

CHLOROPLAST

ATMOSPHERE

OXYGEN

**CHEMICAL
INPUT**



PHOTOSYNTHESIS

P
DR



WATER

LIGHT ENERGY

PHOTO

E-

PHOTOLYSIS

LT RXT

THYLAKOID
GRANUM

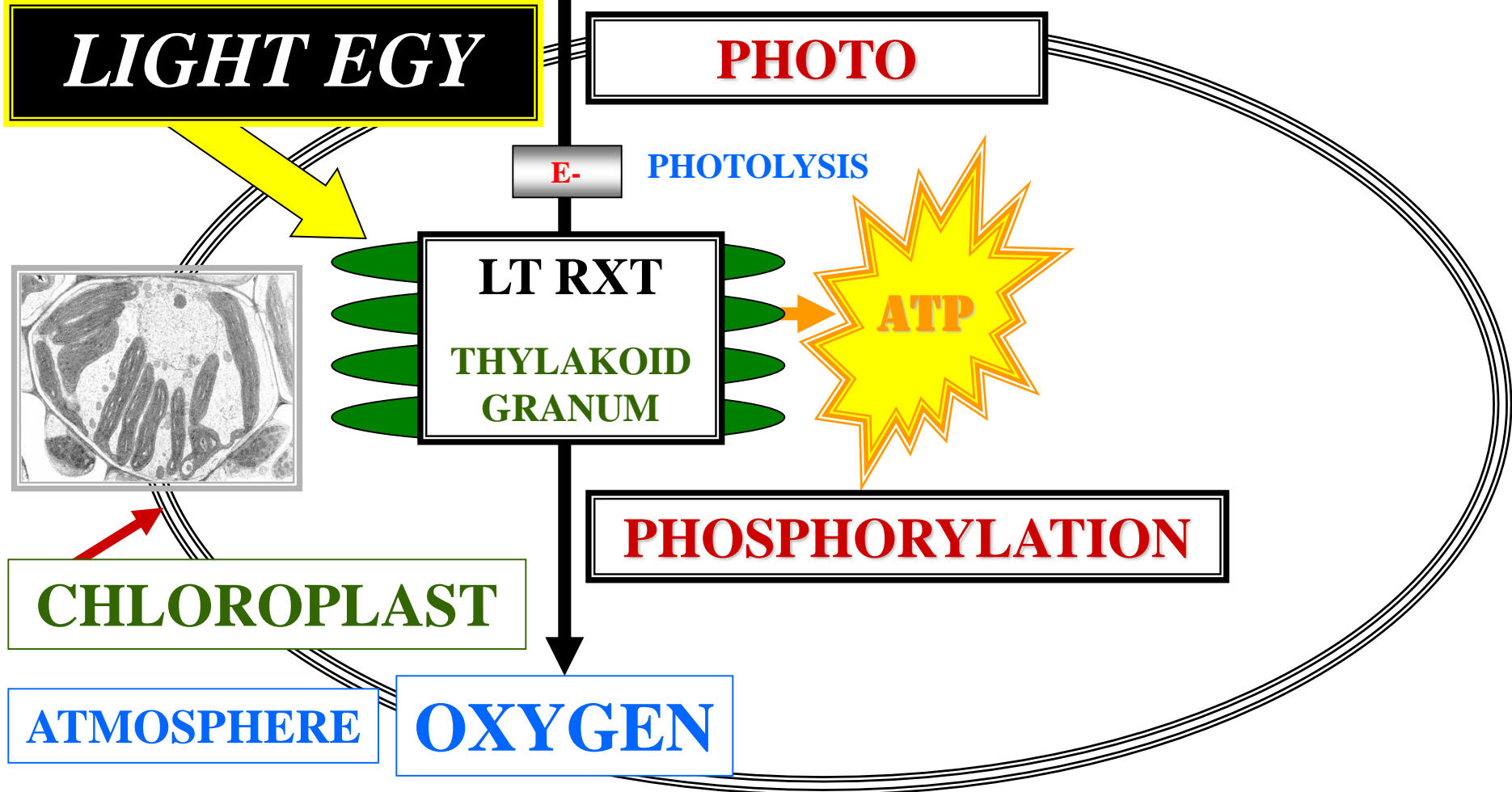
ATP

PHOSPHORYLATION

CHLOROPLAST

ATMOSPHERE

OXYGEN



PHOTOSYNTHESIS

DR



WATER

LIGHT ENERGY

PHOTO

E-

PHOTOLYSIS

LT RXT

THYLAKOID
GRANUM

ATP

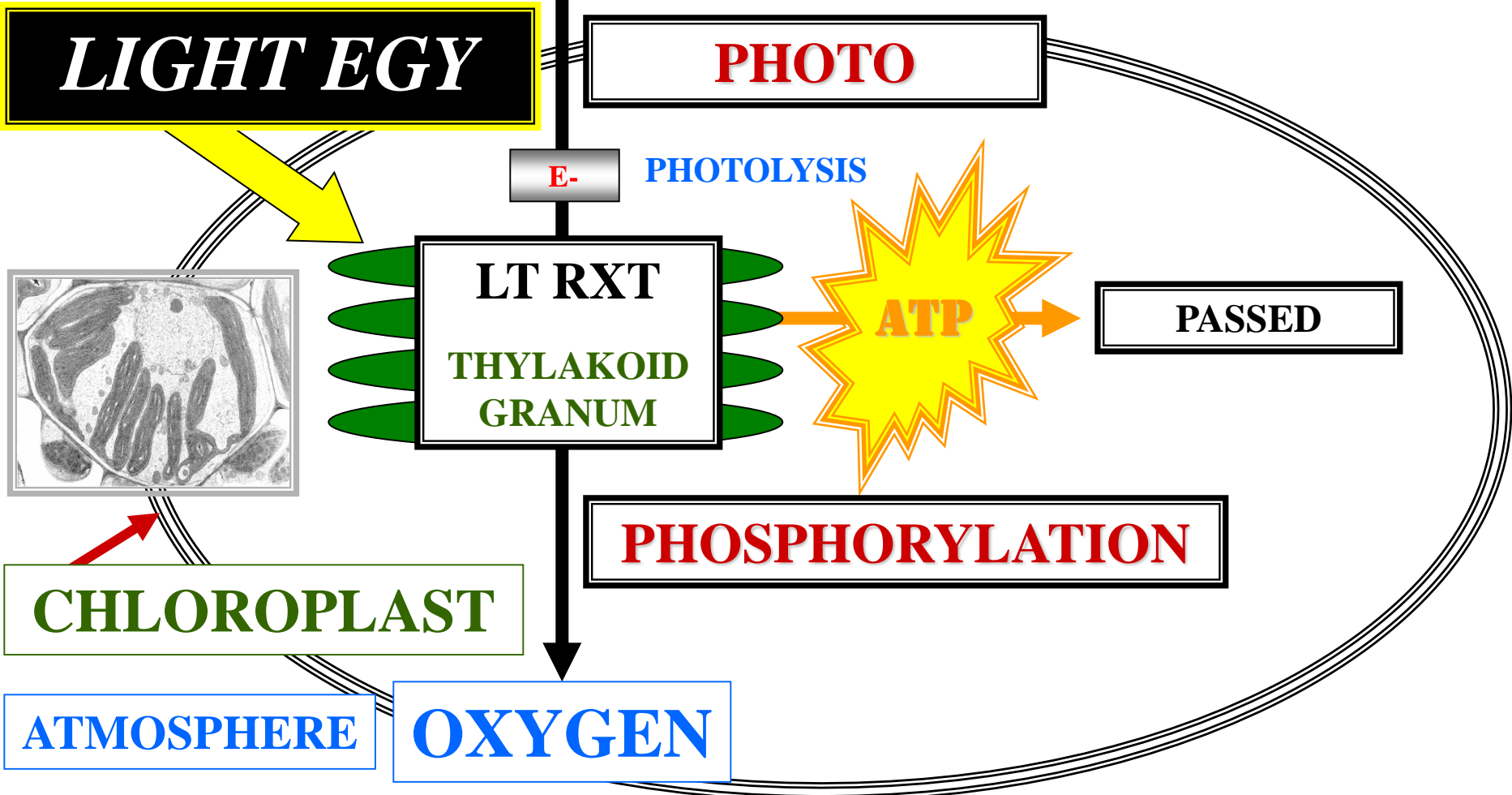
PASSED

PHOSPHORYLATION

CHLOROPLAST

ATMOSPHERE

OXYGEN



DARK REACTION OVERVIEW

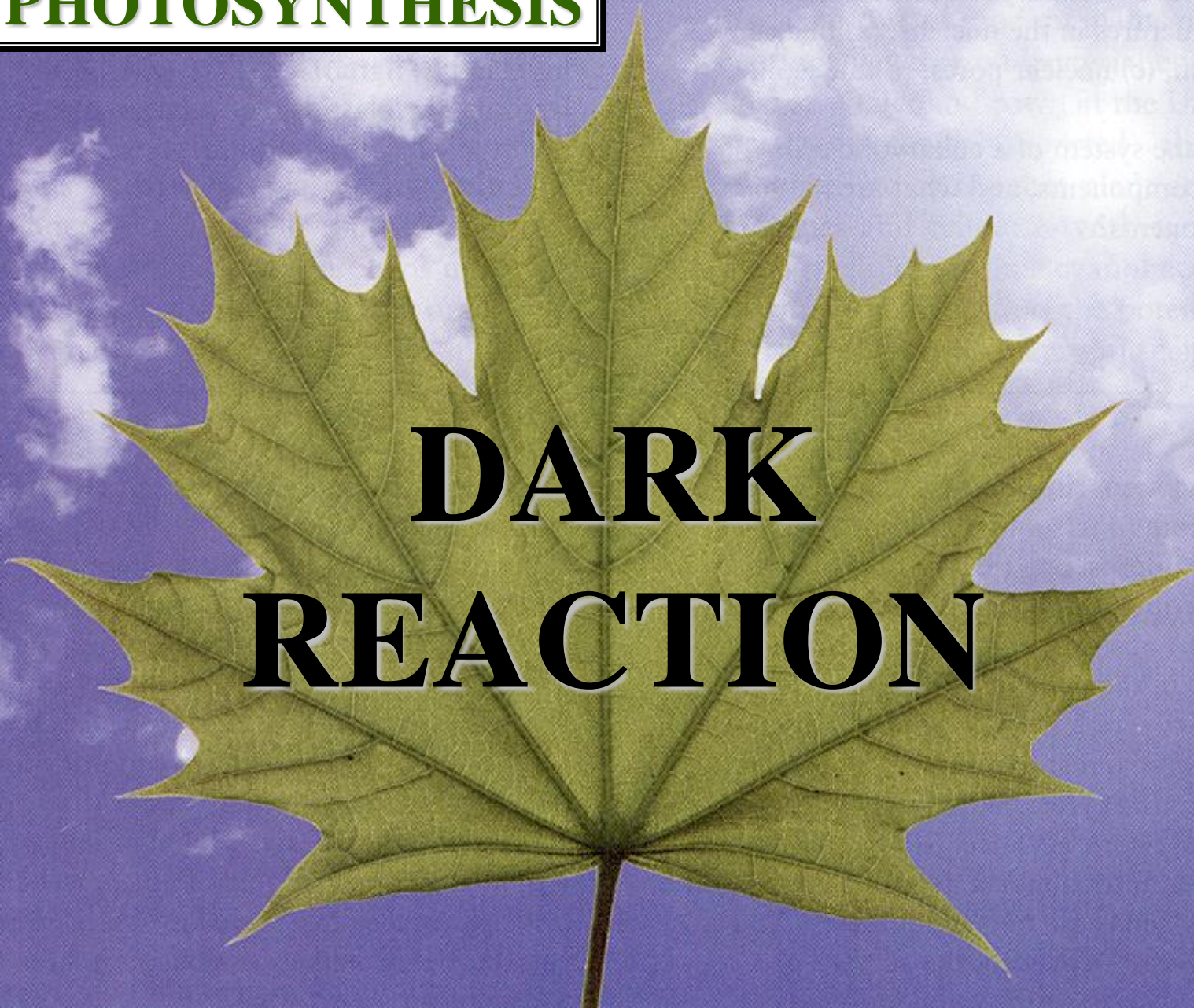


DARK REACTION

PHOTOSYNTHESIS

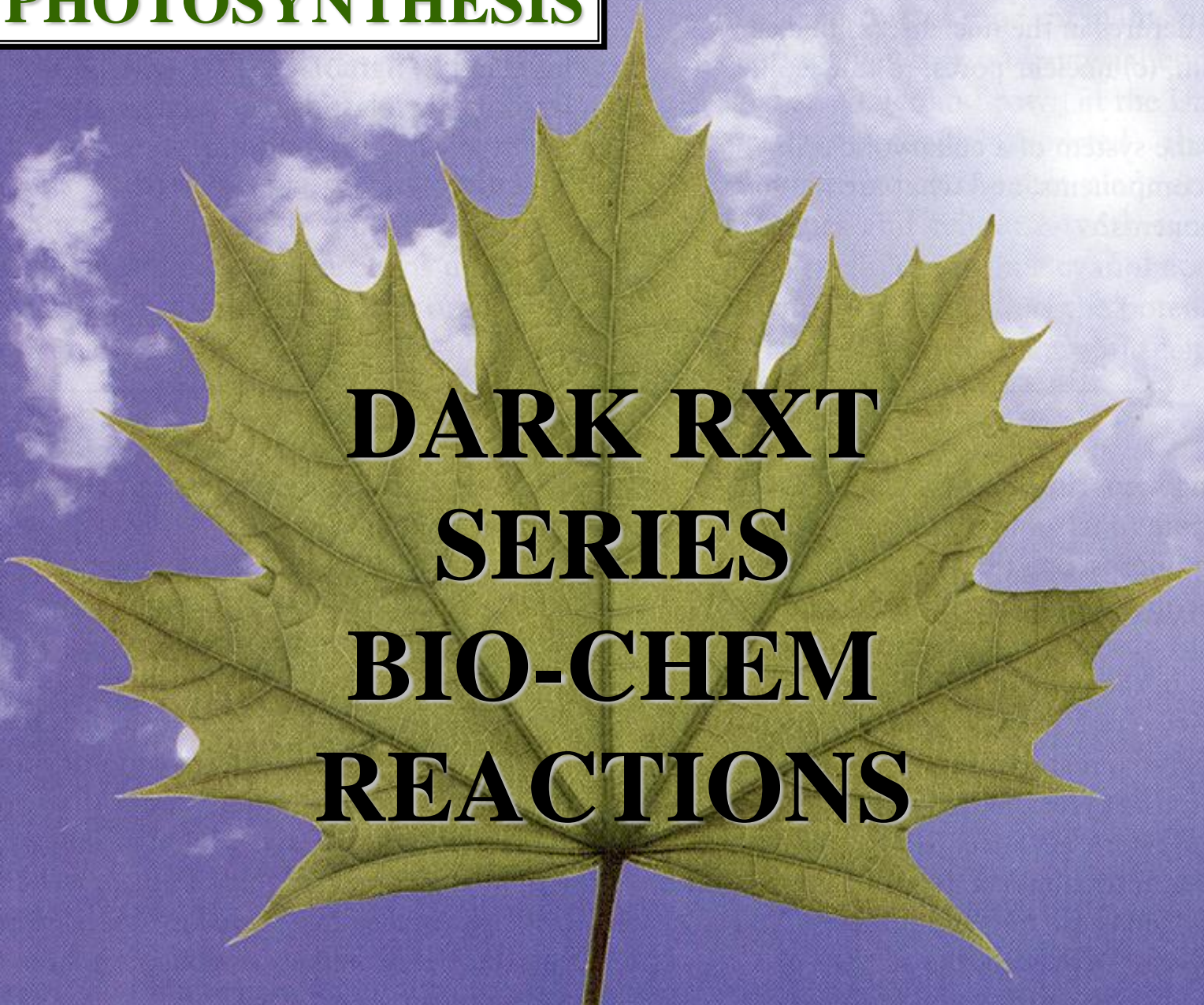


DARK REACTION



PHOTOSYNTHESIS

L



**DARK RXT
SERIES
BIO-CHEM
REACTIONS**

PHOTOSYNTHESIS



DARK RXT
LIGHT
INDEPENDENT
REACTION

PHOTOSYNTHESIS



**DARK RXT
SYNTHESIS
REACTION**

PHOTOSYNTHESIS

DR



WATER

LIGHT ENERGY

PHOTO

E-

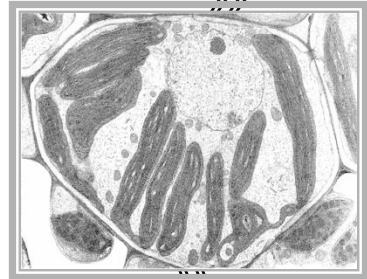
PHOTOLYSIS

LT RXT

THYLAKOID
GRANUM

ATP

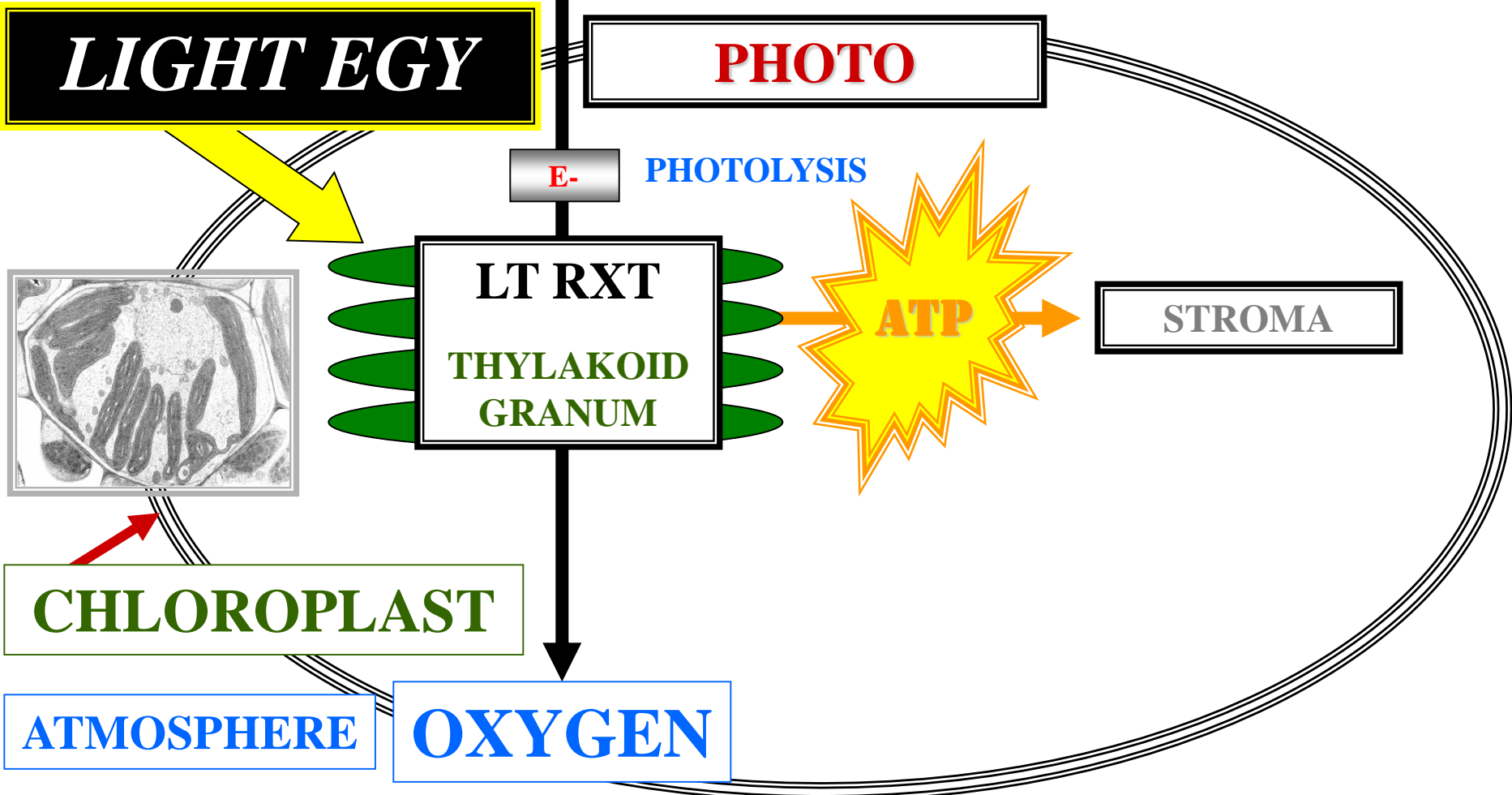
STROMA



CHLOROPLAST

ATMOSPHERE

OXYGEN



PHOTOSYNTHESIS



?

C

WATER

LIGHT ENERGY

PHOTO

E-

PHOTOLYSIS

LT RXT

**THYLAKOID
GRANUM**

ATP

DK RXT

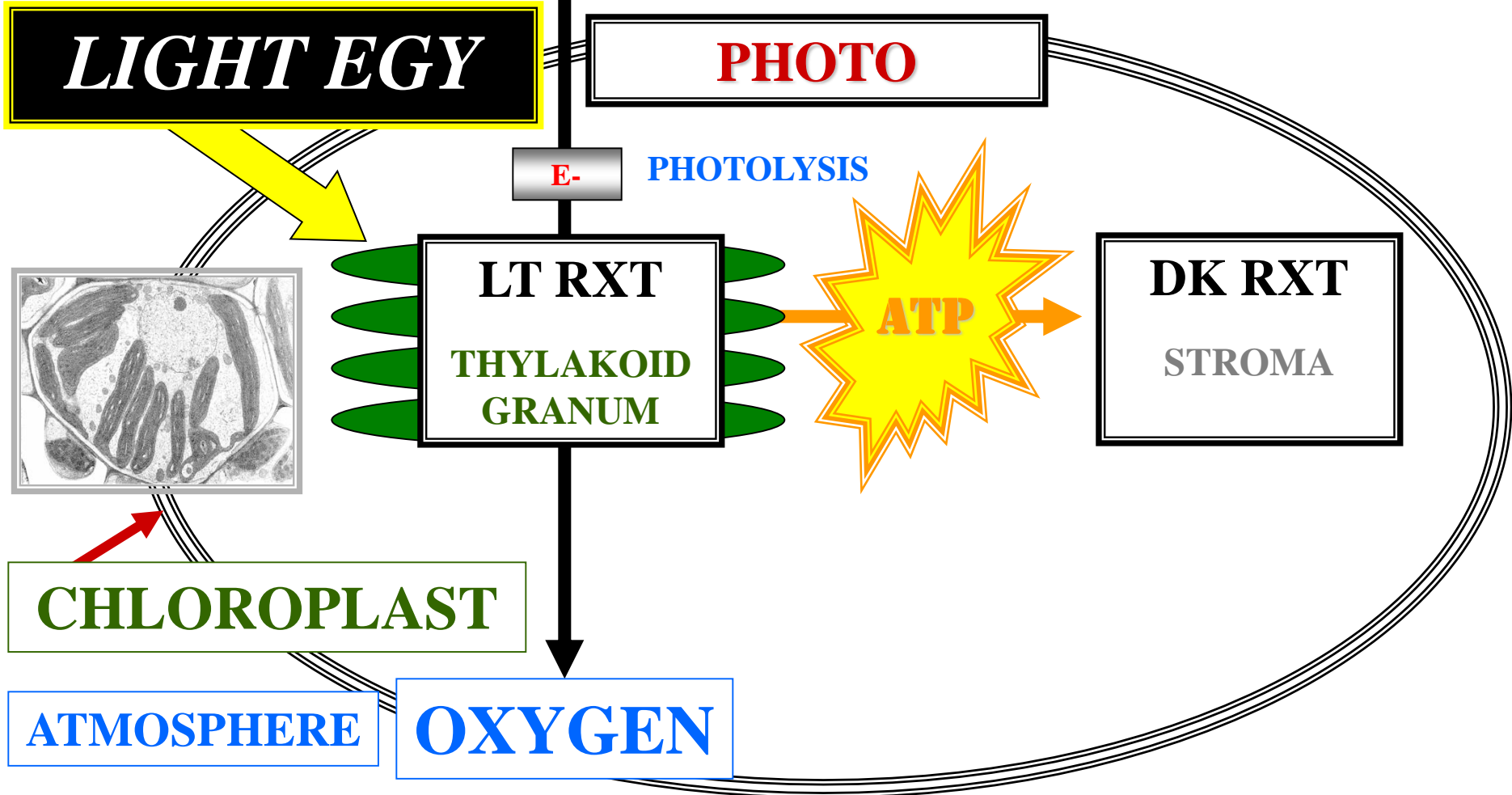
STROMA



CHLOROPLAST

ATMOSPHERE

OXYGEN



PHOTOSYNTHESIS



?

S

WATER

CO₂

LIGHT ENERGY

PHOTO

ATMOSPHERE

E⁻

PHOTOLYSIS

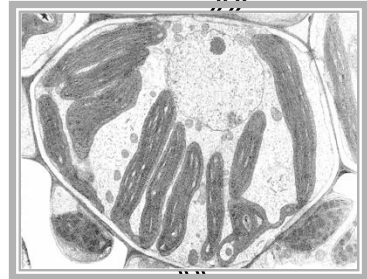
LT RXT

THYLAKOID
GRANUM

ATP

DK RXT

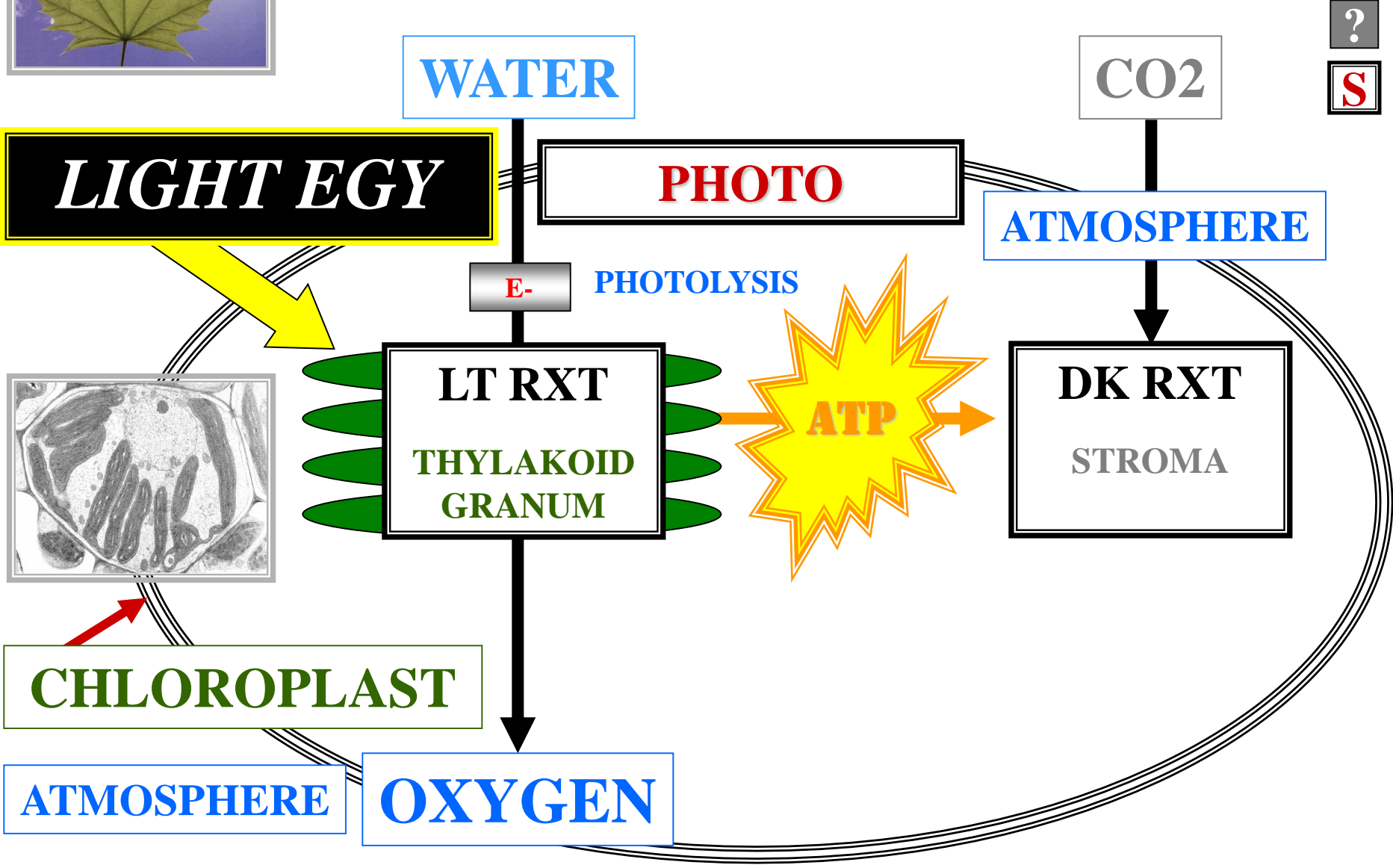
STROMA



CHLOROPLAST

ATMOSPHERE

OXYGEN



PHOTOSYNTHESIS

G



WATER

CO₂

LIGHT ENERGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT

THYLAKOID
GRANUM

CHEMICAL
ENERGY

DK RXT

STROMA

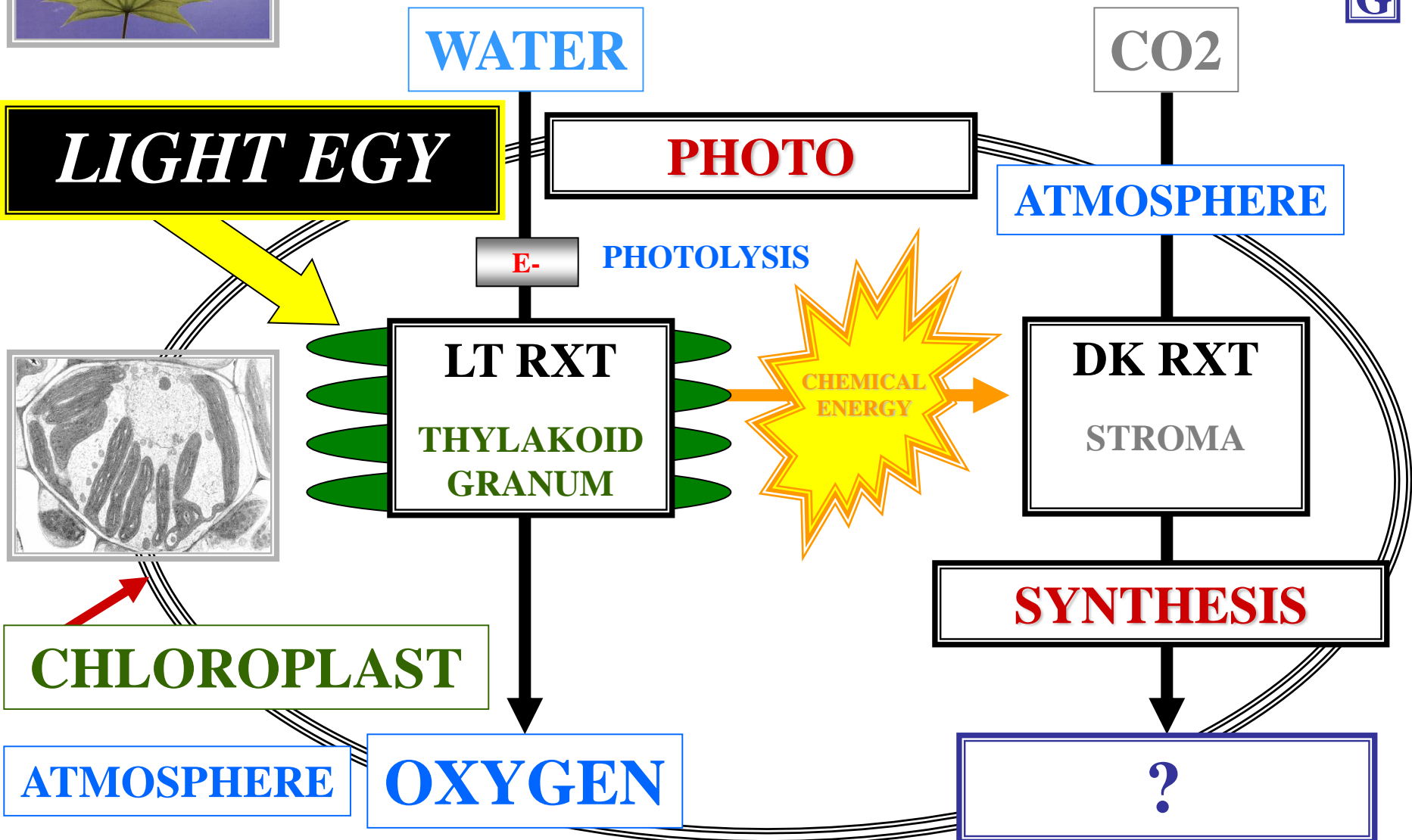
CHLOROPLAST

SYNTHESIS

ATMOSPHERE

OXYGEN

?



PHOTOSYNTHESIS



WATER

CO₂

G



M

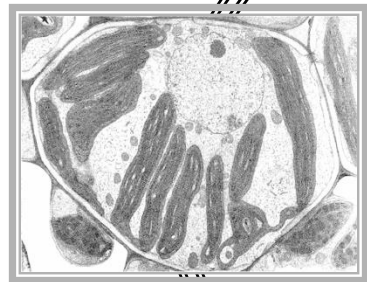
LIGHT ENERGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT

THYLAKOID
GRANUM

ATP

DK RXT

STROMA

CHLOROPLAST

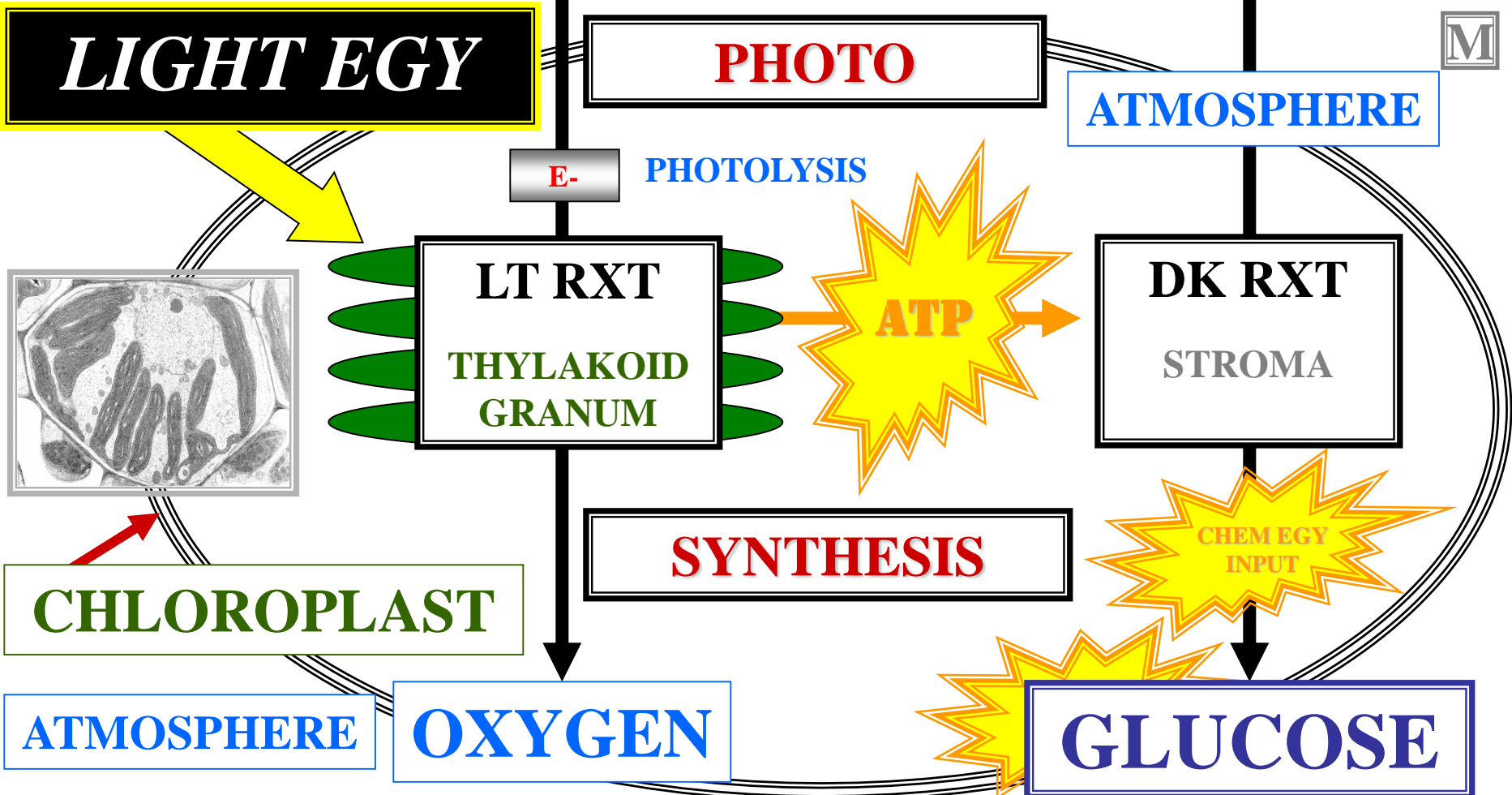
SYNTHESIS

CHEMICAL
INPUT

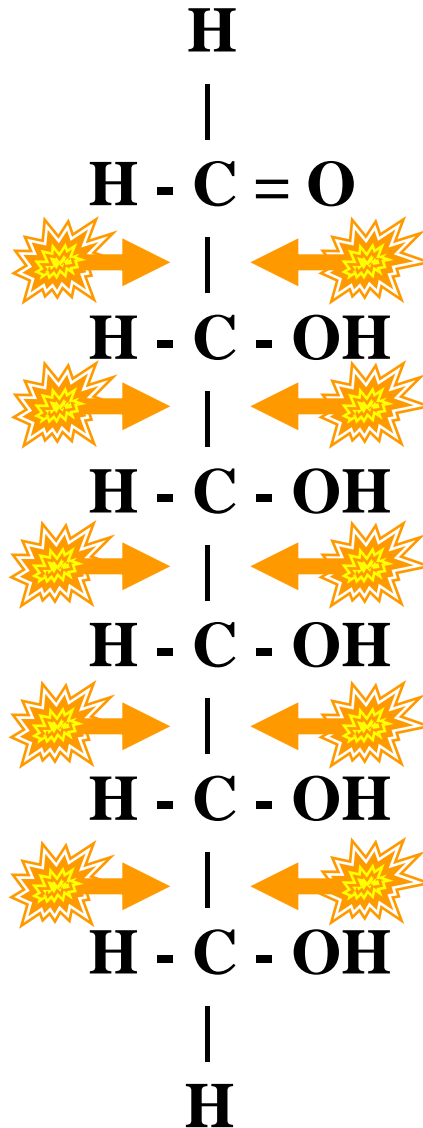
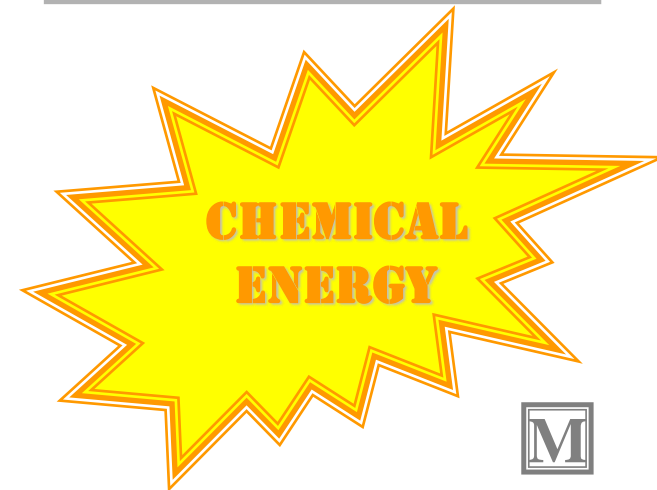
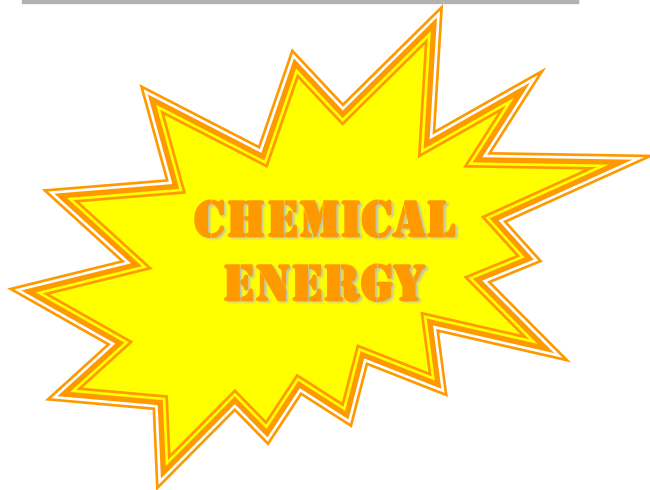
ATMOSPHERE

OXYGEN

GLUCOSE



GLUCOSE



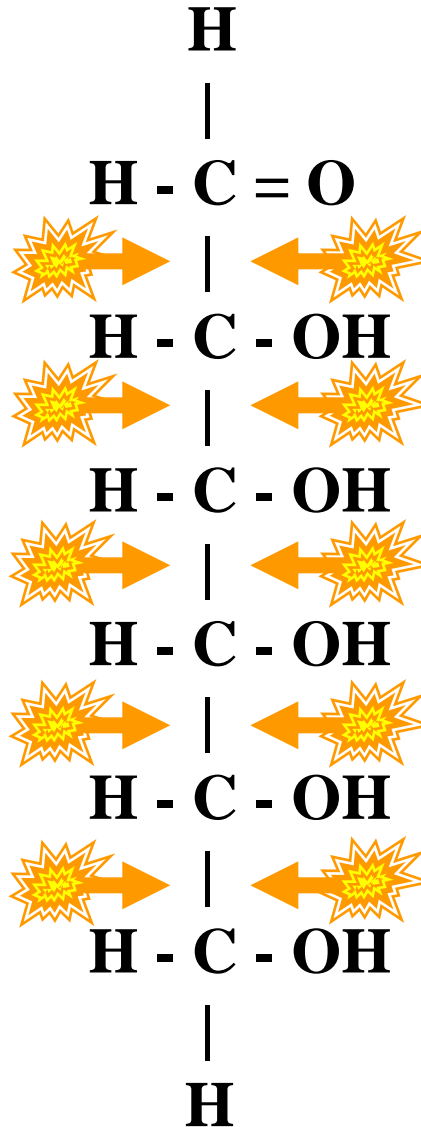


GLUCOSE



**ENTERS
METABOLISM**

**ENTERS
METABOLISM**



CELL METABOLISM

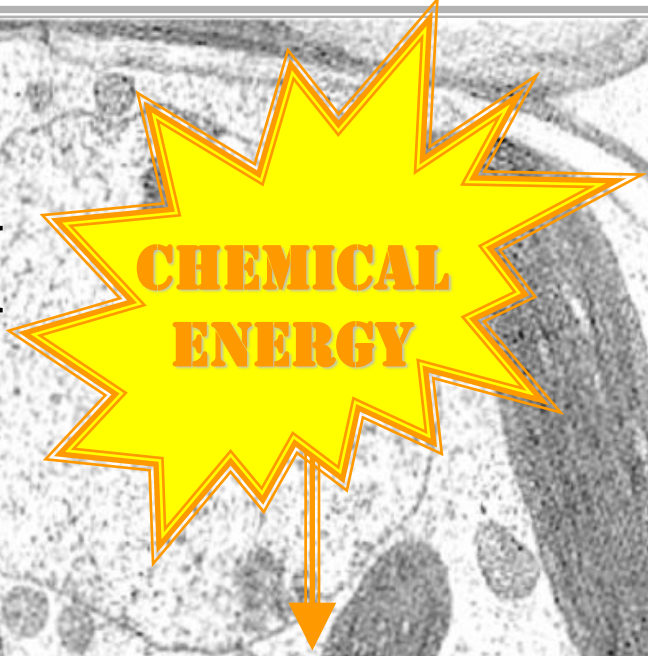


**CHEMICAL
ENERGY**



BIOCHEMICAL REACTION

CELL METABOLISM



ENDERGONIC BIOCHEMICAL REACTIONS

CELL METABOLISM



**CHEMICAL
ENERGY**



**CHEMICAL ENERGY
DRIVES
ENDERGONIC REACTIONS
TO A PRODUCT**

PHOTOSYNTHESIS



*EFFICIENT
METABOLISM*

PHOTOSYNTHESIS

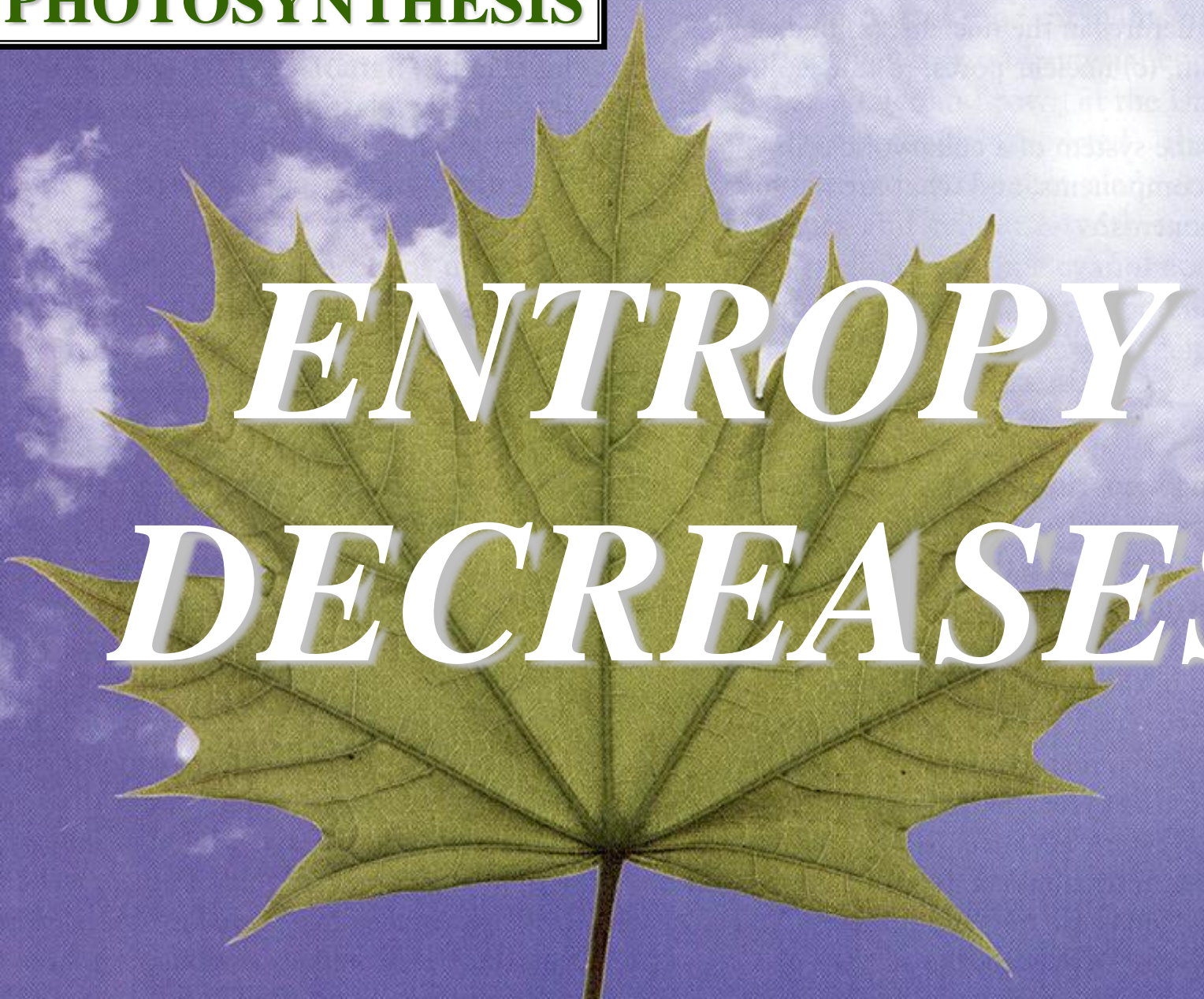


*ORGANIZATION
INCREASES*

PHOTOSYNTHESIS

H

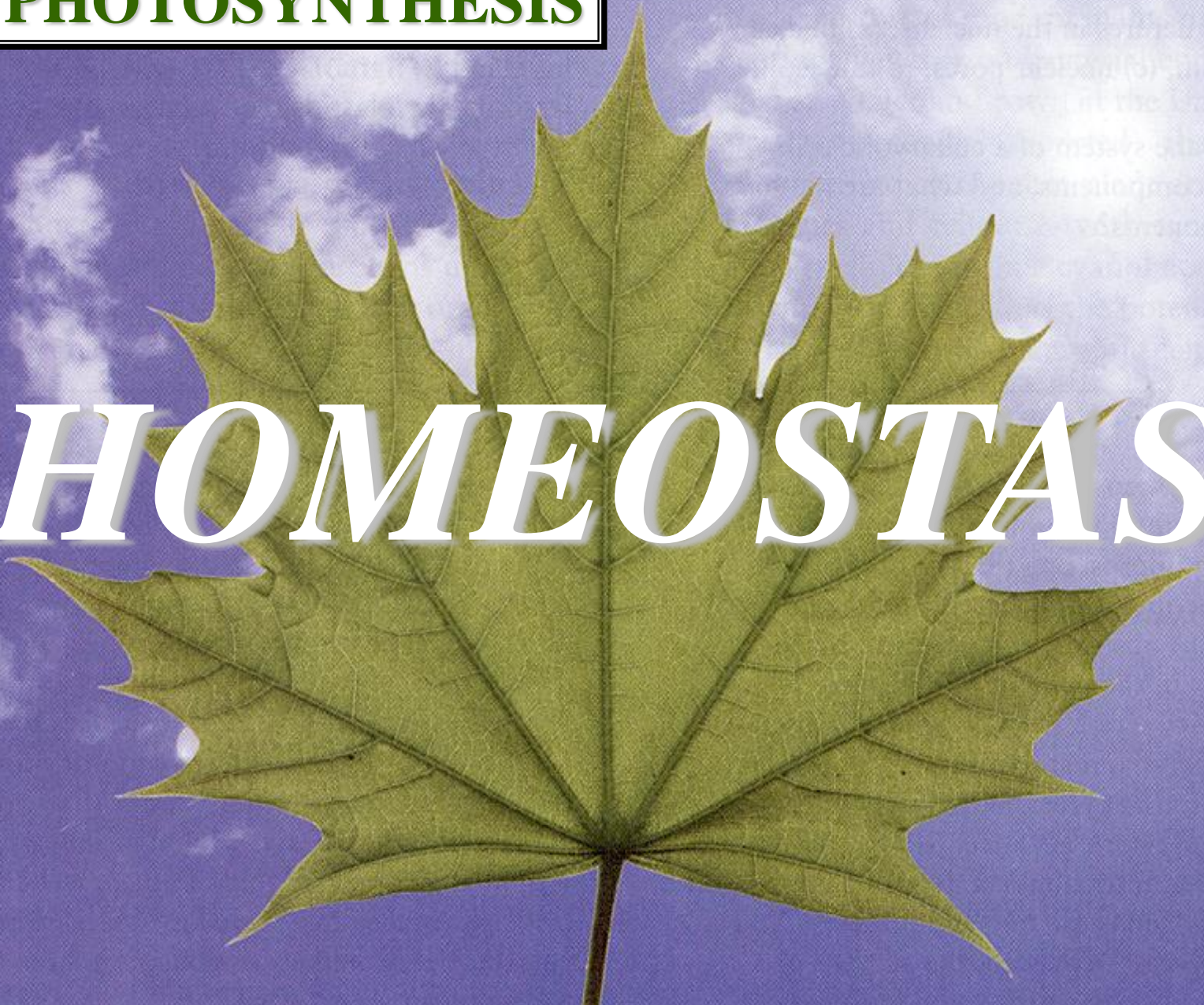
*ENTROPY
DECREASES*



PHOTOSYNTHESIS



HOMEOSTASIS





LIGHT & DARK REACTION OVERVIEW SUMMARY

PHOTOSYNTHESIS

A large, vibrant green maple leaf is the central focus of the slide. It is set against a background of a bright blue sky with scattered white clouds. The leaf's veins are clearly visible, and its edges are sharply pointed.

LIGHT REACTION

PHOTOSYNTHESIS

LT

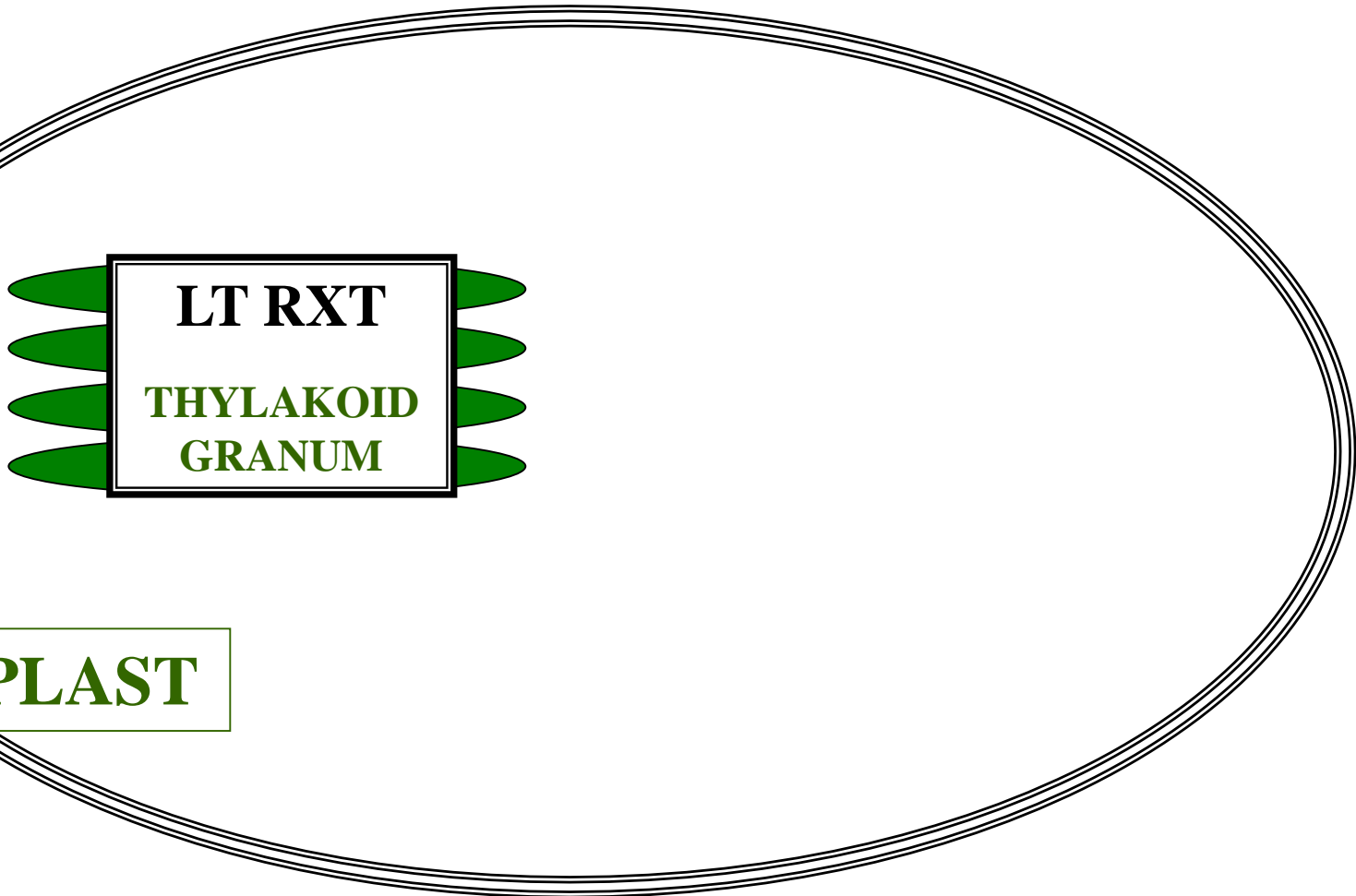
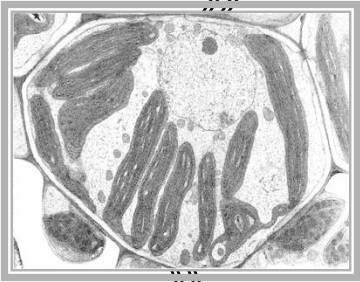


CHLOROPLAST



PHOTOSYNTHESIS

LT



LT RXT

**THYLAKOID
GRANUM**

CHLOROPLAST

PHOTOSYNTHESIS



C



LIGHT ENERGY

PHOTO



THYLAKOID

GRANUM

CHLOROPLAST

PHOTOSYNTHESIS

A



WATER

LIGHT ENERGY

PHOTO

E-

PHOTOLYSIS

LIGHT REACTION

THYLAKOID GRANUM

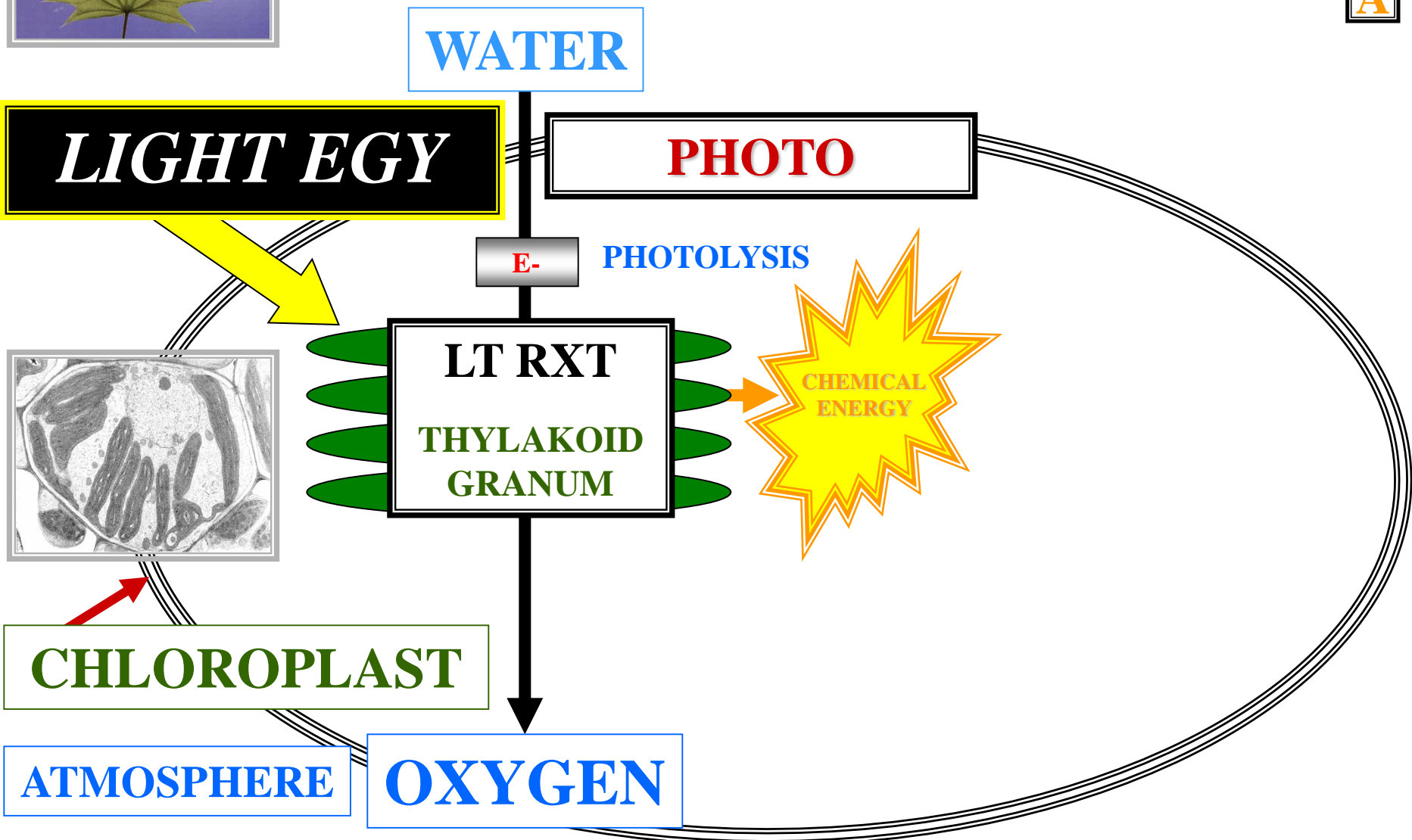
CHEMICAL ENERGY



CHLOROPLAST

ATMOSPHERE

OXYGEN



PHOTOSYNTHESIS

P



WATER

LIGHT ENERGY

PHOTO

E-

PHOTOLYSIS

LT RXT

**THYLAKOID
GRANUM**

ATP

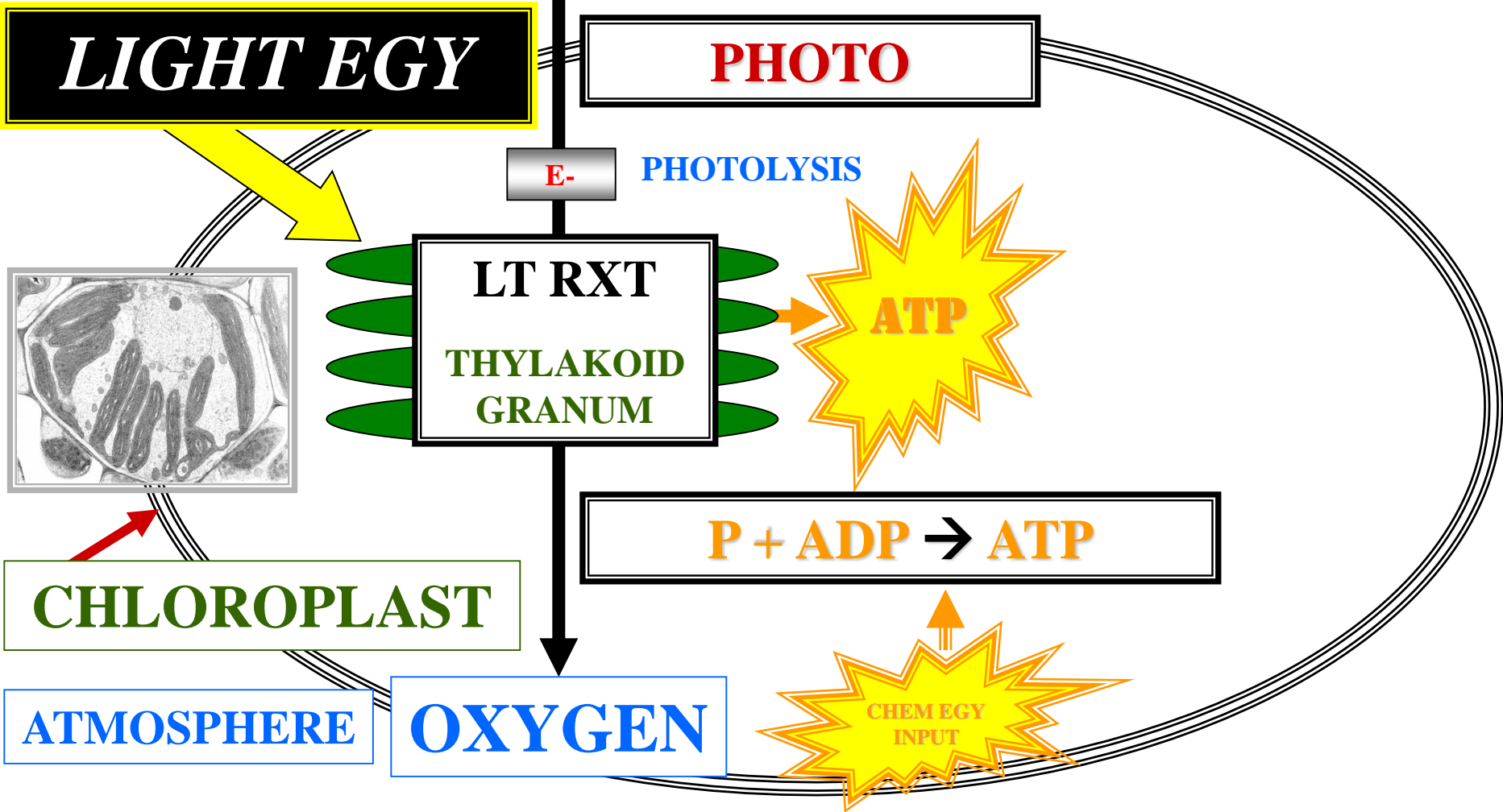
P + ADP → ATP

CHLOROPLAST

ATMOSPHERE

OXYGEN

**CHEM ENERGY
INPUT**



PHOTOSYNTHESIS



WATER

LIGHT ENERGY

PHOTO

E- PHOTOLYSIS

LT RXT

**THYLAKOID
GRANUM**

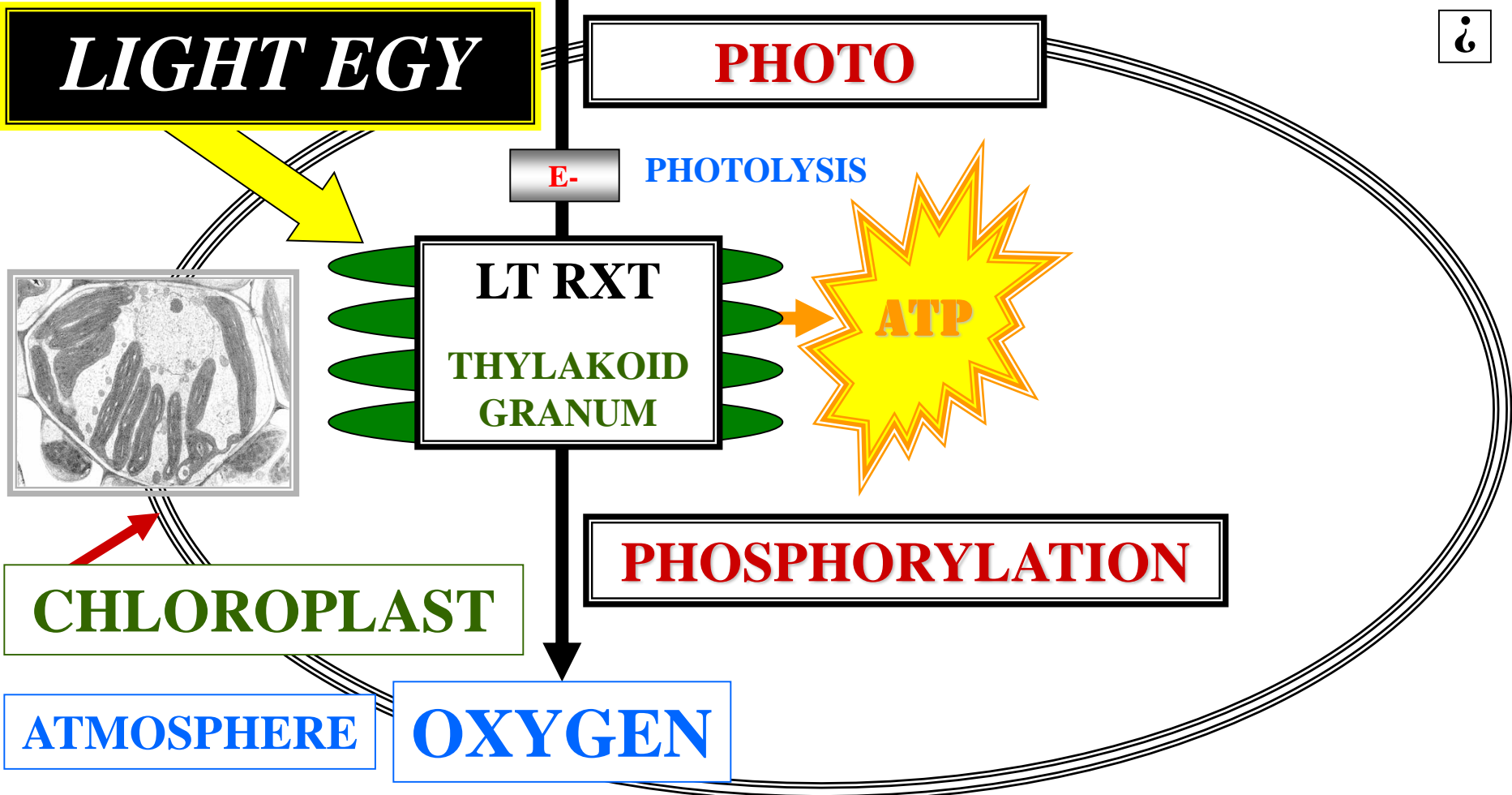
ATP

PHOSPHORYLATION

CHLOROPLAST

ATMOSPHERE

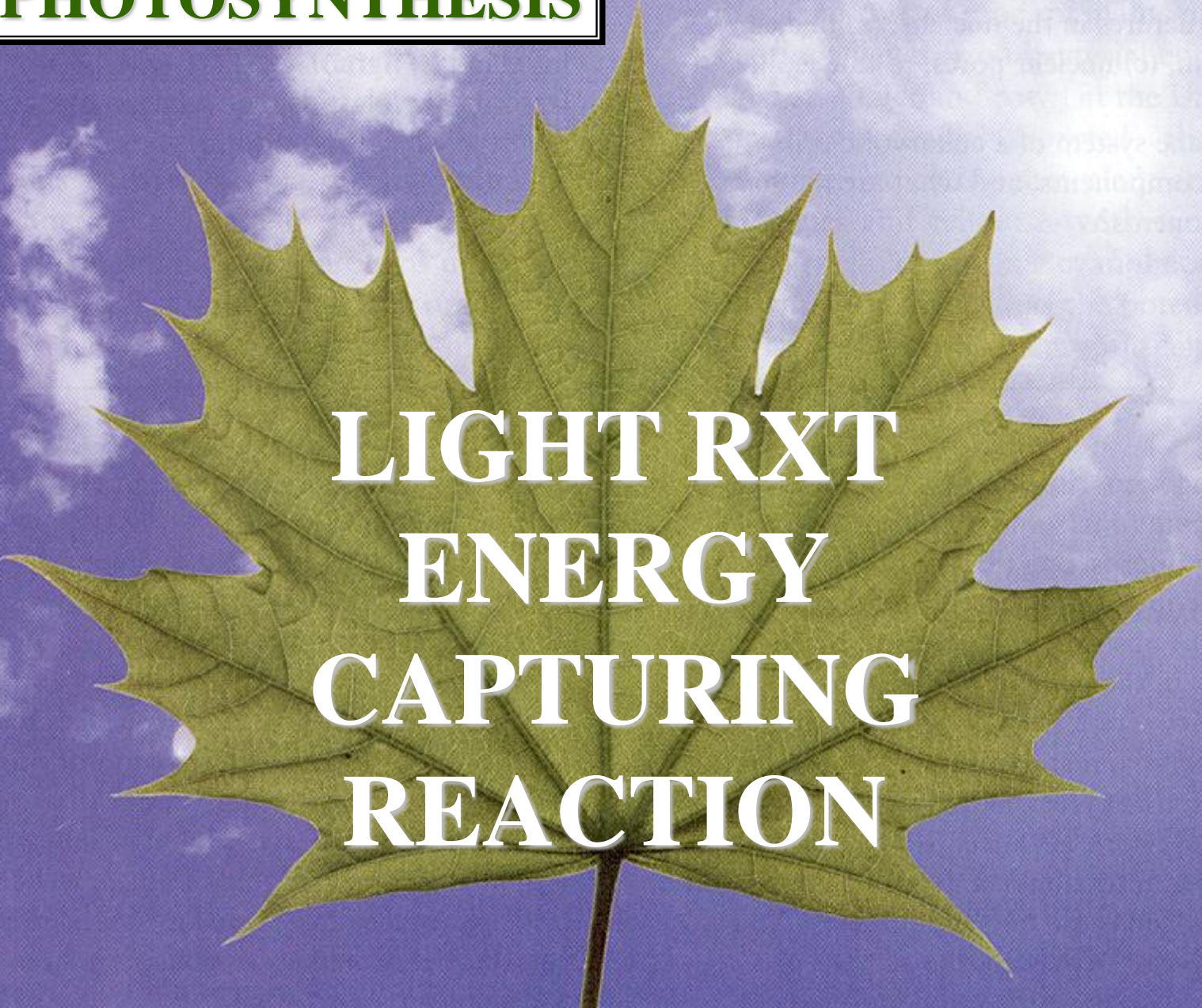
OXYGEN



PHOTOSYNTHESIS

A

P



LIGHT RXT
ENERGY
CAPTURING
REACTION

PHOTOSYNTHESIS

DR



WATER

LIGHT ENERGY

PHOTO

E-

PHOTOLYSIS

LT RXT

THYLAKOID
GRANUM

ATP

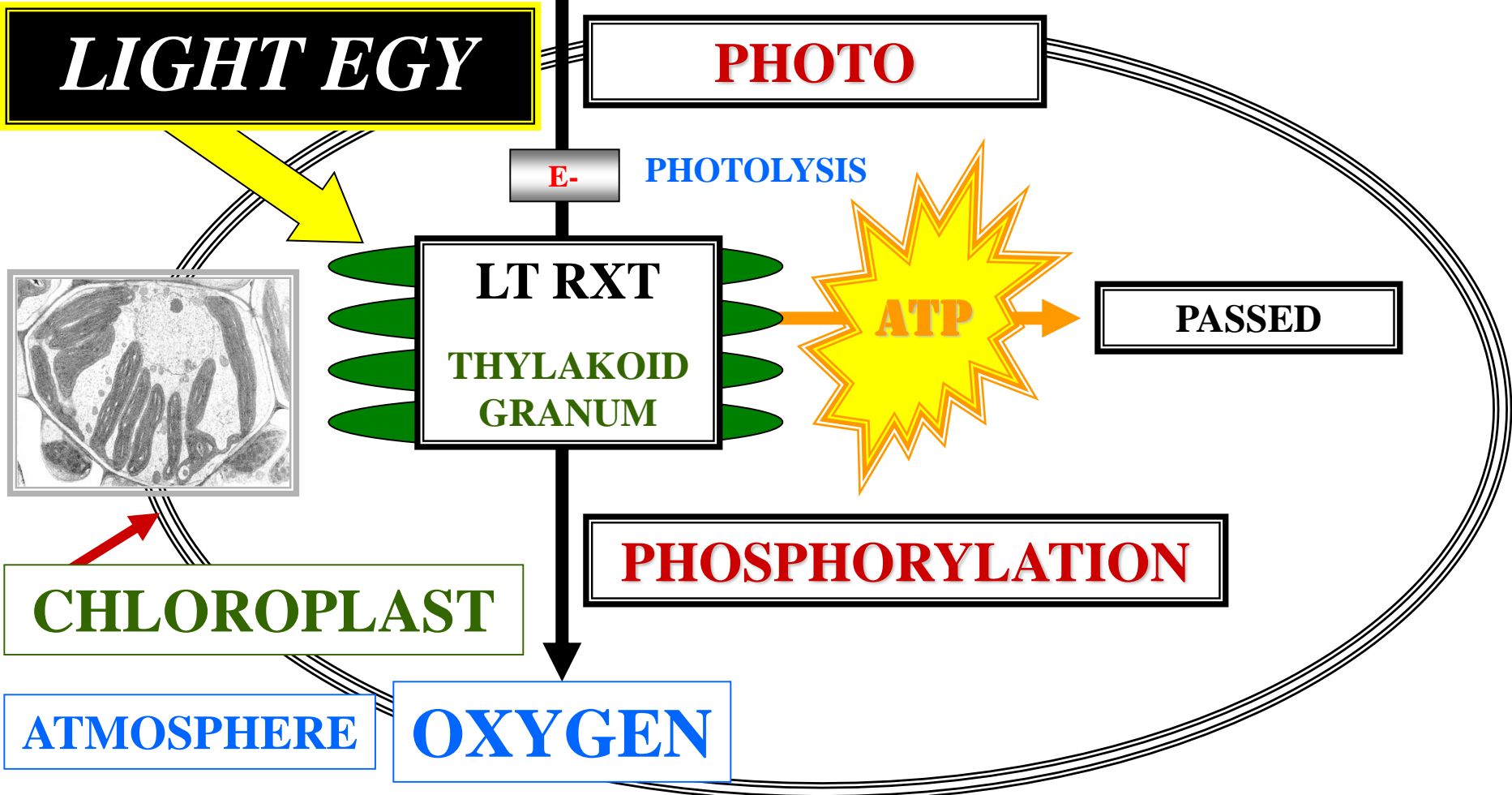
PASSED

PHOSPHORYLATION

CHLOROPLAST

ATMOSPHERE

OXYGEN



PHOTOSYNTHESIS

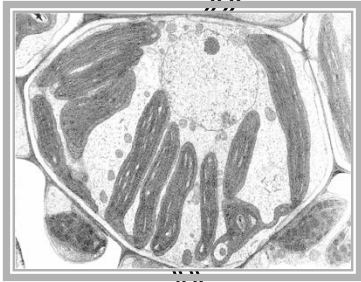


WATER

LIGHT ENERGY

PHOTO

E- PHOTOLYSIS



LT RXT
THYLAKOID
GRANUM



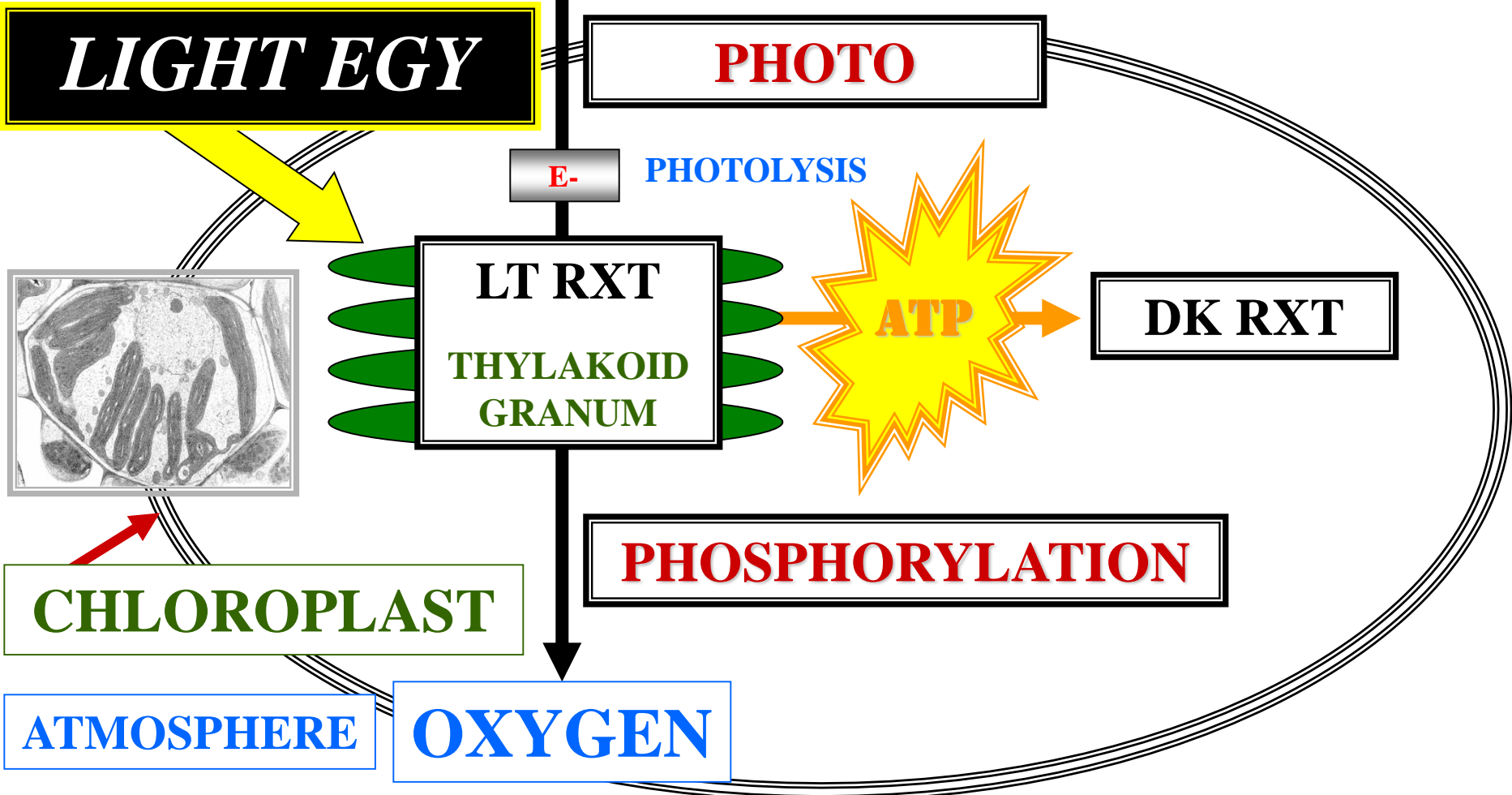
DK RXT

CHLOROPLAST

PHOSPHORYLATION

ATMOSPHERE

OXYGEN



PHOTOSYNTHESIS

A large, vibrant green maple leaf is the central focus of the slide. It is set against a background of a bright blue sky with scattered white clouds. The leaf's veins are clearly visible, and its edges are sharply pointed.

DARK REACTION

PHOTOSYNTHESIS

DR



WATER

LIGHT ENERGY

PHOTO

E-

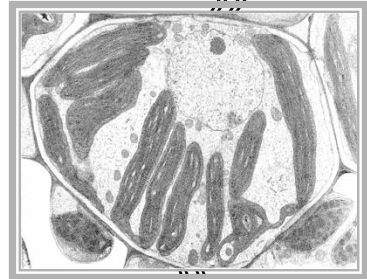
PHOTOLYSIS

LT RXT

THYLAKOID
GRANUM

ATP

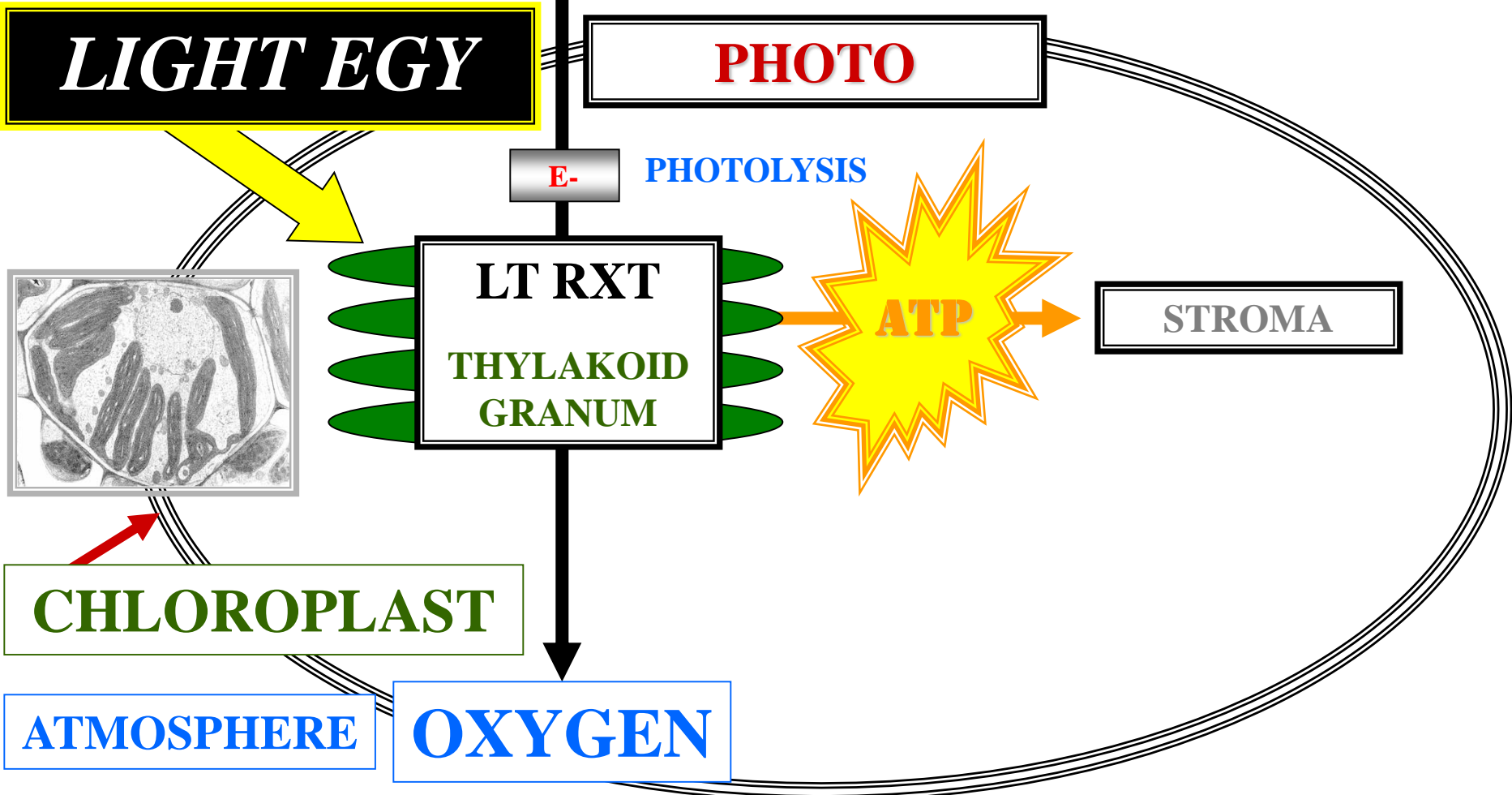
STROMA



CHLOROPLAST

ATMOSPHERE

OXYGEN



PHOTOSYNTHESIS

C



WATER

LIGHT ENERGY

PHOTO

E-

PHOTOLYSIS

LT RXT

THYLAKOID
GRANUM

ATP

DK RXT

STROMA



CHLOROPLAST

ATMOSPHERE

OXYGEN

