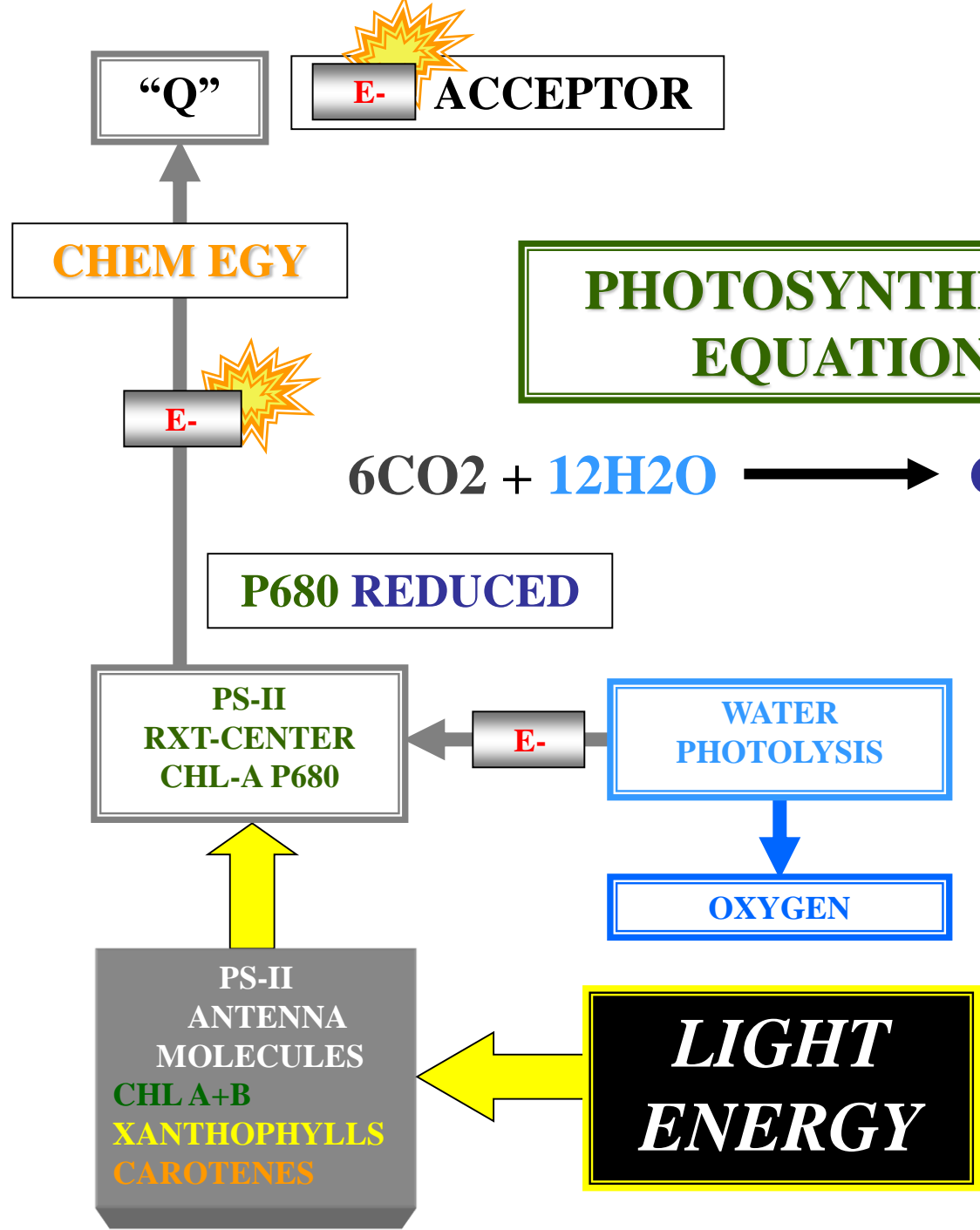




PHOTOSYNTHESIS EQUATION



“Q”

E-

ACCEPTOR

CHEM EGY

E-

P680 REDUCED

PS-II
REACT-CENTER
CHL-A P680

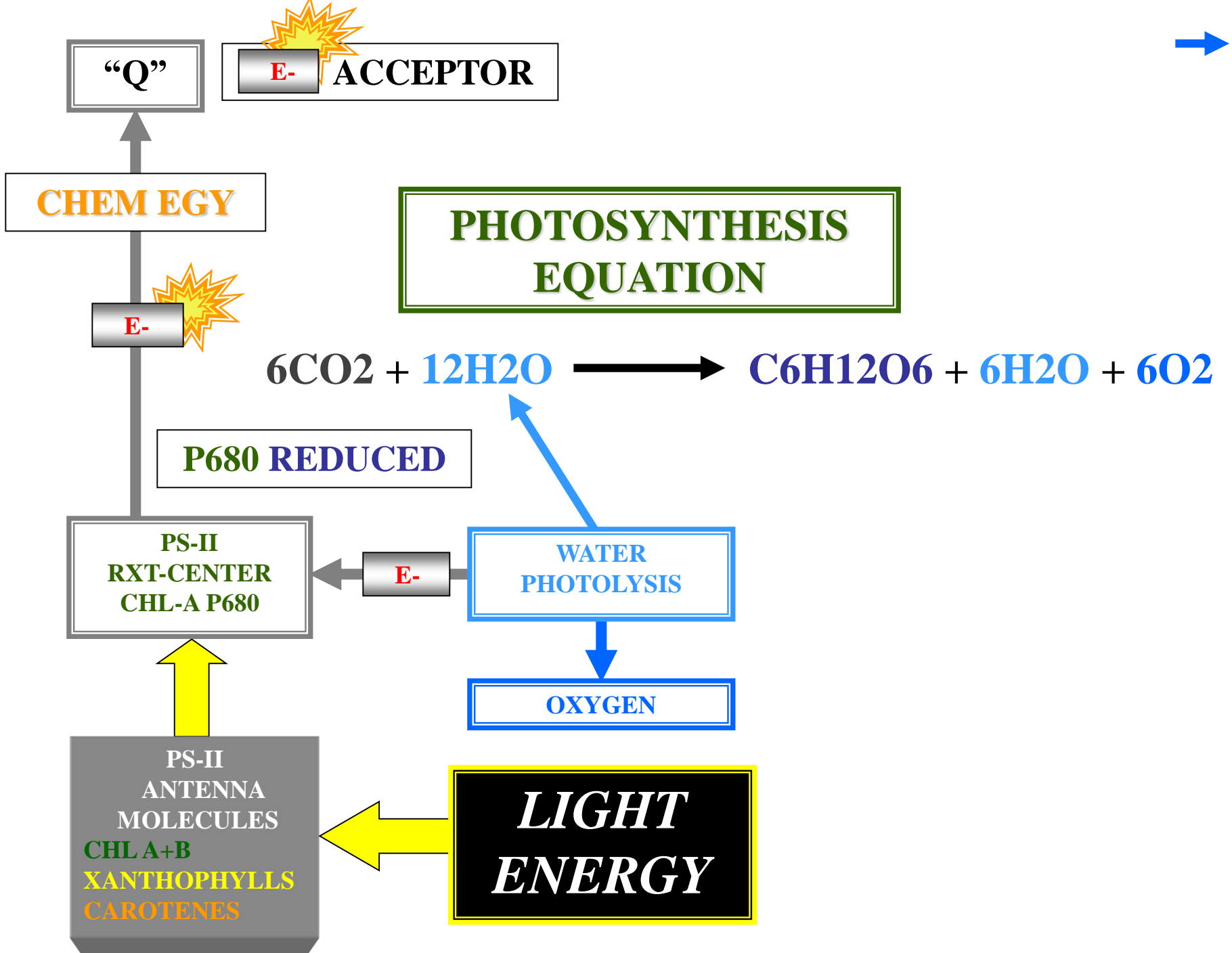
WATER
PHOTOLYSIS

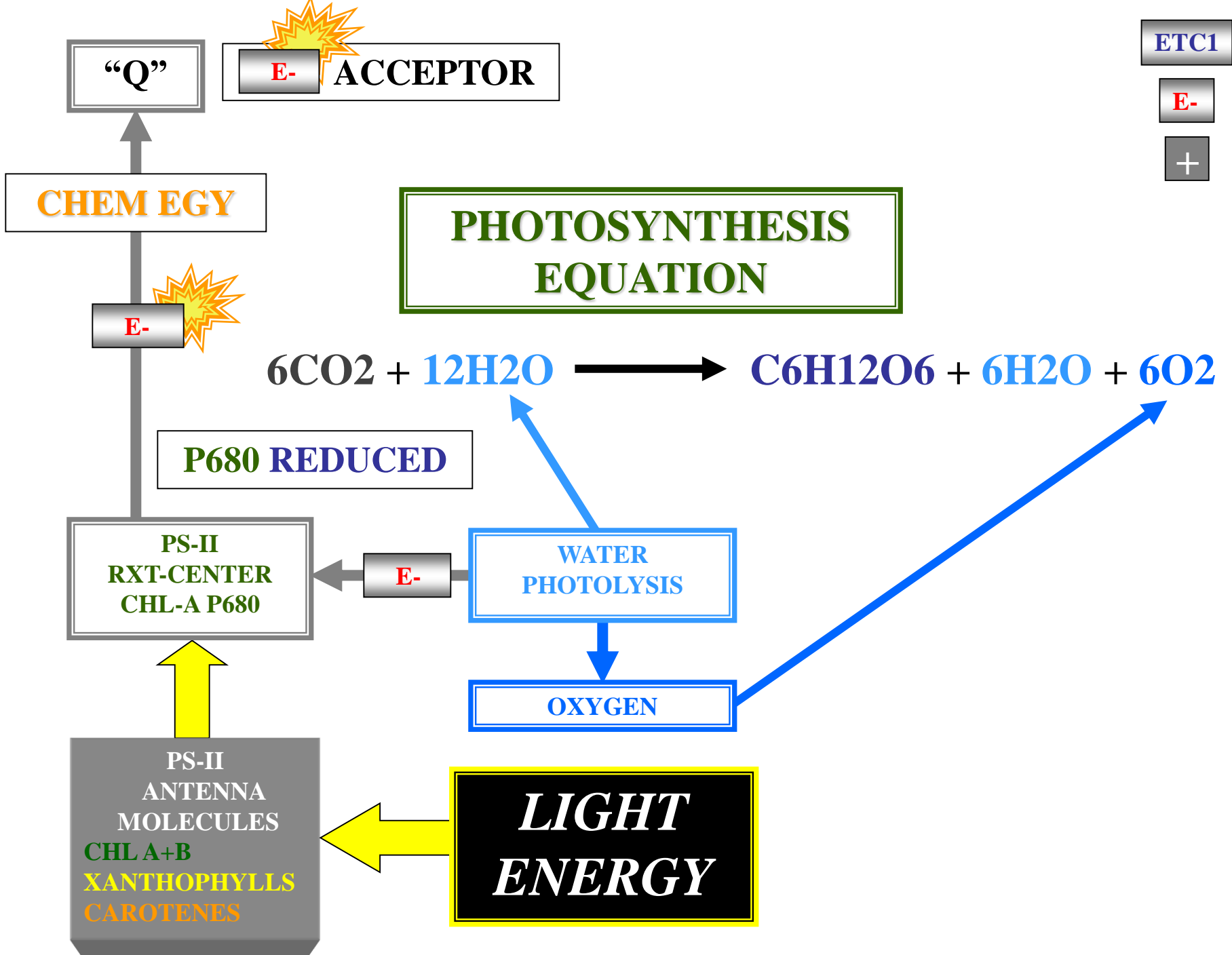
E-

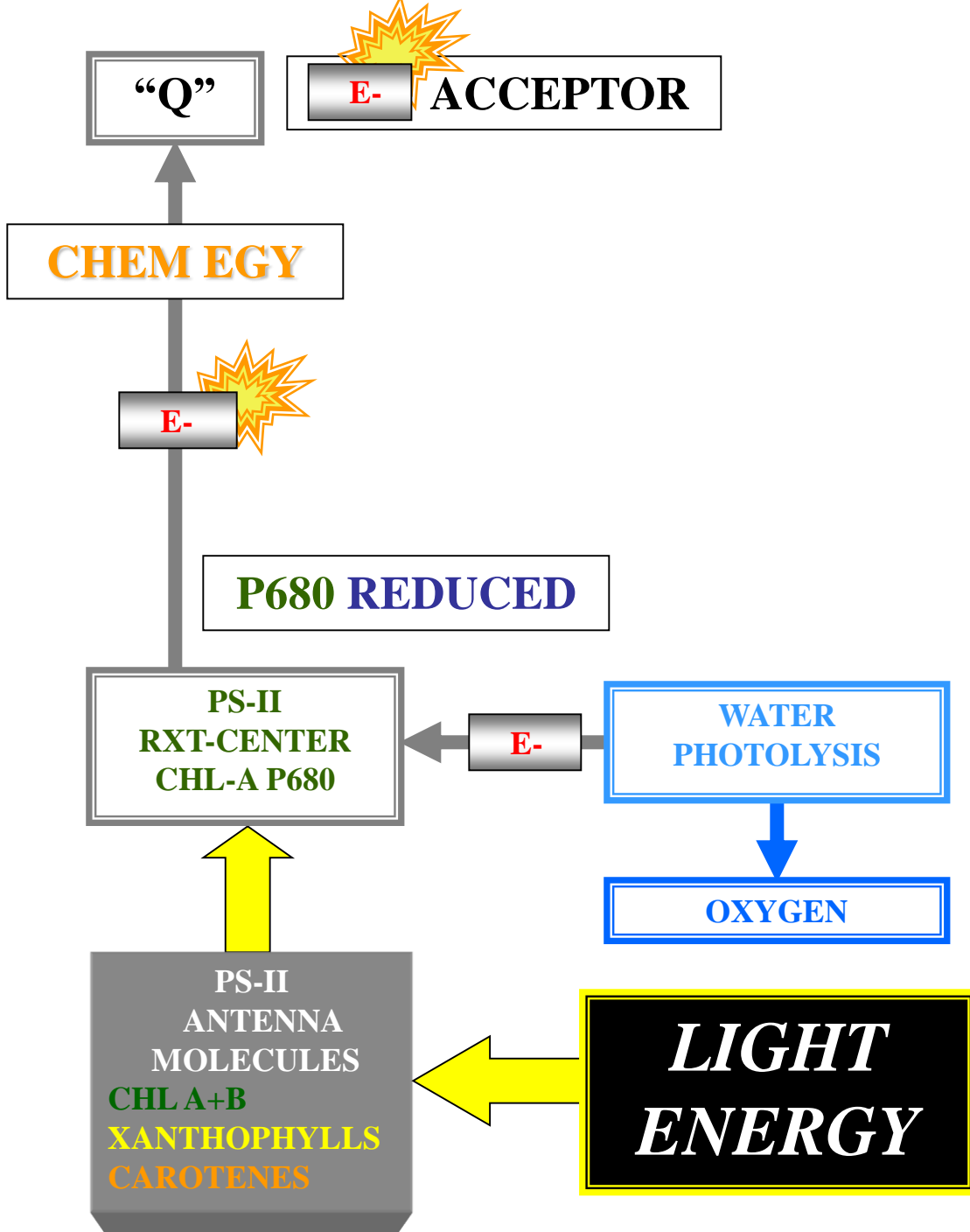
OXYGEN

PS-II
ANTENNA
MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES

LIGHT
ENERGY

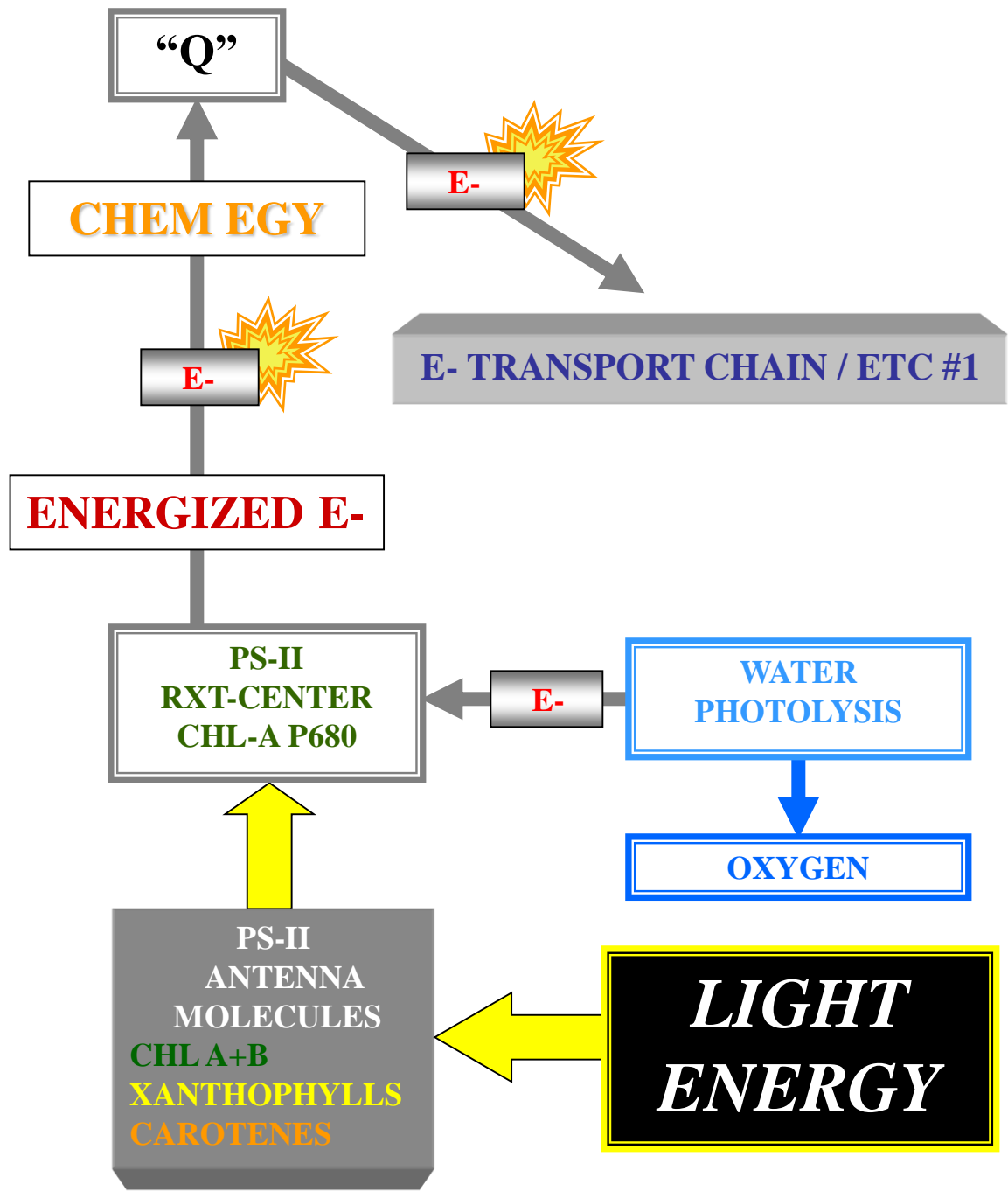






ETC1

E-



ELECTRON TRANSPORT CHAIN

#1

ELECTRON TRANSPORT CHAIN

#1

E- TRANSPORT CHAIN #1

SERIES

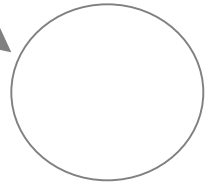
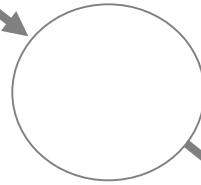
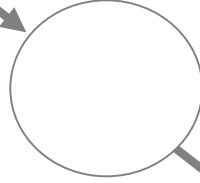
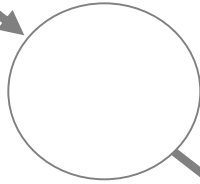
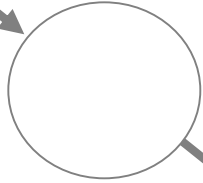
REDOX REACTIONS

E- TRANSPORT CHAIN #1

ELECTRON TRANSPORT CHAIN #1



THYLAKOID GRANUM



= CHEMICAL ENERGY

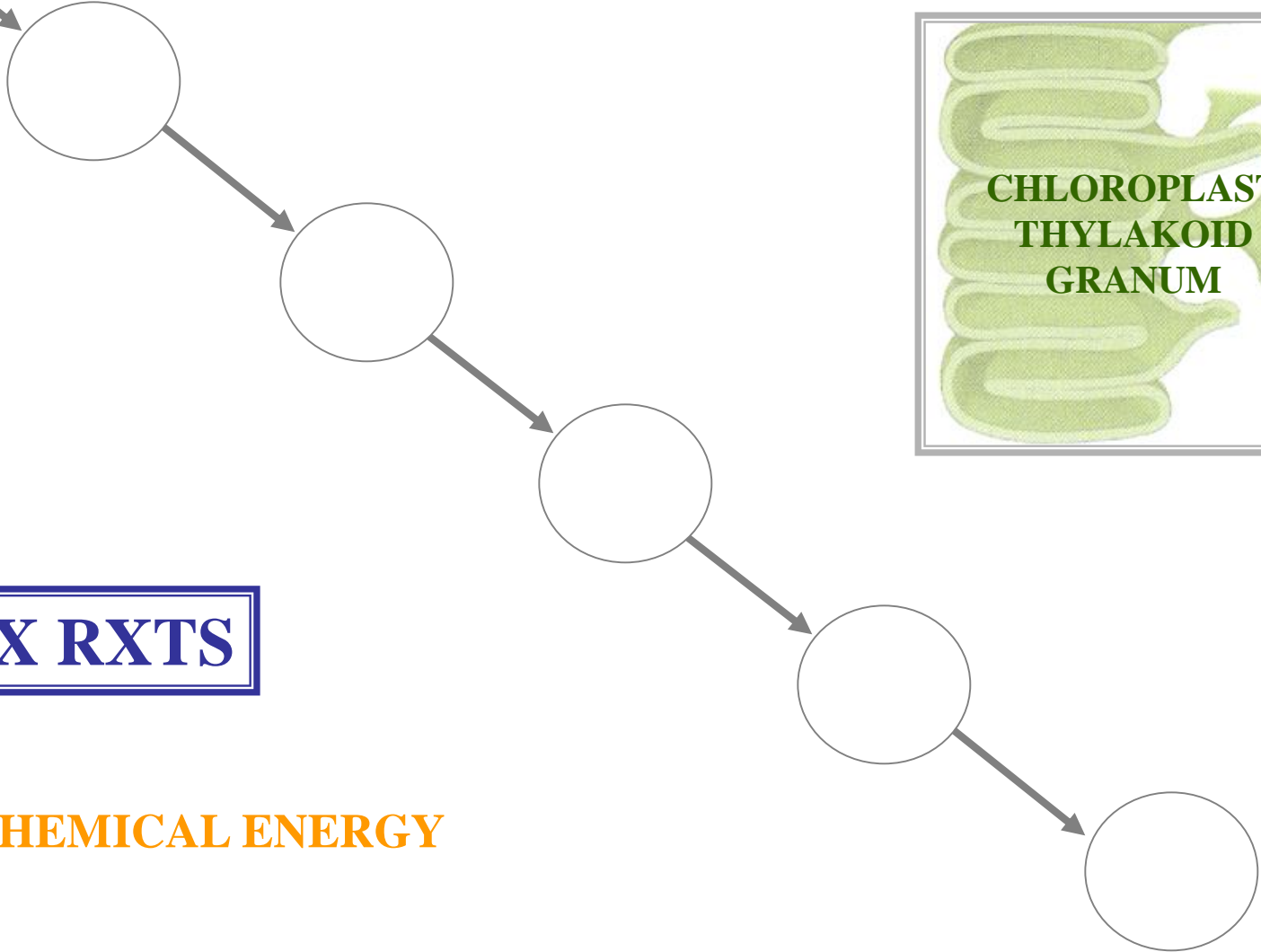


= DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN #1



THYLAKOID GRANUM



REDOX RXTS



= **CHEMICAL ENERGY**

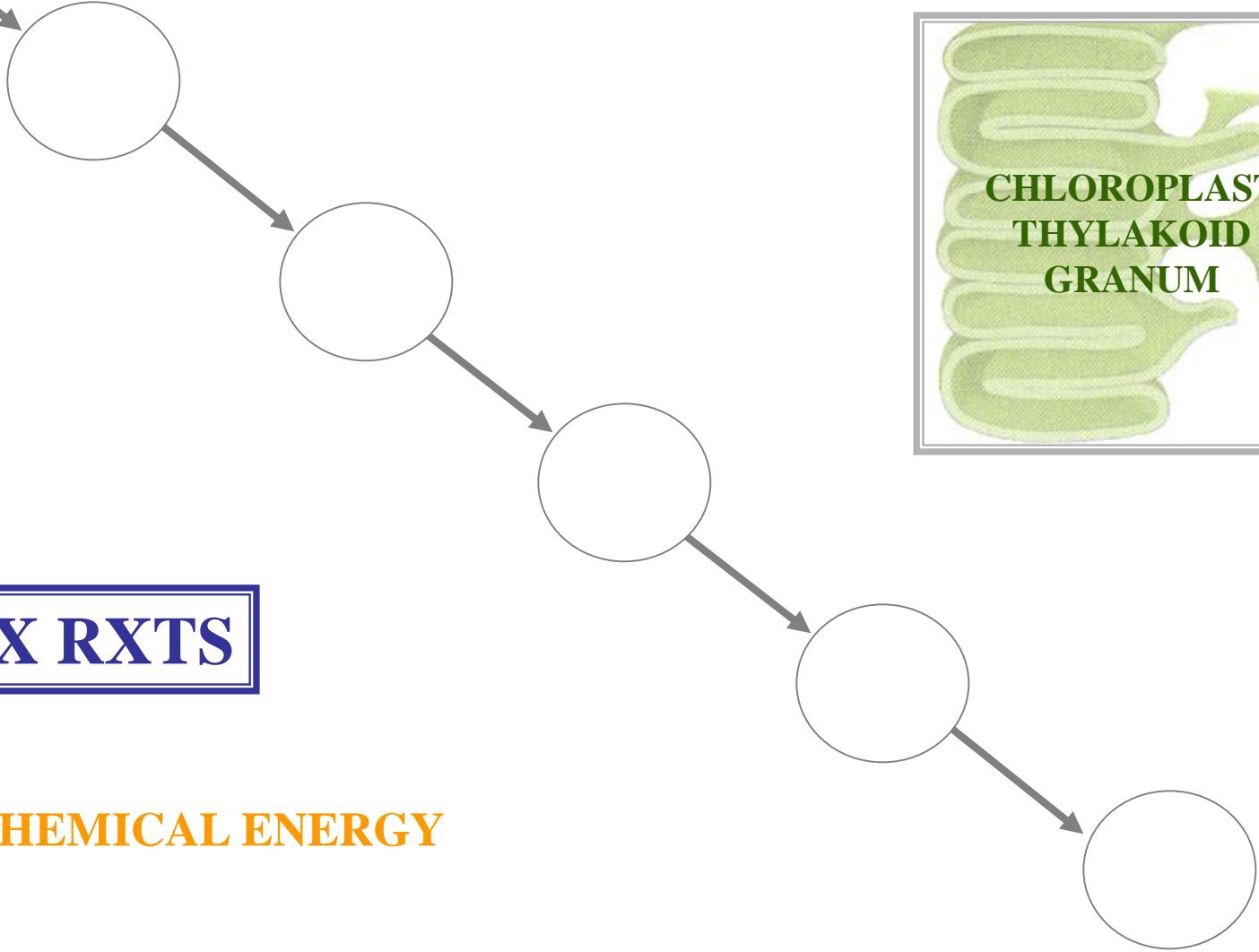


= **DISSIPATED HEAT ENERGY**

ELECTRON TRANSPORT CHAIN #1

E-

THYLAKOID GRANUM



REDOX RXTS



= CHEMICAL ENERGY

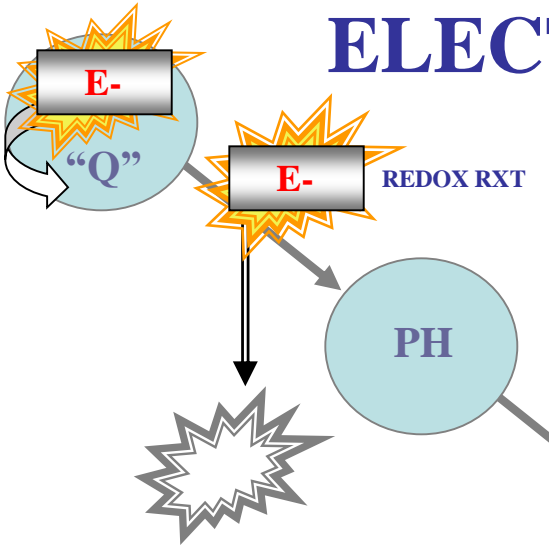


= DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN #1



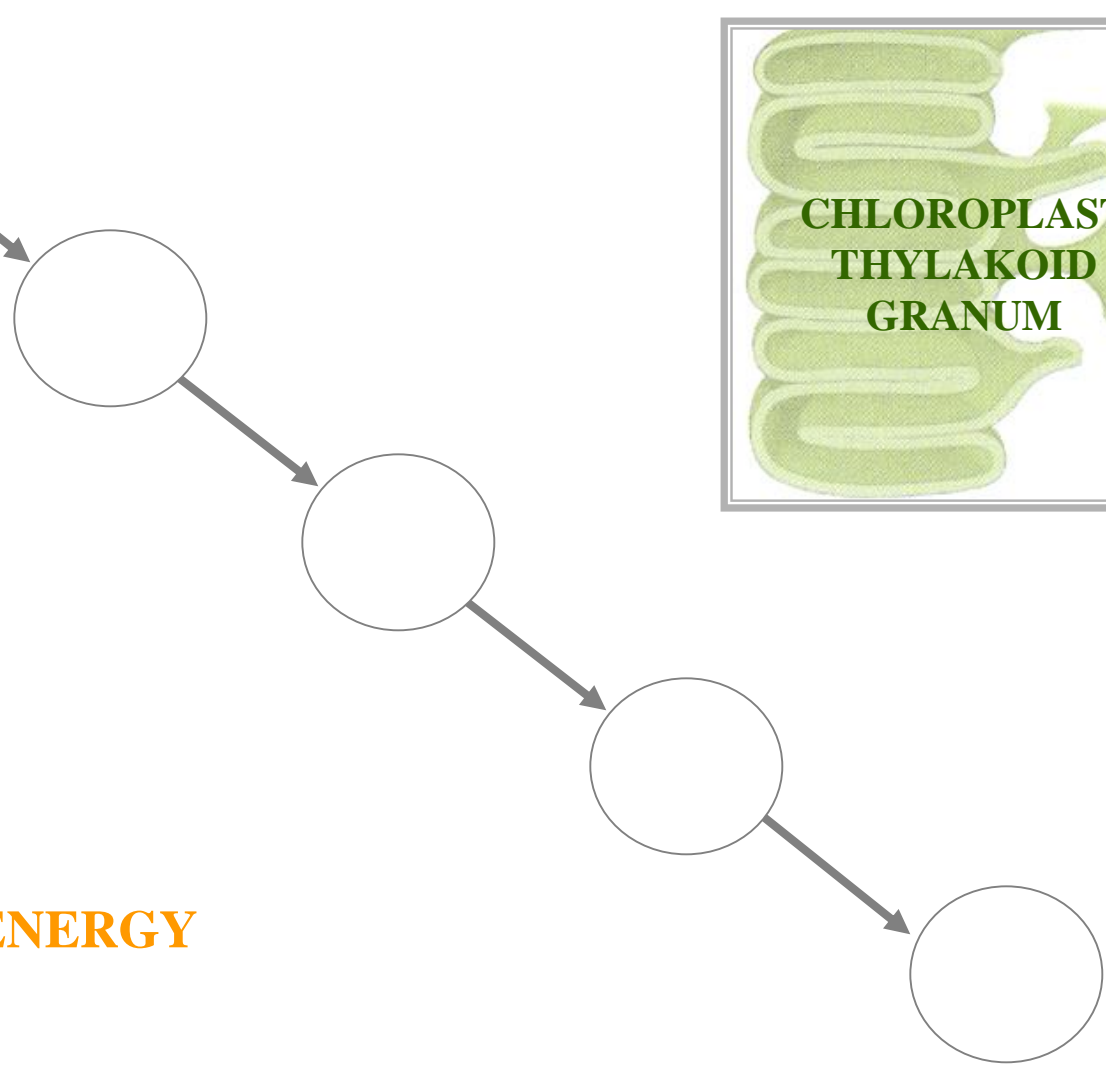
THYLAKOID GRANUM



REDOX RXTS

 = CHEMICAL ENERGY

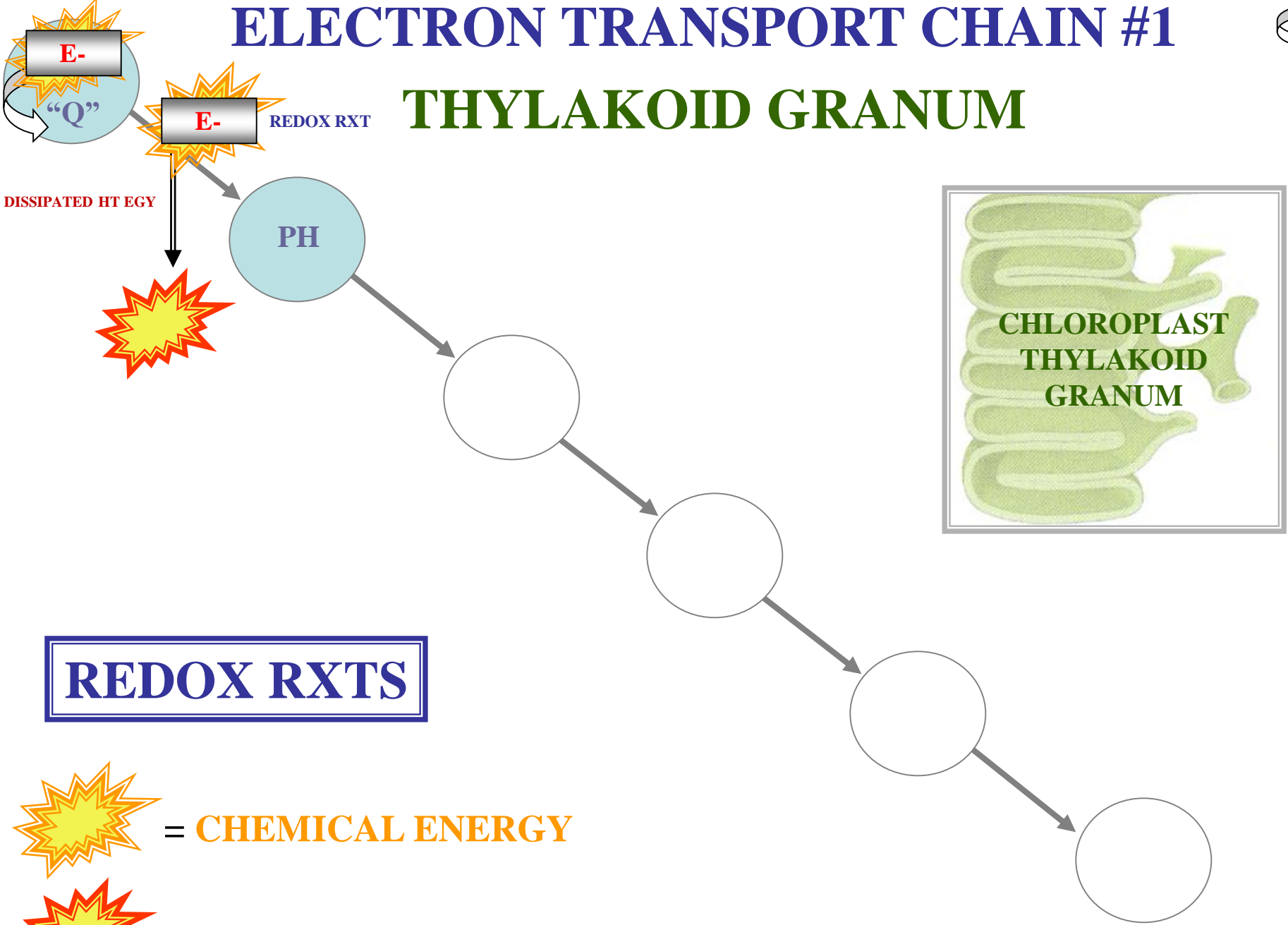
 = DISSIPATED HEAT ENERGY



ELECTRON TRANSPORT CHAIN #1



THYLAKOID GRANUM



REDOX RXTS

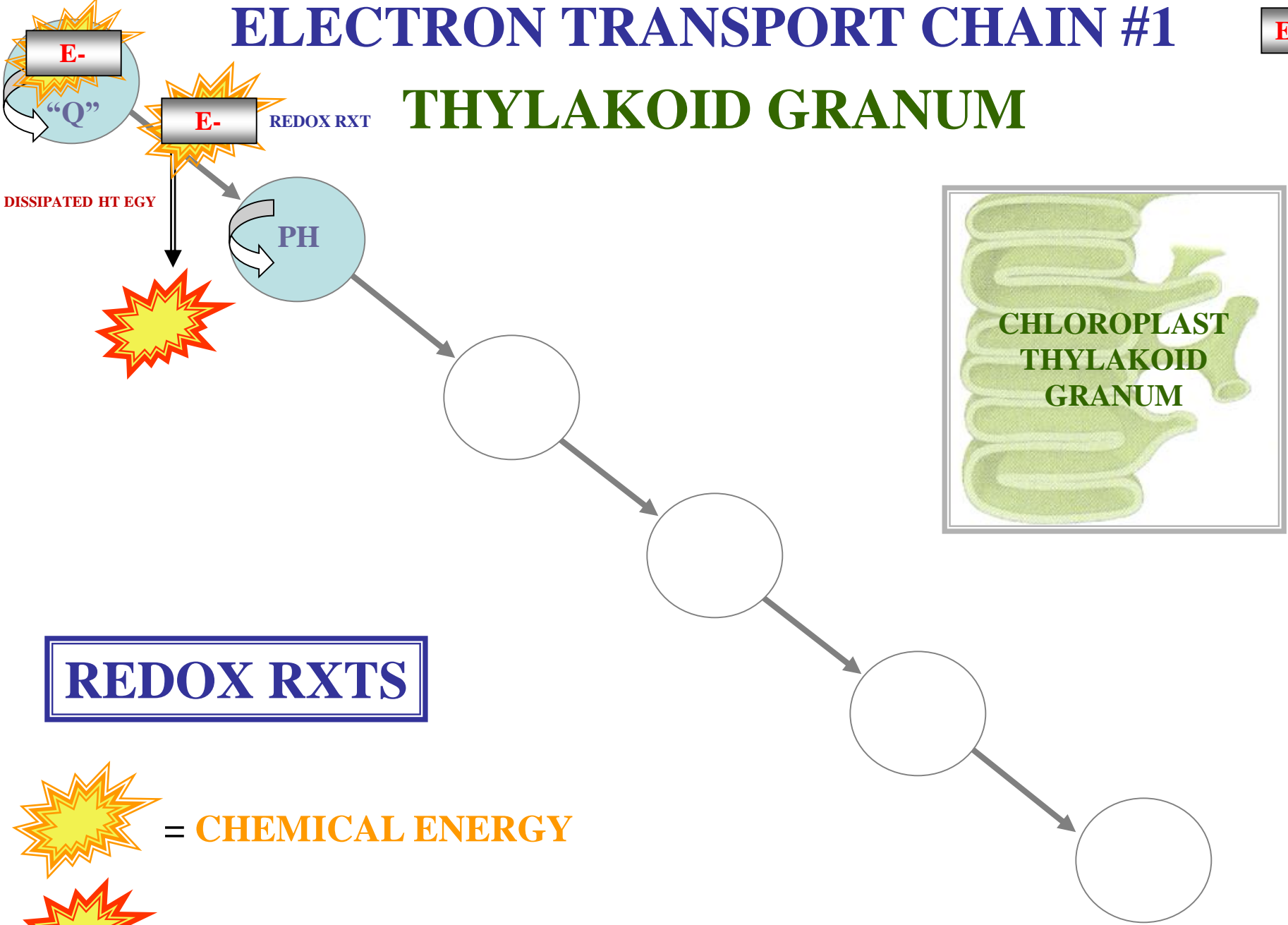
 = **CHEMICAL ENERGY**

 = **DISSIPATED HEAT ENERGY**

ELECTRON TRANSPORT CHAIN #1

E-

THYLAKOID GRANUM



REDOX RXTS

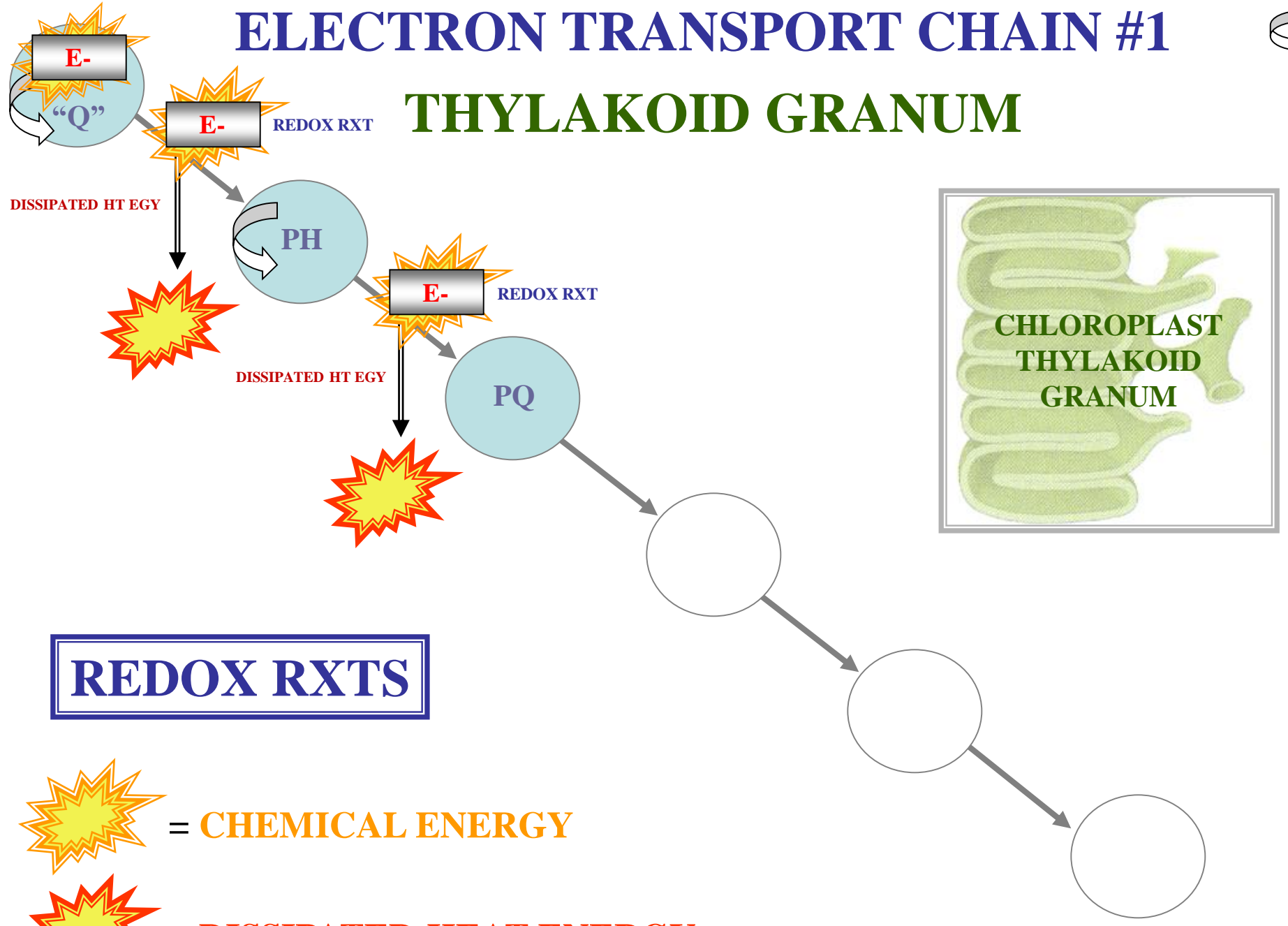
 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN #1



THYLAKOID GRANUM



REDOX RXTS

 = CHEMICAL ENERGY

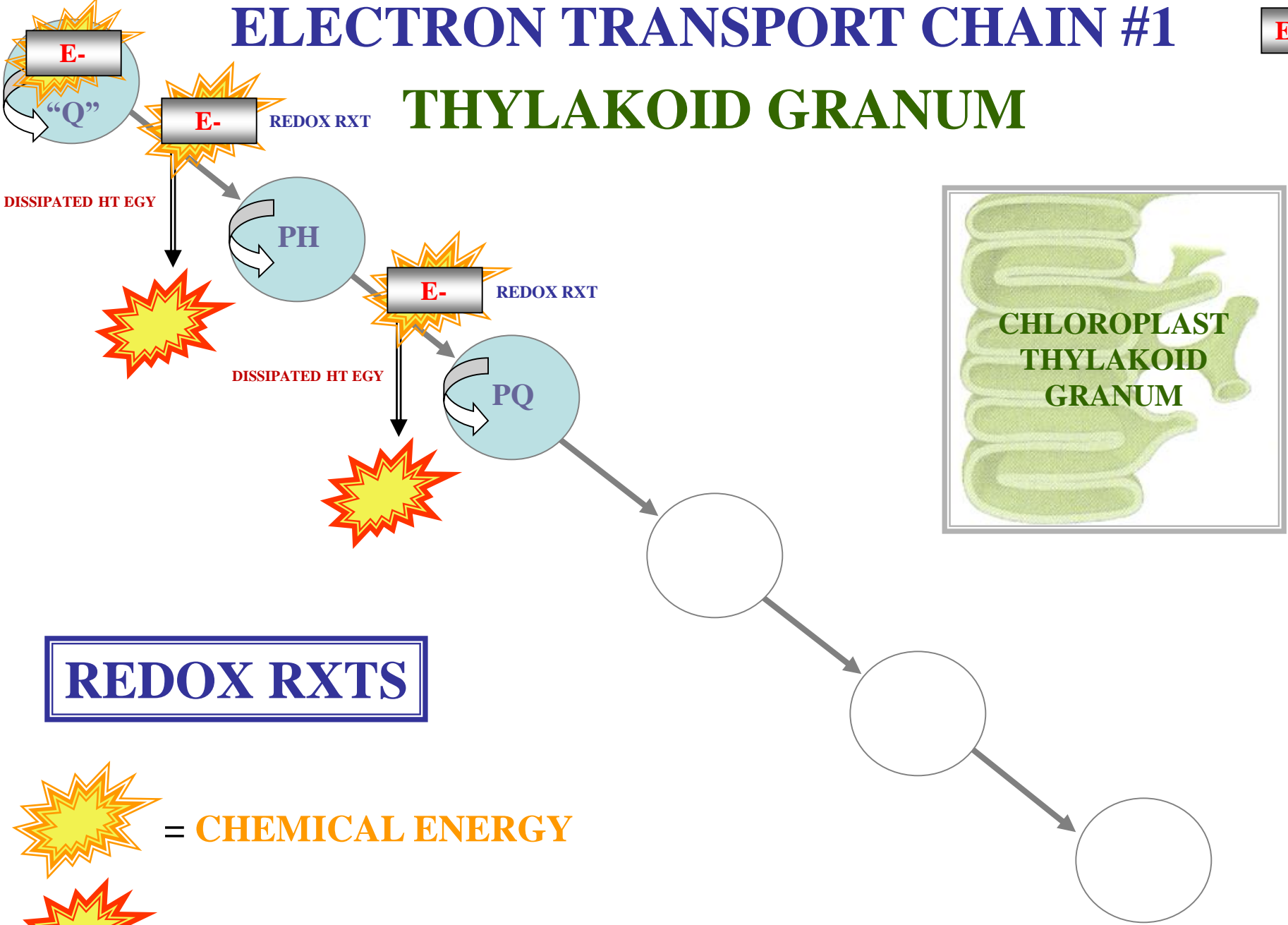
 = DISSIPATED HEAT ENERGY



ELECTRON TRANSPORT CHAIN #1

E-

THYLAKOID GRANUM



REDOX RXTS

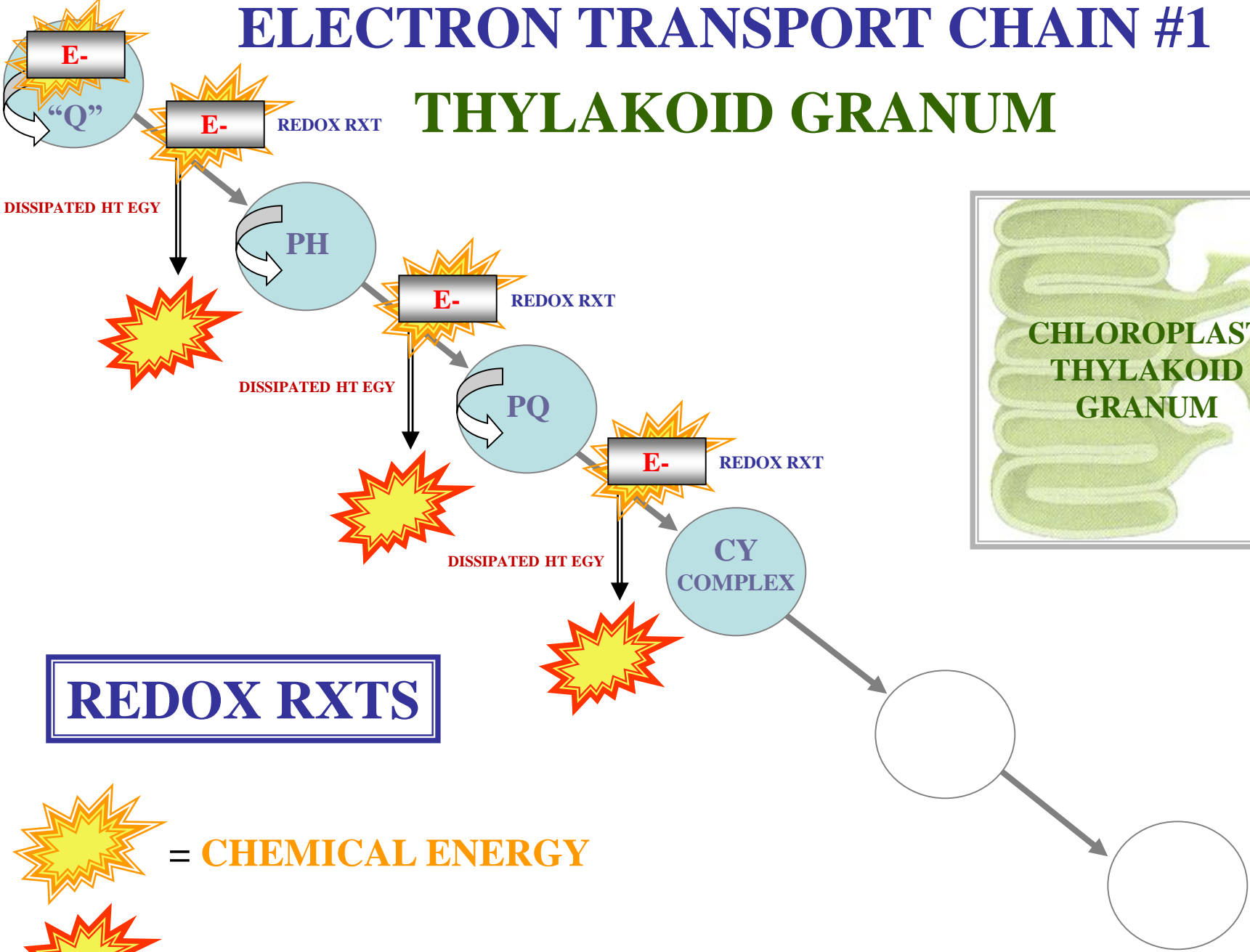
 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN #1

E-

THYLAKOID GRANUM



REDOX RXTS

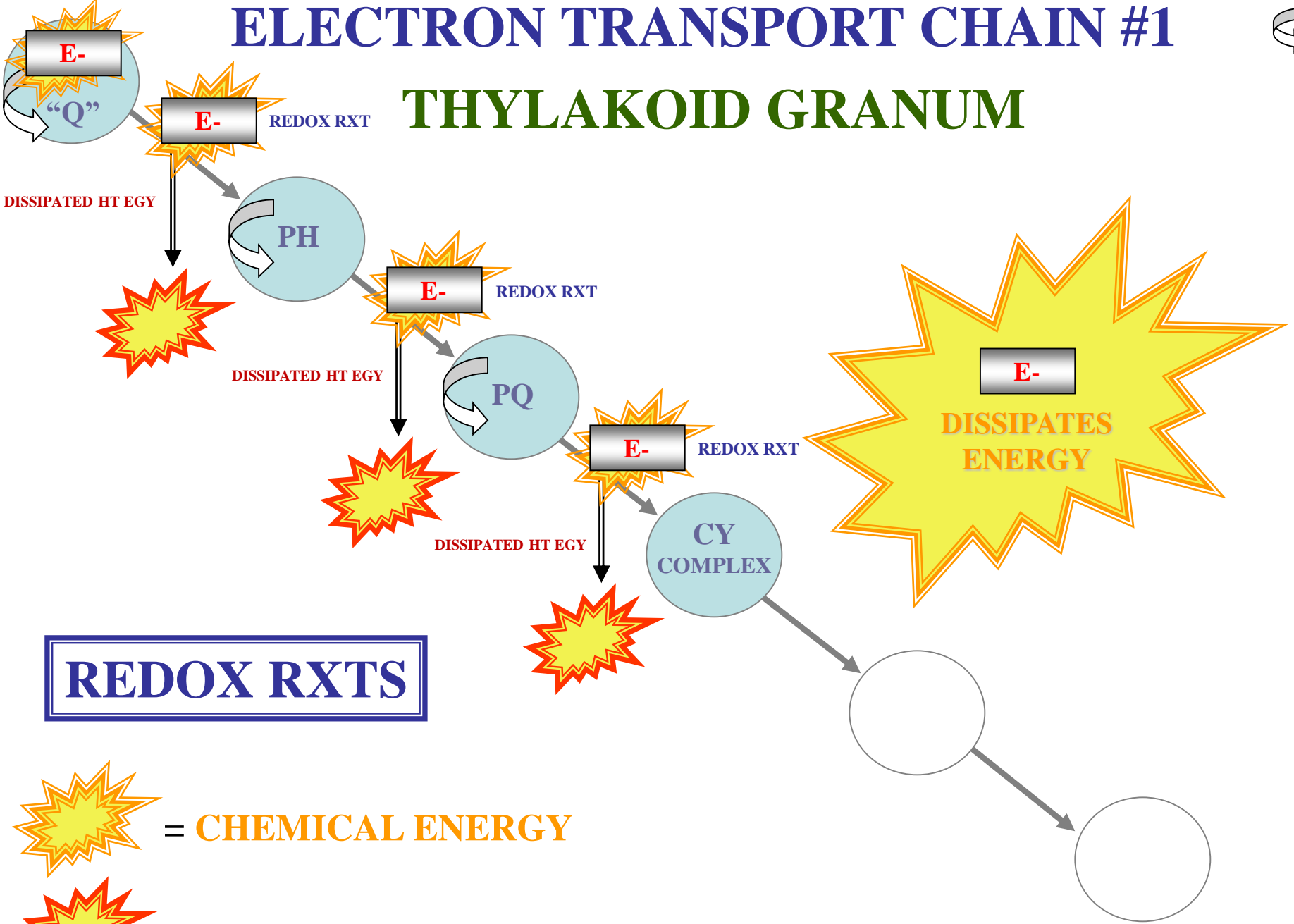
 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN #1



THYLAKOID GRANUM



REDOX RXTS

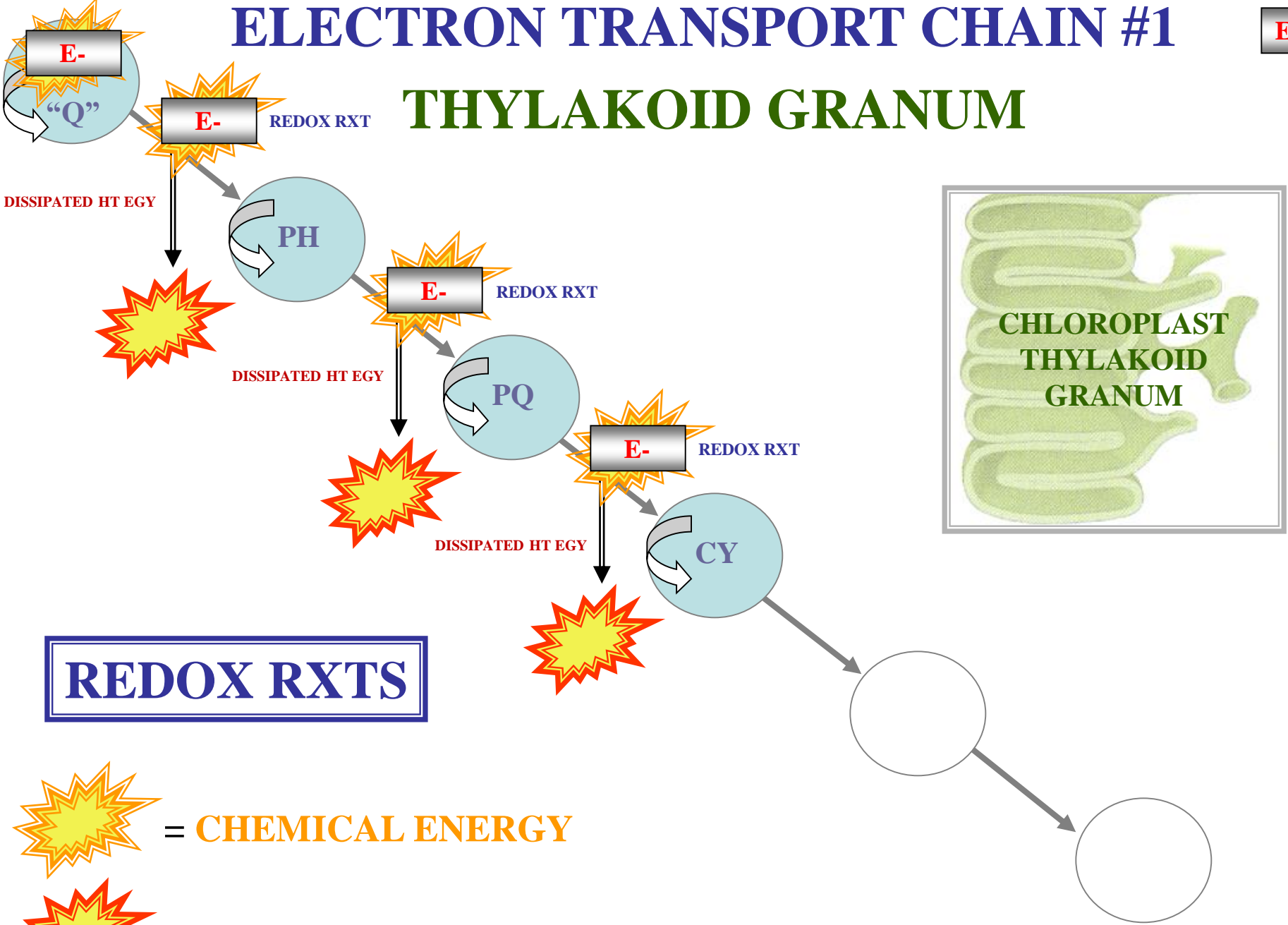
 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN #1

E-

THYLAKOID GRANUM



REDOX RXTS

 = CHEMICAL ENERGY

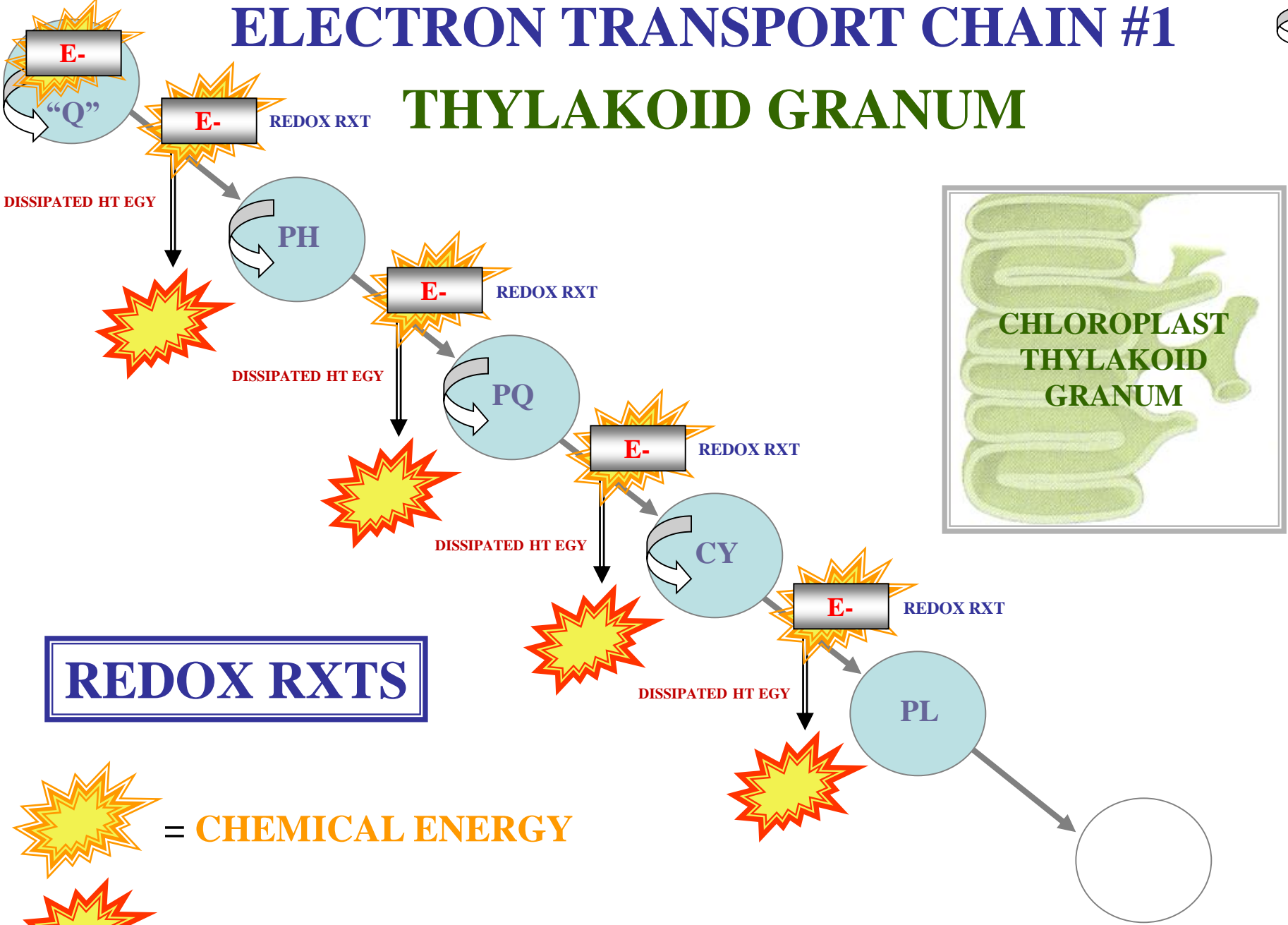
 = DISSIPATED HEAT ENERGY



ELECTRON TRANSPORT CHAIN #1



THYLAKOID GRANUM



REDOX RXTS

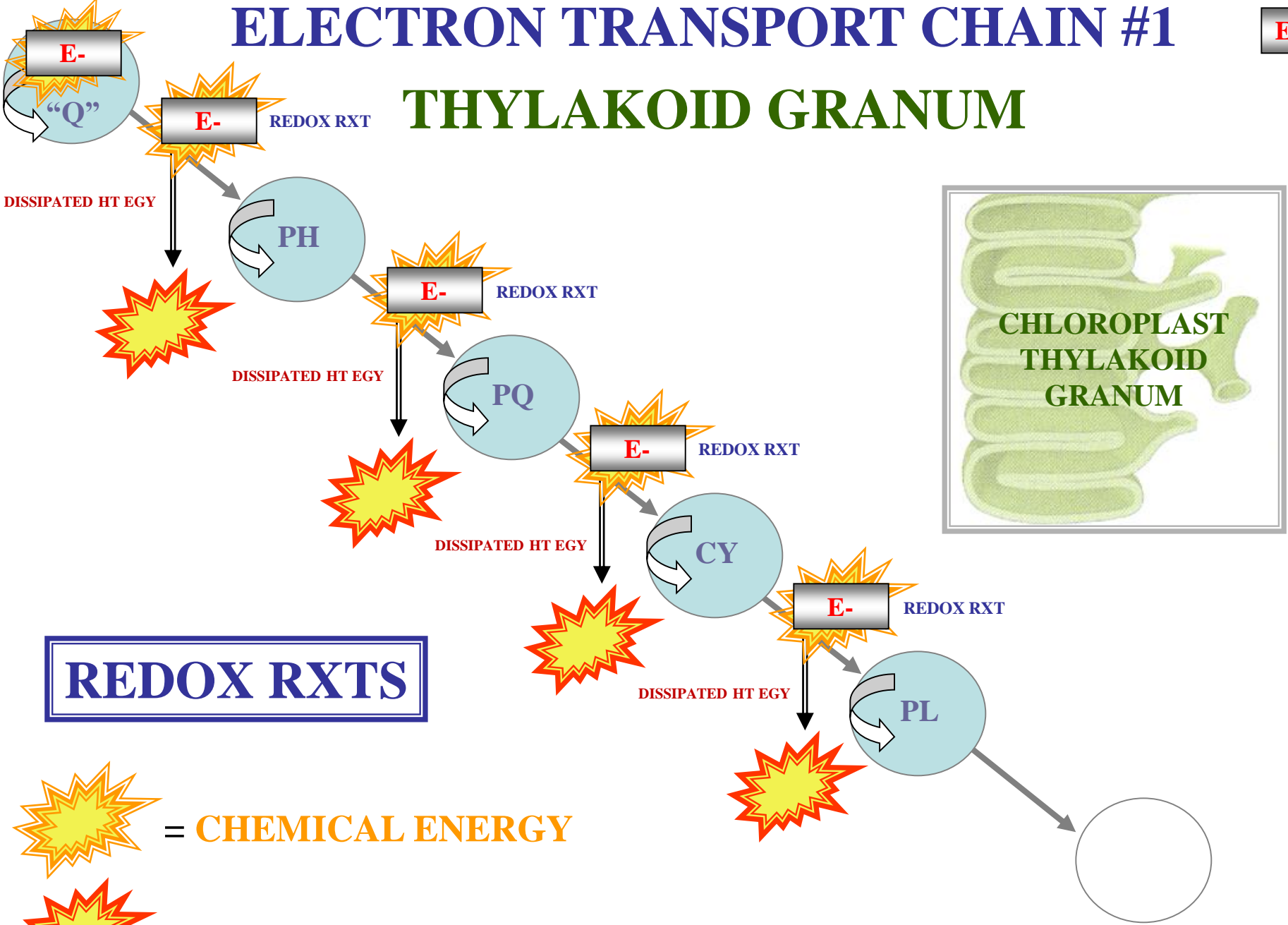
 = **CHEMICAL ENERGY**

 = **DISSIPATED HEAT ENERGY**

ELECTRON TRANSPORT CHAIN #1

E-

THYLAKOID GRANUM



REDOX RXTS

 = CHEMICAL ENERGY

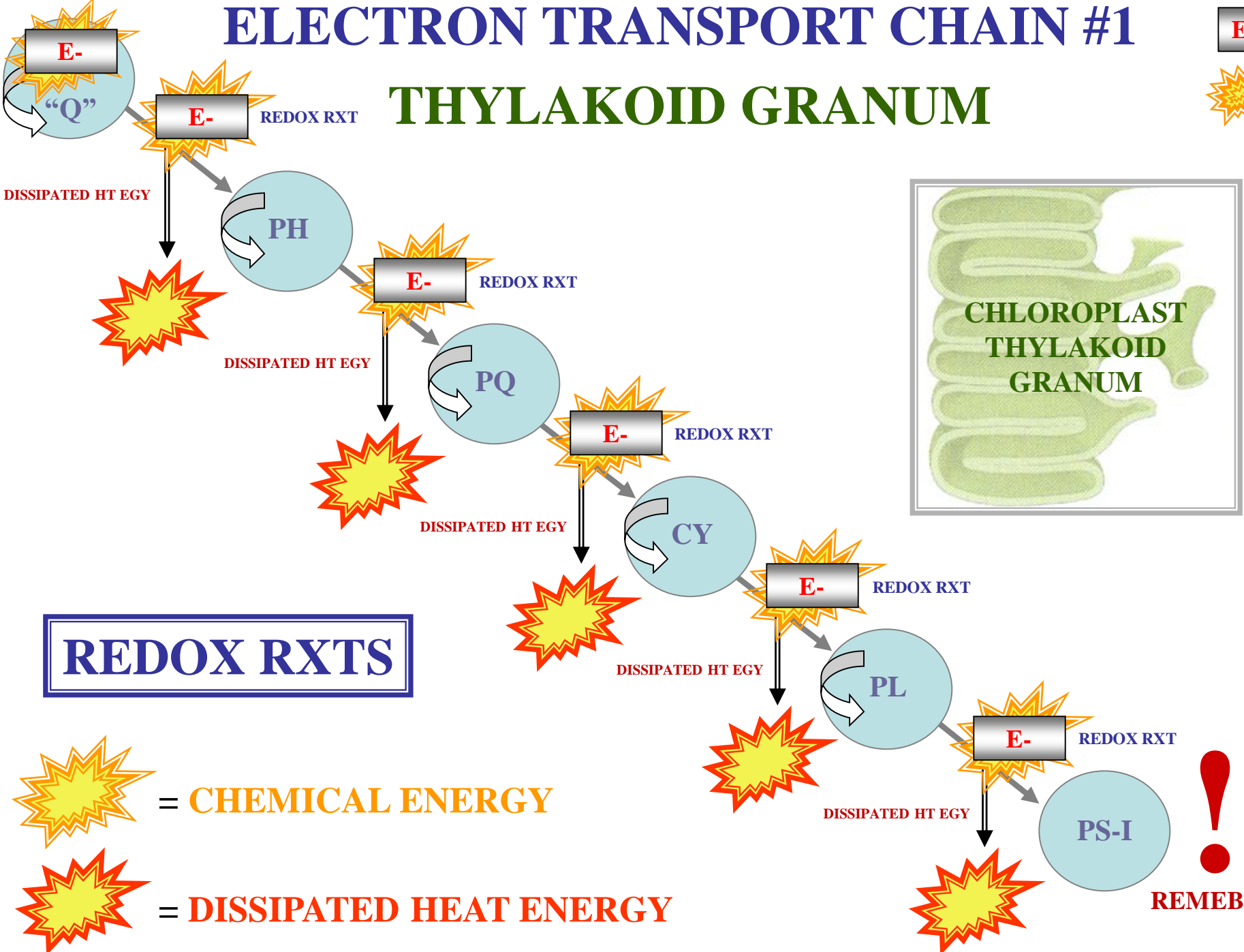
 = DISSIPATED HEAT ENERGY



ELECTRON TRANSPORT CHAIN #1

E-

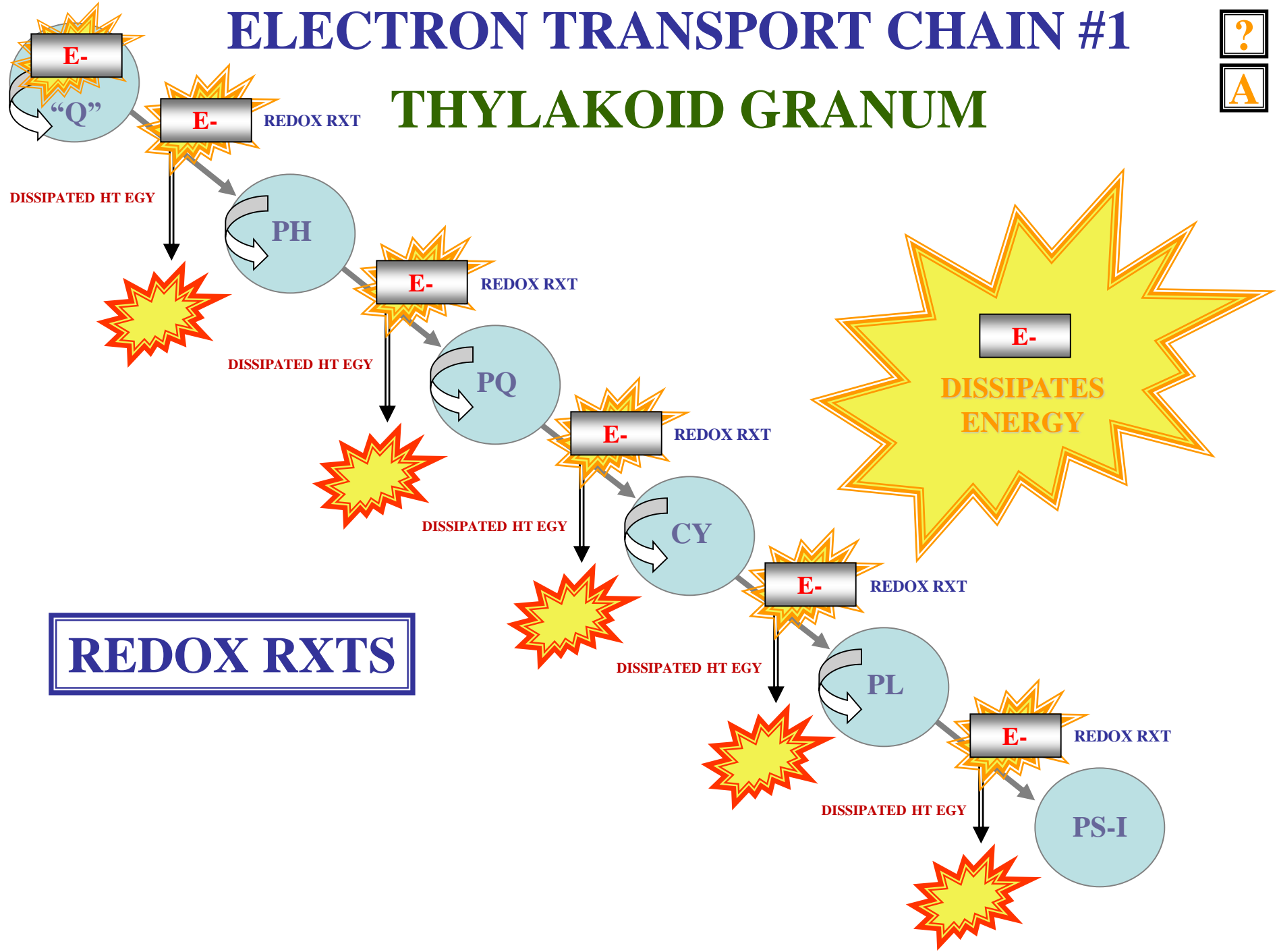
THYLAKOID GRANUM



ELECTRON TRANSPORT CHAIN #1



THYLAKOID GRANUM

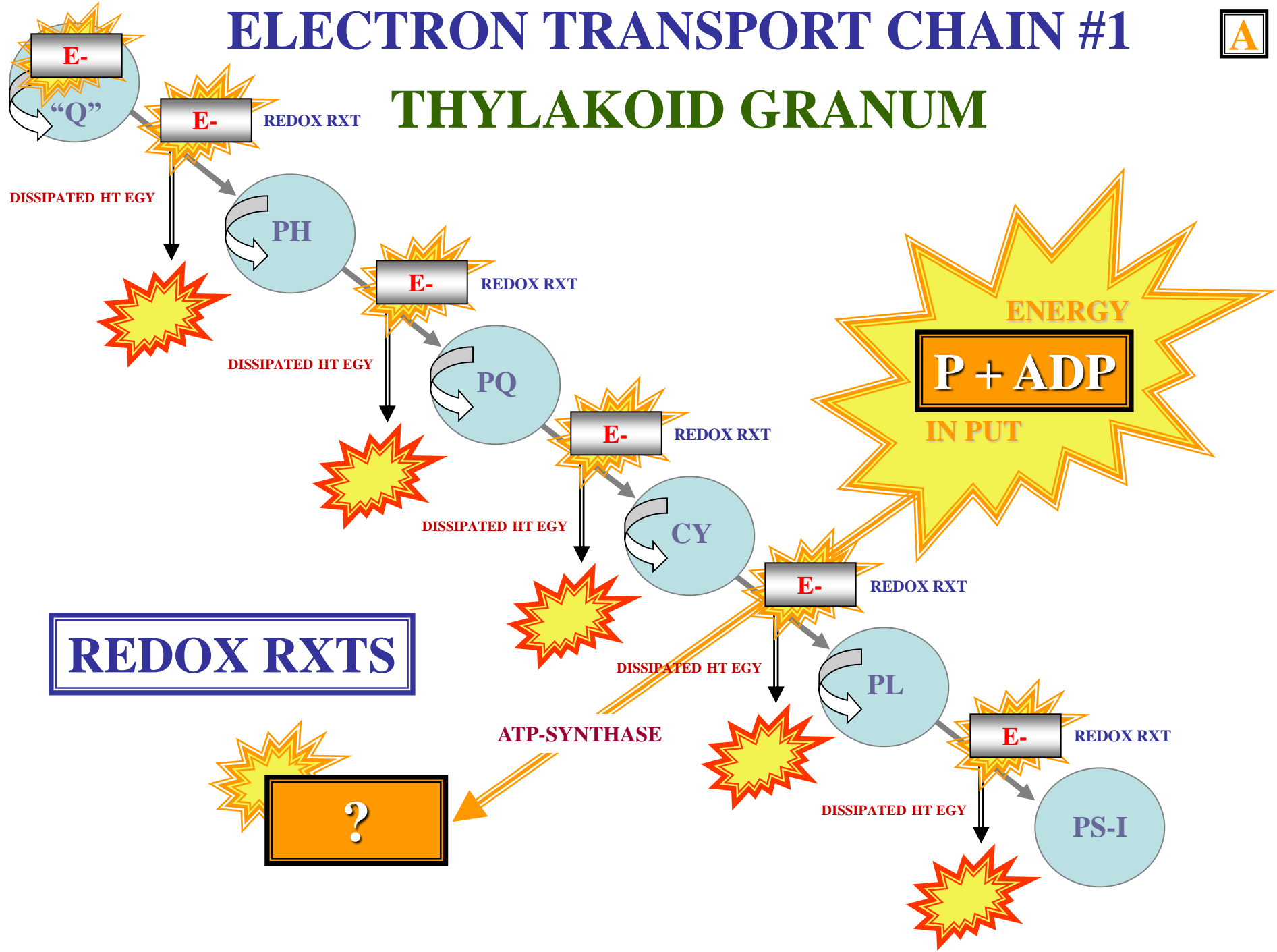


REDOX RXTS

ELECTRON TRANSPORT CHAIN #1



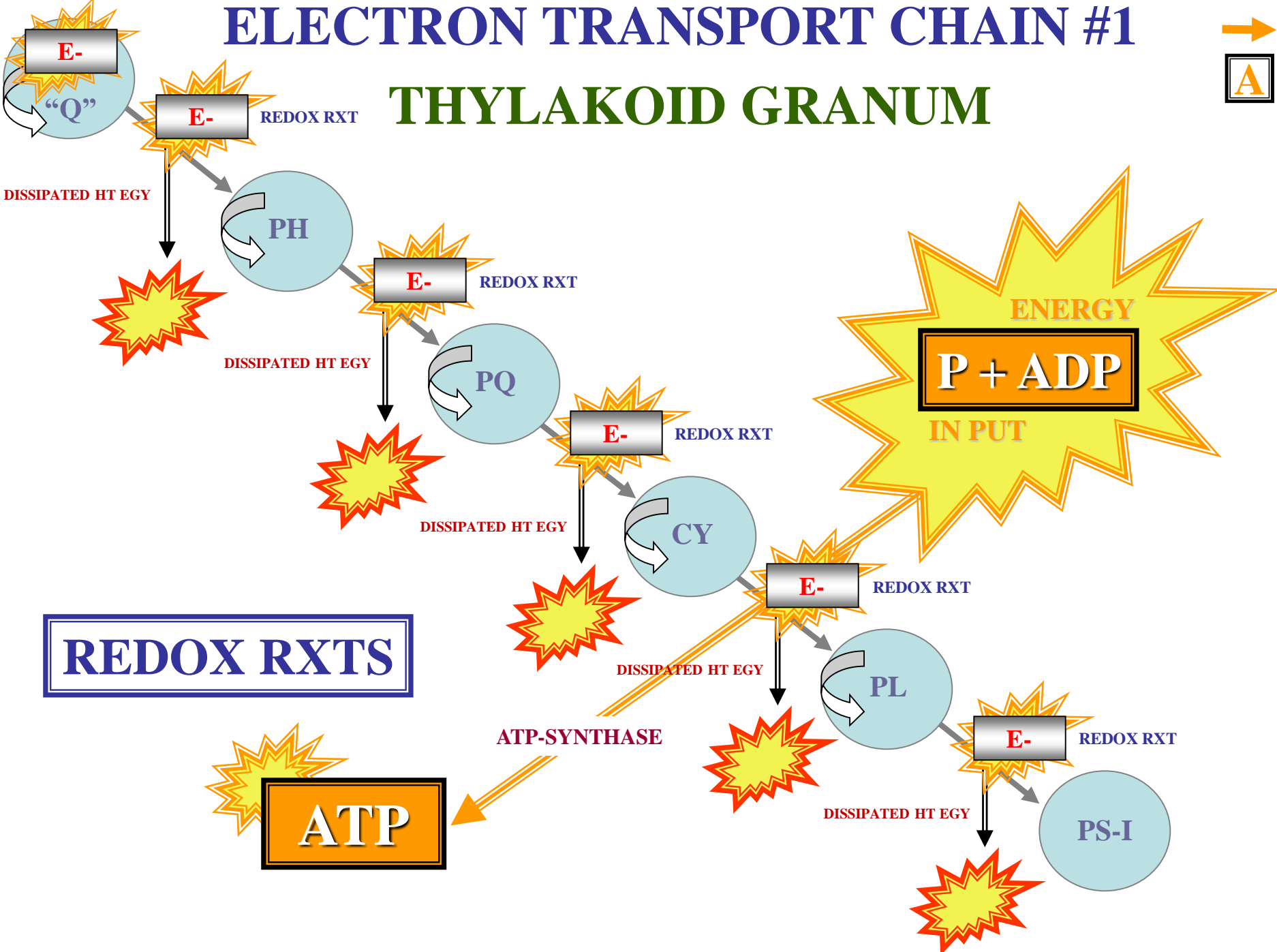
THYLAKOID GRANUM



ELECTRON TRANSPORT CHAIN #1



THYLAKOID GRANUM



PHOTOSYNTHESIS

DK



WATER

LIGHT ENERGY

E-

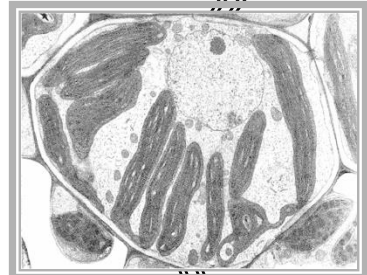
PHOTOLYSIS

LT RXT

THYLAKOID
GRANUM

ATP

PASSED



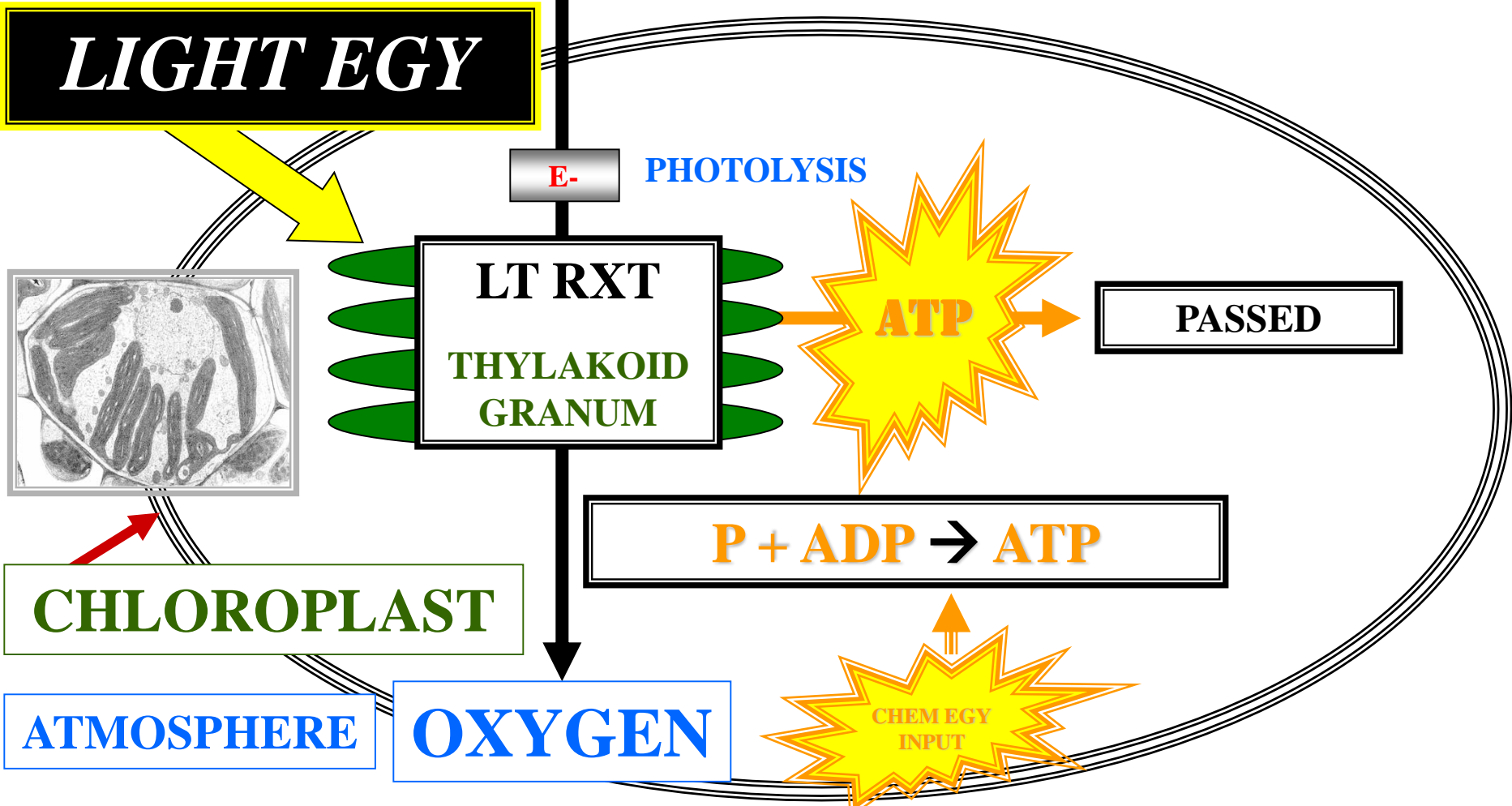
$P + ADP \rightarrow ATP$

CHLOROPLAST

ATMOSPHERE

OXYGEN

CHEM ENERGY
INPUT



PHOTOSYNTHESIS

P



WATER

LIGHT ENERGY

E-

PHOTOLYSIS

LT RXT

THYLAKOID
GRANUM

ATP

DK RXT

STROMA

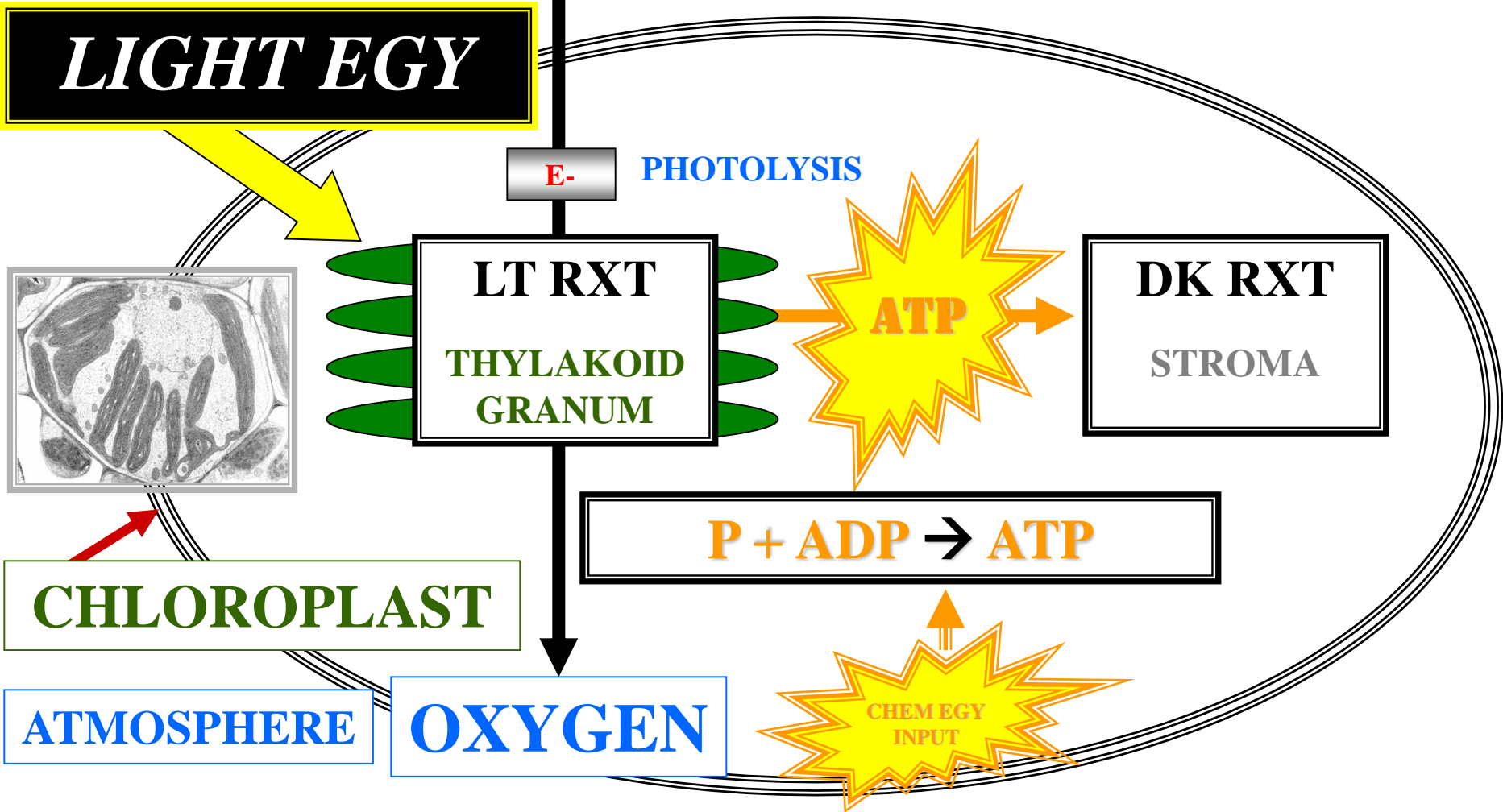
$P + ADP \rightarrow ATP$

CHLOROPLAST

ATMOSPHERE

OXYGEN

CHEM ENERGY
INPUT



PHOTOSYNTHESIS



LT

P

WATER

LIGHT ENERGY

PHOSPHORYLATION

E-

PHOTOLYSIS

LT RXT

**THYLAKOID
GRANUM**

ATP

DK RXT

STROMA

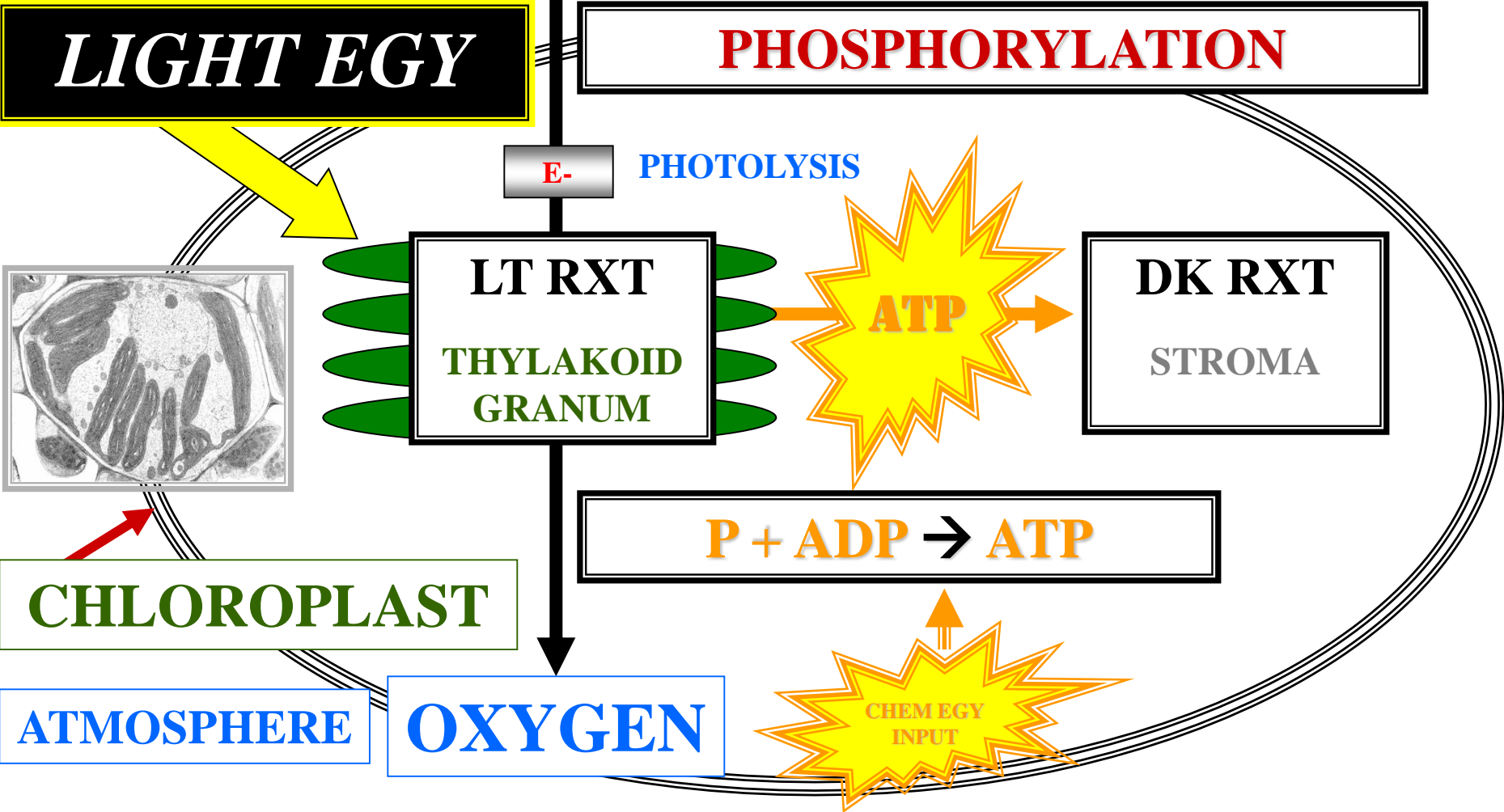
P + ADP → ATP

CHLOROPLAST

ATMOSPHERE

OXYGEN

**CHEM ENERGY
INPUT**



PHOTOSYNTHESIS



N

>

WATER

LIGHT ENERGY

PHOTO-PHOSPHORYLATION

E-

PHOTOLYSIS



LT RXT

THYLAKOID
GRANUM

ATP

DK RXT

STROMA

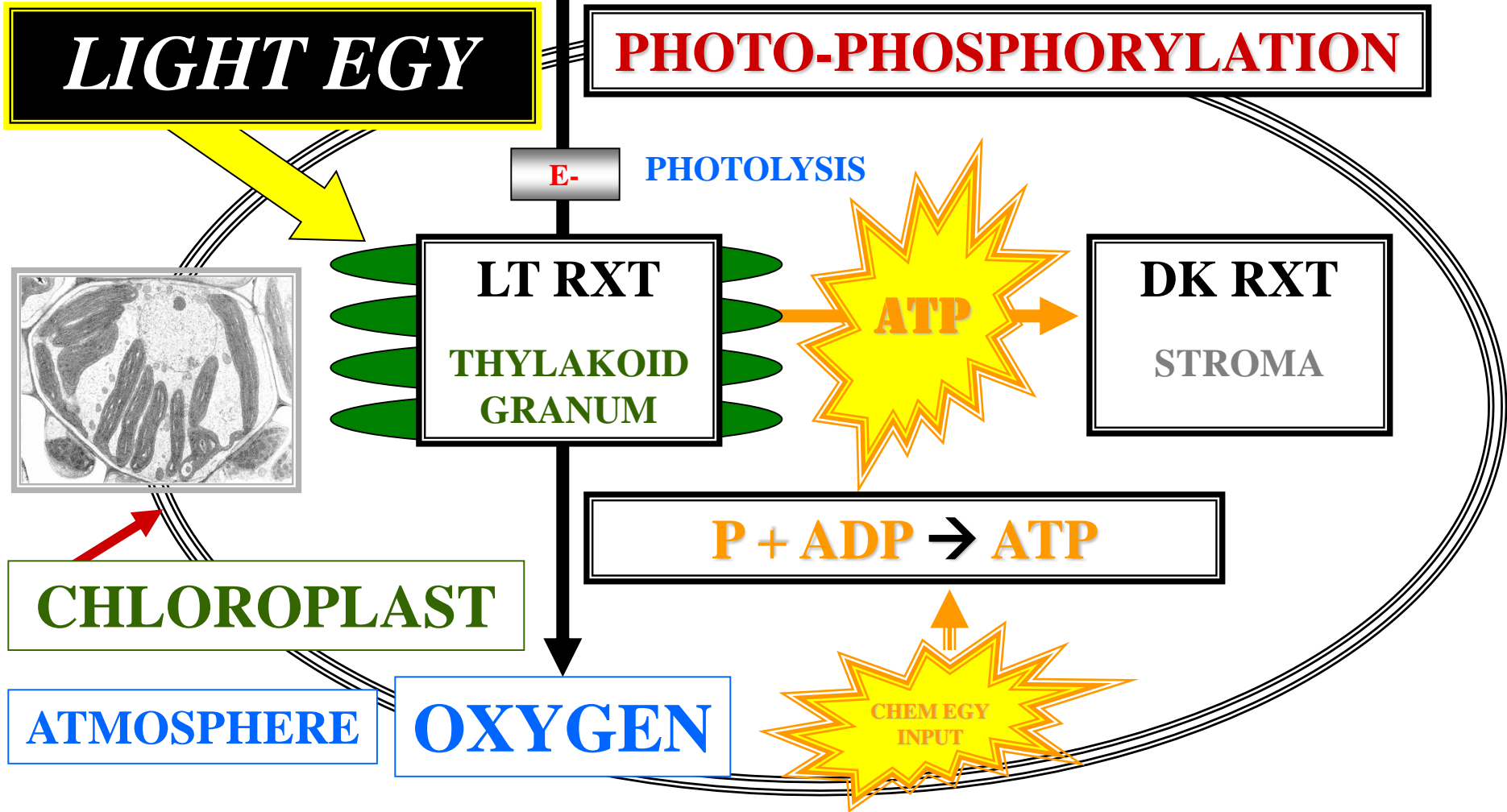
$P + ADP \rightarrow ATP$

CHLOROPLAST

ATMOSPHERE

OXYGEN

CHEM ENERGY
INPUT



PHOTOSYNTHESIS



WATER

NON-CYCLIC

LIGHT ENERGY

PHOTO-PHOSPHORYLATION

E- PHOTOLYSIS



LT RXT

THYLAKOID
GRANUM

ATP

DK RXT

STROMA

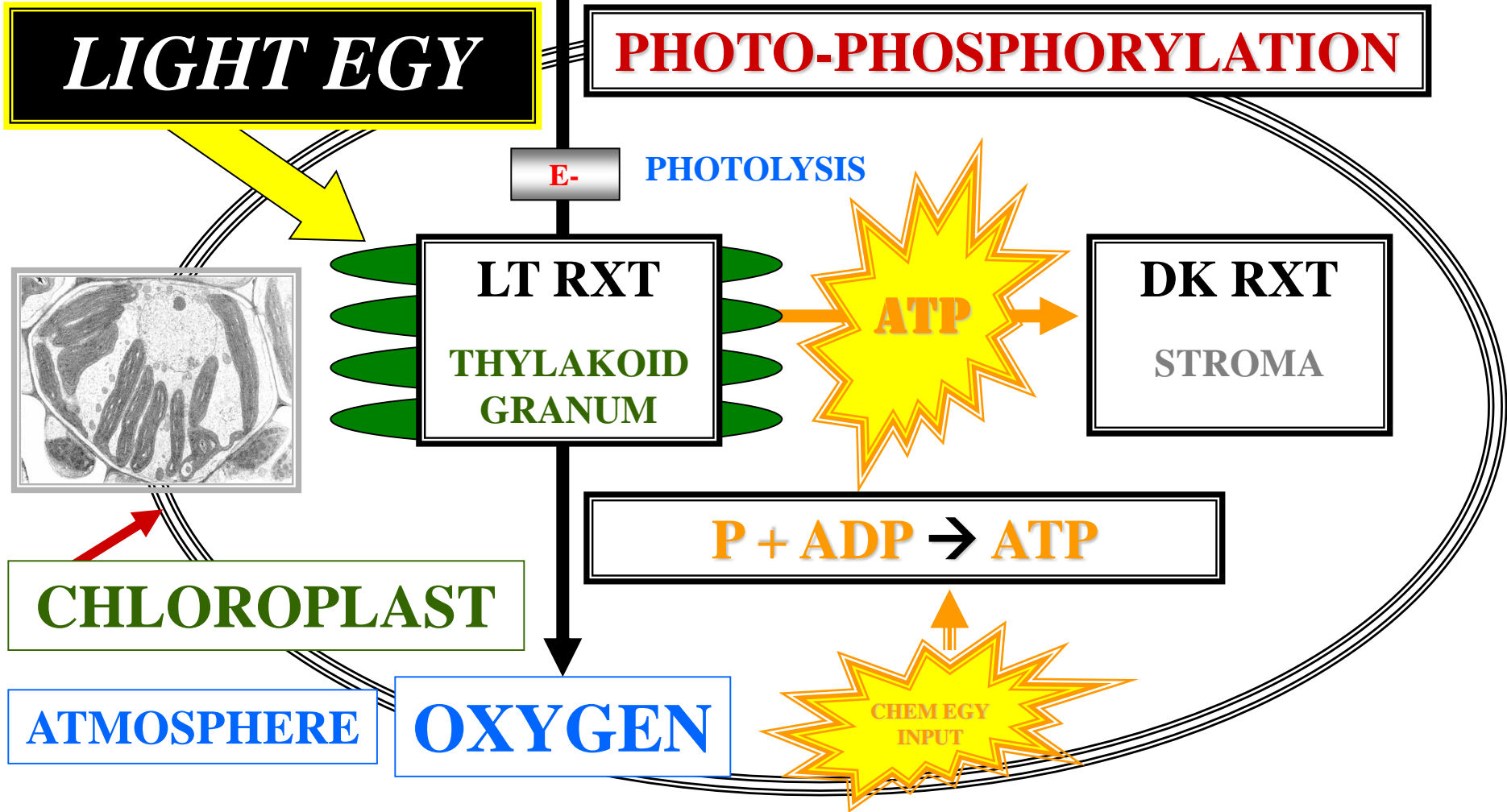
$P + ADP \rightarrow ATP$

CHLOROPLAST

ATMOSPHERE

OXYGEN

CHEM ENERGY
INPUT



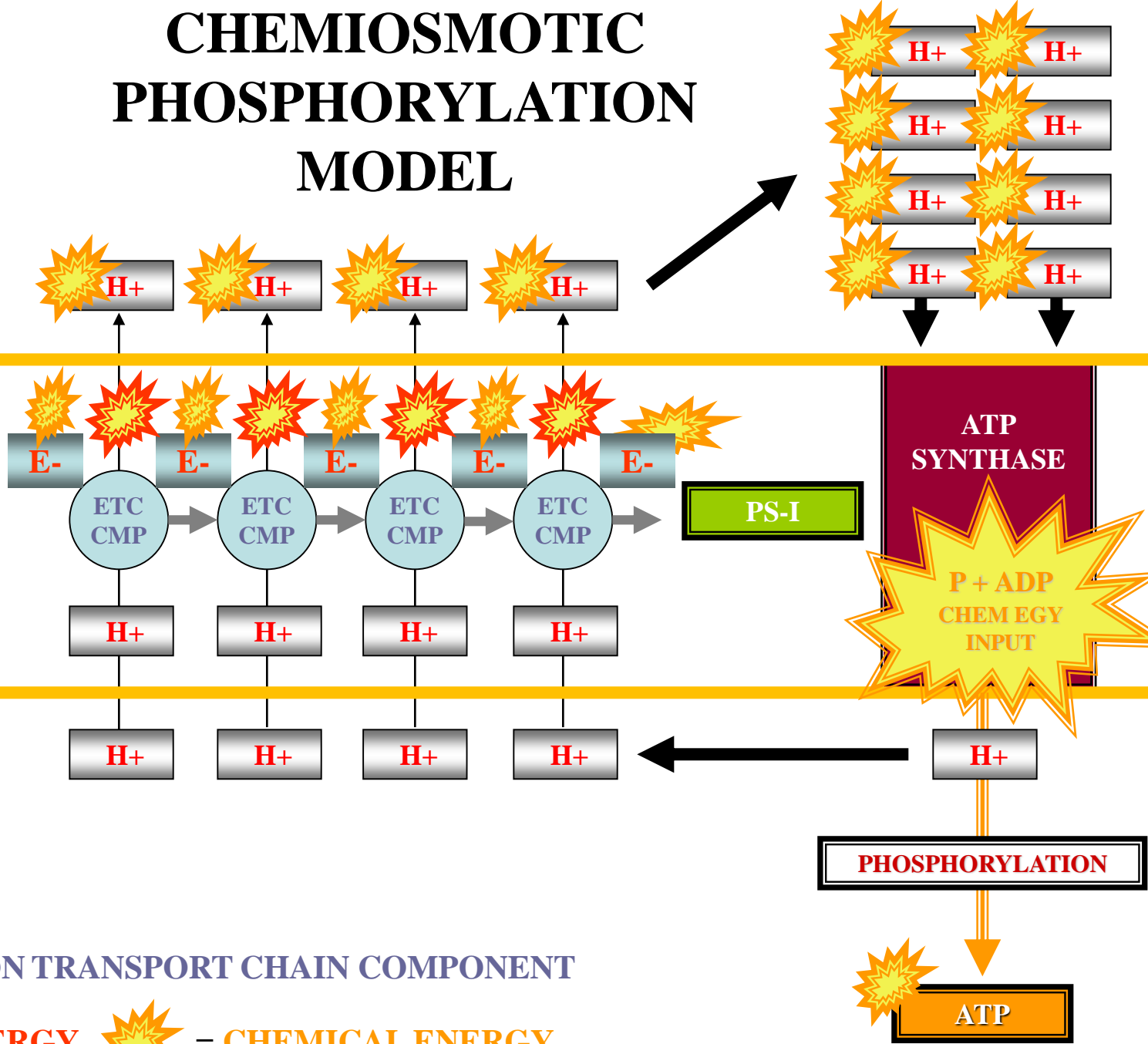
↔ \$ NC

CHEMIOSMOTIC PHOSPHORYLATION MODEL

CHLOROPLAST THYLAKOID SPACE

PS-II / PS-I
CHLOROPLAST THYLAKOID ETC

CHLOROPLAST STROMA

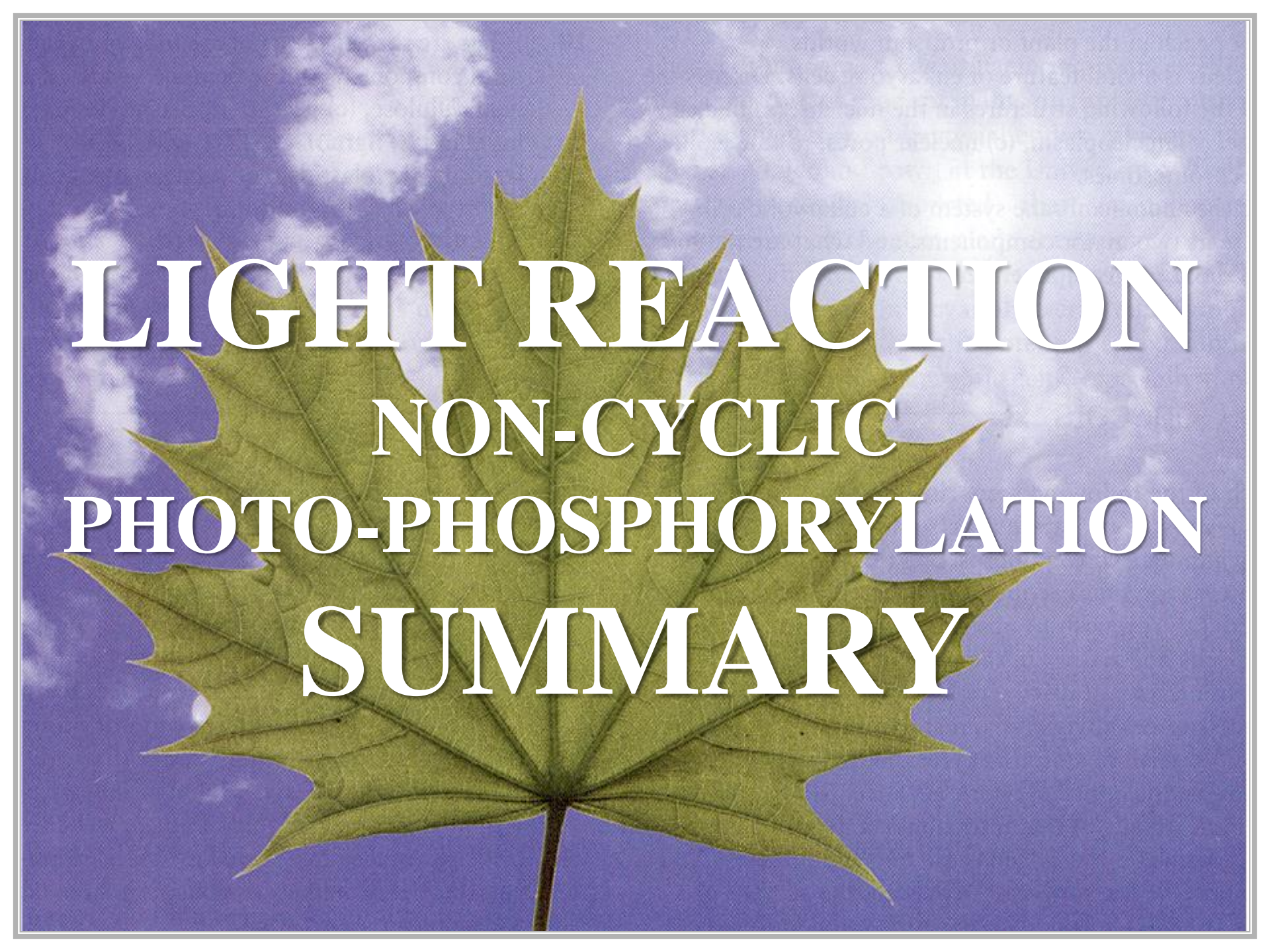


● = ELECTRON TRANSPORT CHAIN COMPONENT

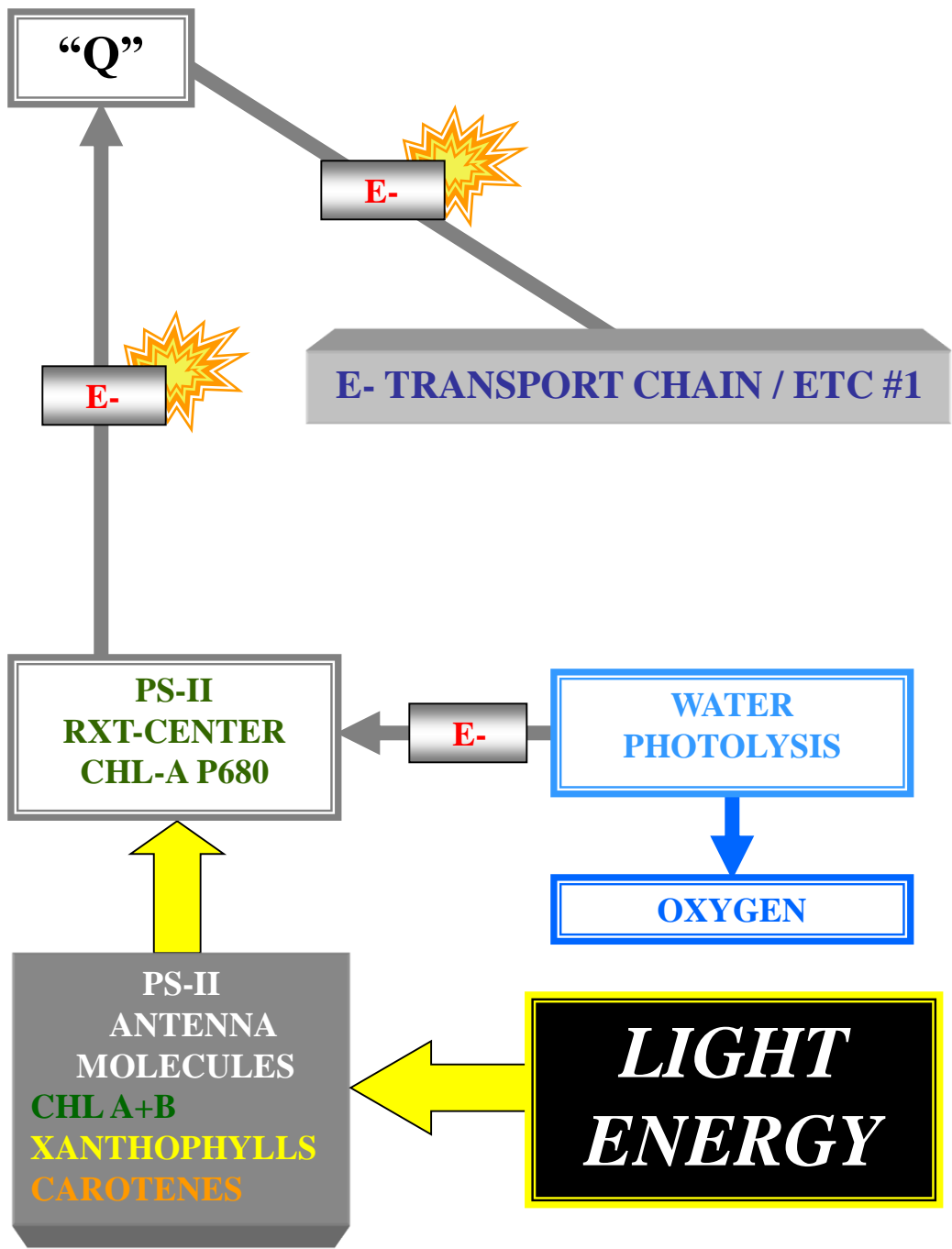
★ = HEAT ENERGY ★ = CHEMICAL ENERGY

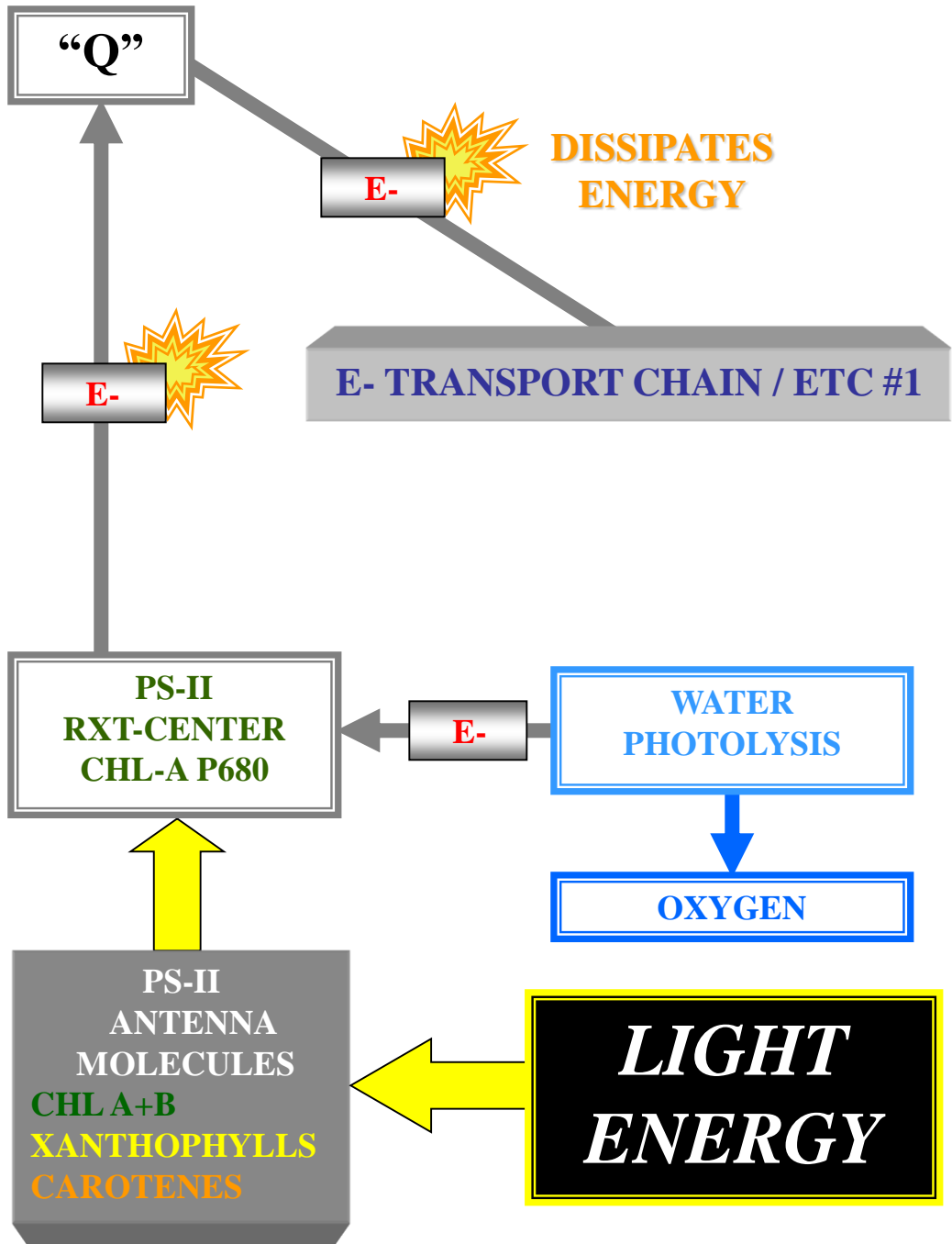
PHOSPHORYLATION

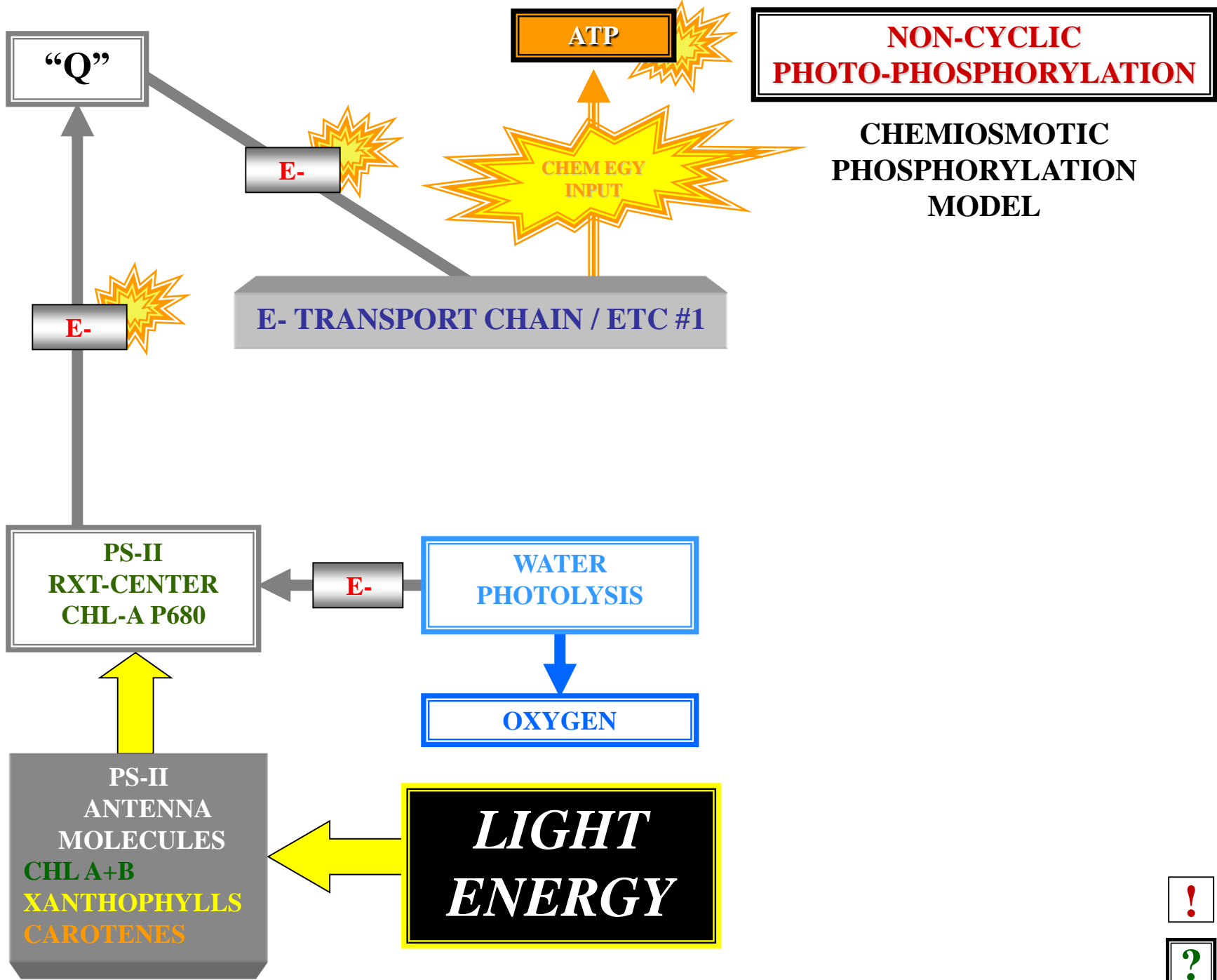
ATP

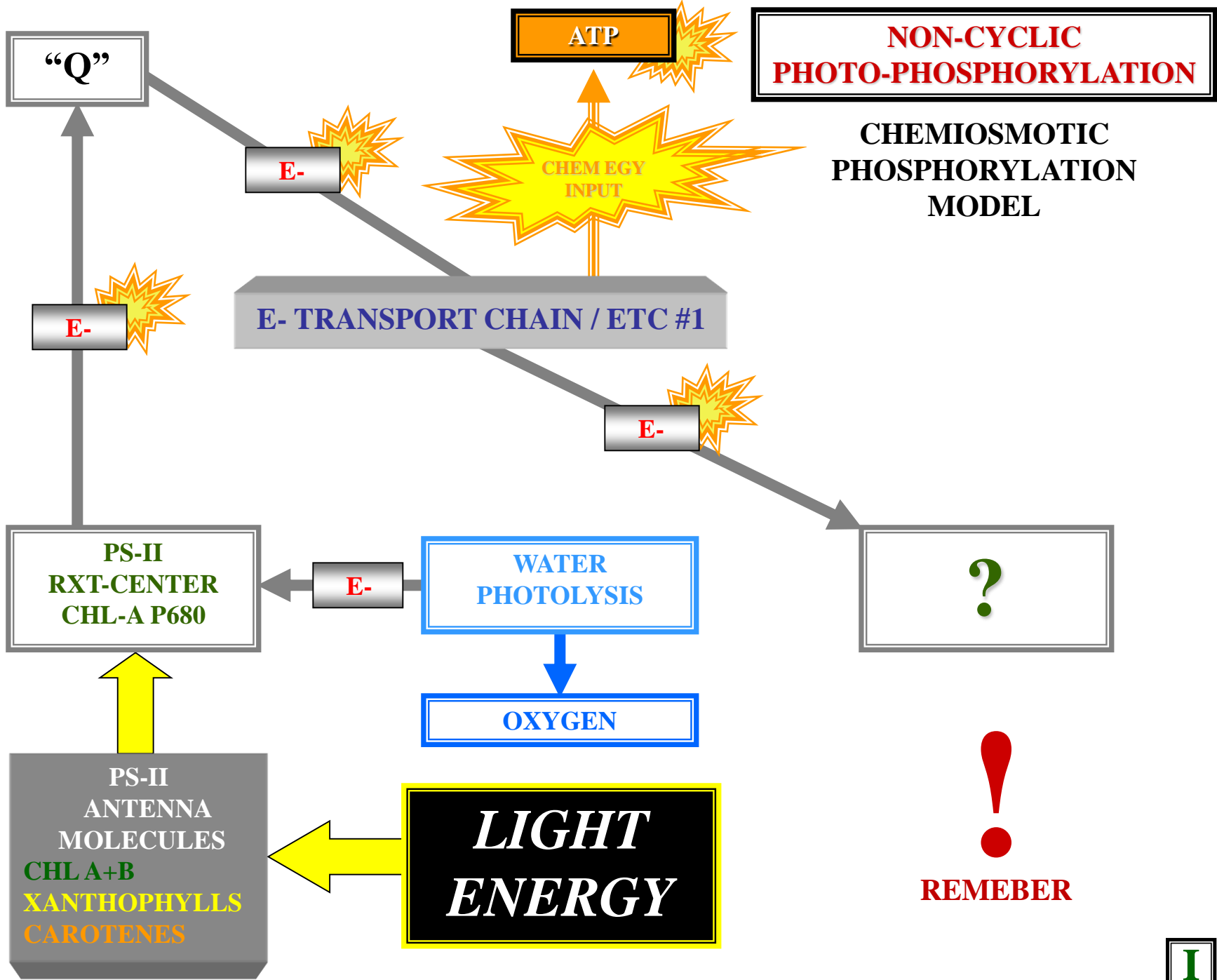
A large, vibrant green maple leaf is the central focus, set against a bright blue sky with scattered white clouds. The leaf's veins are clearly visible, and its stem extends downwards. The overall scene is bright and natural, suggesting a sunny day.

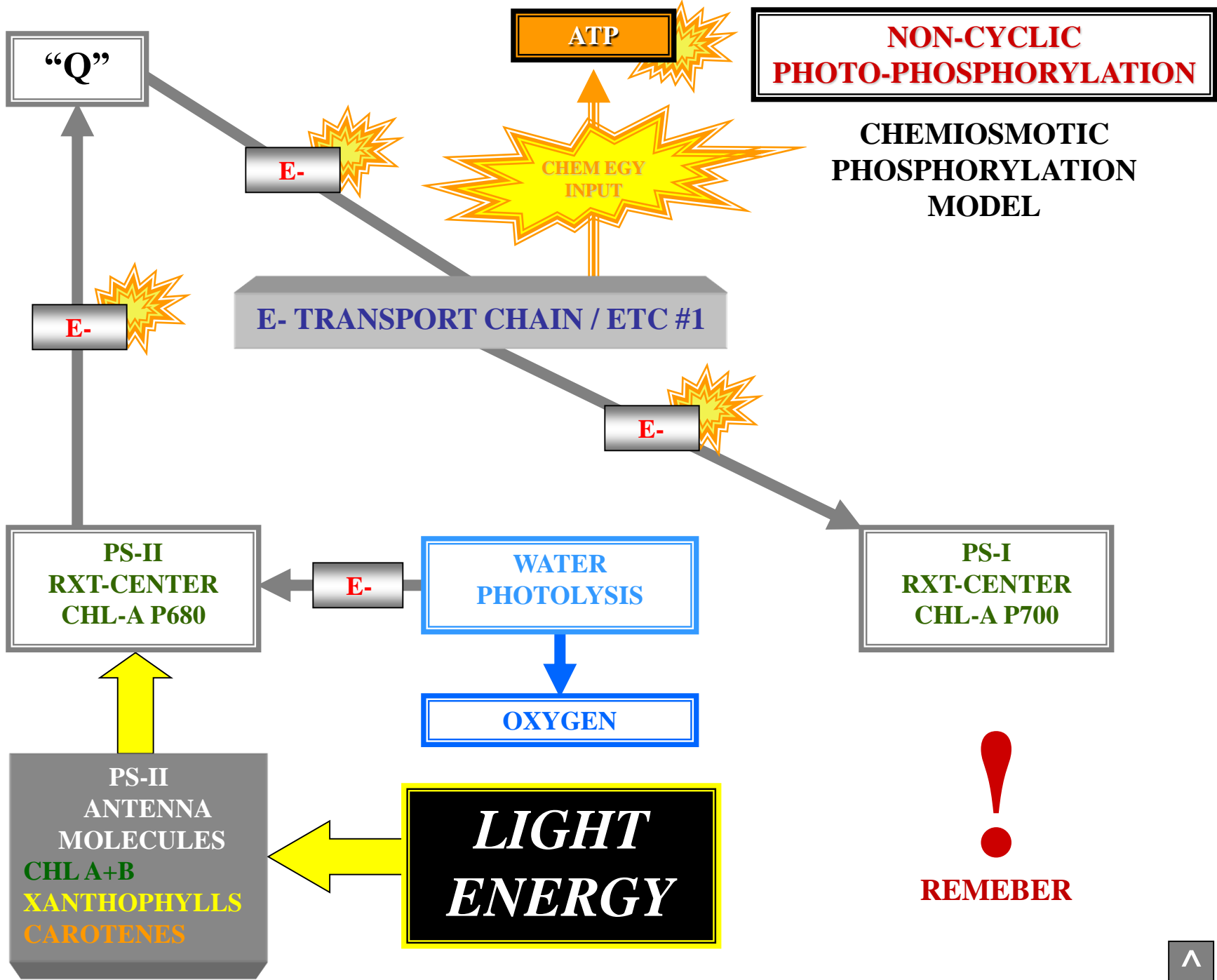
LIGHT REACTION
NON-CYCLIC
PHOTO-PHOSPHORYLATION
SUMMARY











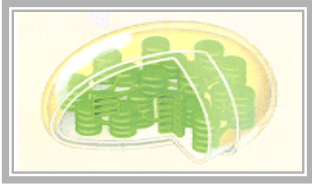


PHOTOSYSTEM I

CHLOROPLAST

PS-I

THYLAKOID



+

I

GRANUM

THYLAKOID VESICLE

STROMA

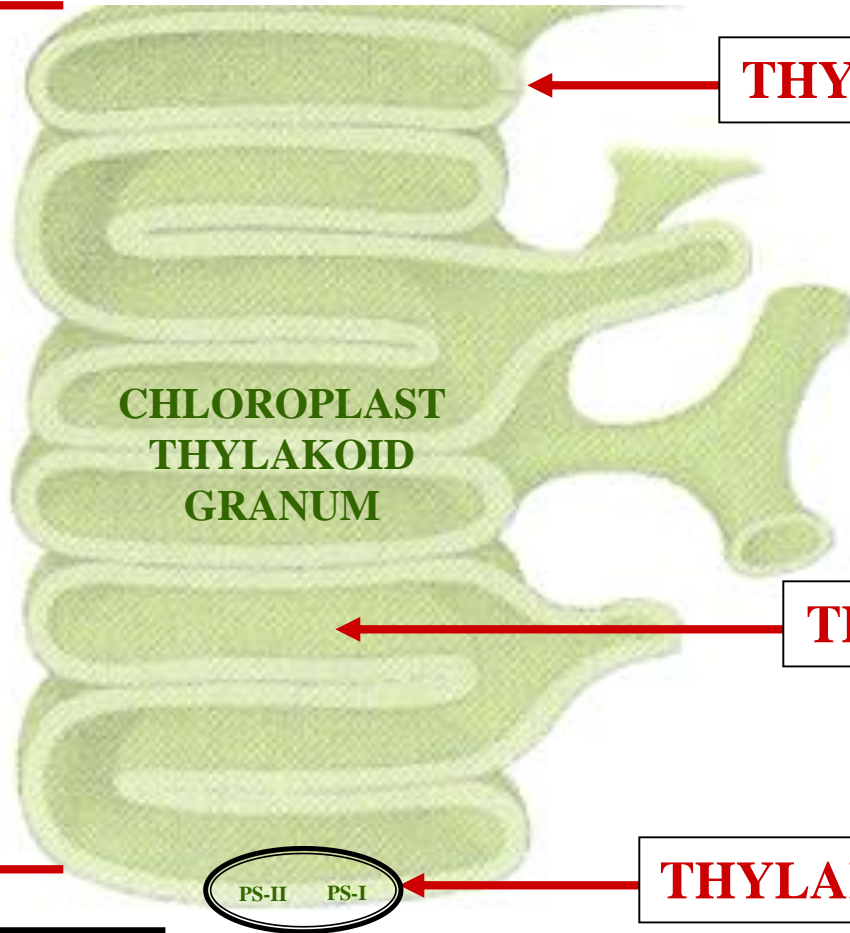
**CHLOROPLAST
THYLAKOID
GRANUM**

THYLAKOID SPACE

THYLAKOID MEMBRANE

NON-CYCLIC P-P

PS-II PS-I



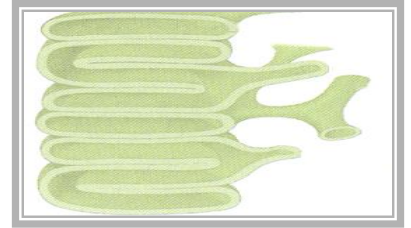
CHLOROPLAST

PS-I

THYLAKOID



**PIGMENT
MOLECULES**



A

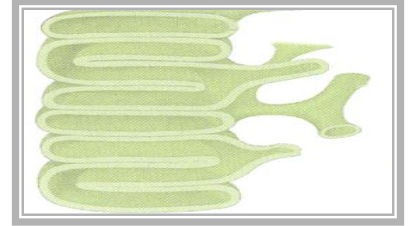
CHLOROPLAST

PS-I

THYLAKOID



**ANTENNA
MOLECULES**



A

ANTENNA MOLECULES



ANTENNA MOLECULES

ABSORB LIGHT ENERGY



ANTENNA MOLECULES

ANTENNA MOLECULES

AM



ABSORB LIGHT ENERGY



REACTION CENTER

ANTENNA MOLECULES

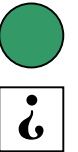
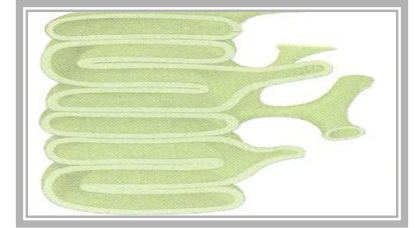
CHLOROPLAST

PS-I

THYLAKOID



**ANTENNA
MOLECULES**



ANTENNA MOLECULES
=
PRIMARY & SECONDARY
PHOTOSYNTHETIC
PIGMENTS

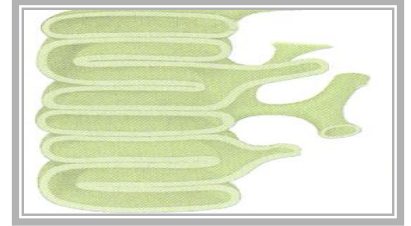
CHLOROPLAST

PS-I

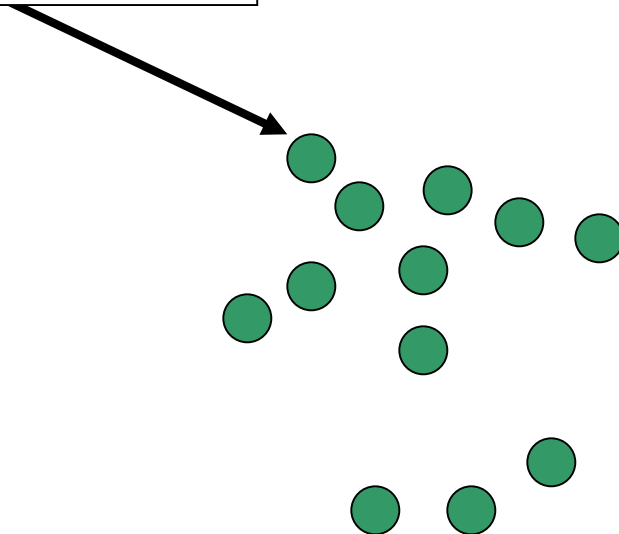
THYLAKOID



**ANTENNA
MOLECULES**



CHLOROPHYLLA



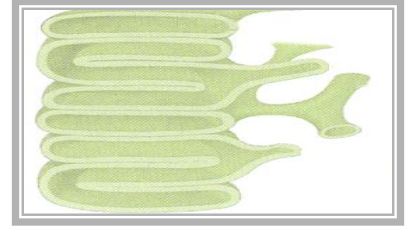
CHLOROPLAST

PS-I

THYLAKOID

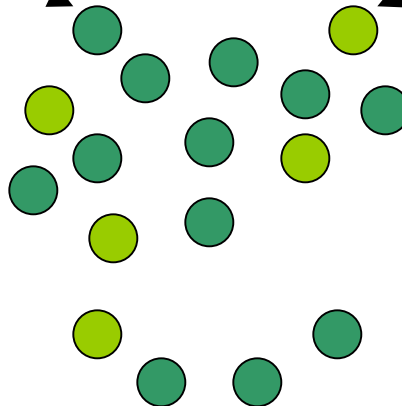


**ANTENNA
MOLECULES**



CHLOROPHYLL A

CHLOROPHYLL B



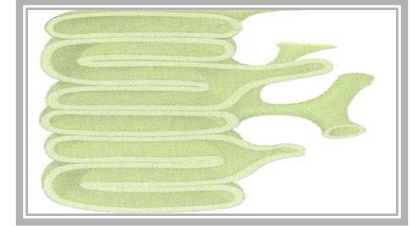
CHLOROPLAST

PS-I

THYLAKOID



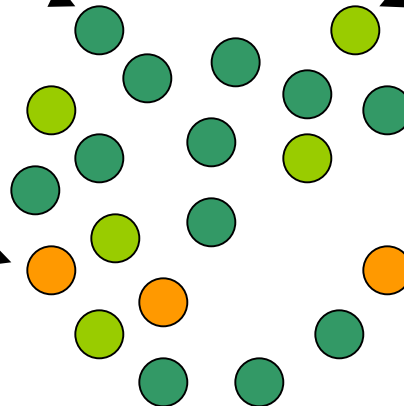
**ANTENNA
MOLECULES**



CHLOROPHYLL A

CHLOROPHYLL B

CAROTENES



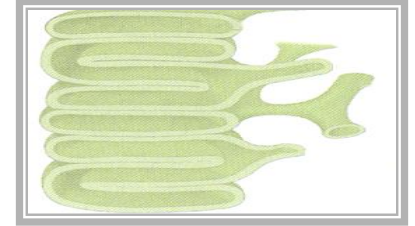
CHLOROPLAST

PS-I

THYLAKOID



**ANTENNA
MOLECULES**

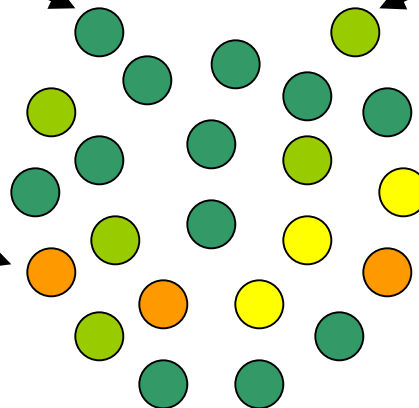


CHLOROPHYLL A

CHLOROPHYLL B

CAROTENES

XANTHOPHYLLS



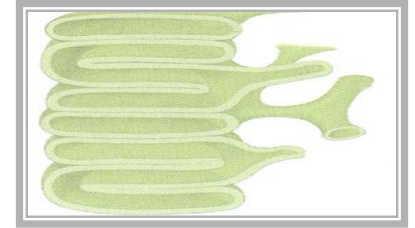
CHLOROPLAST

PS-I

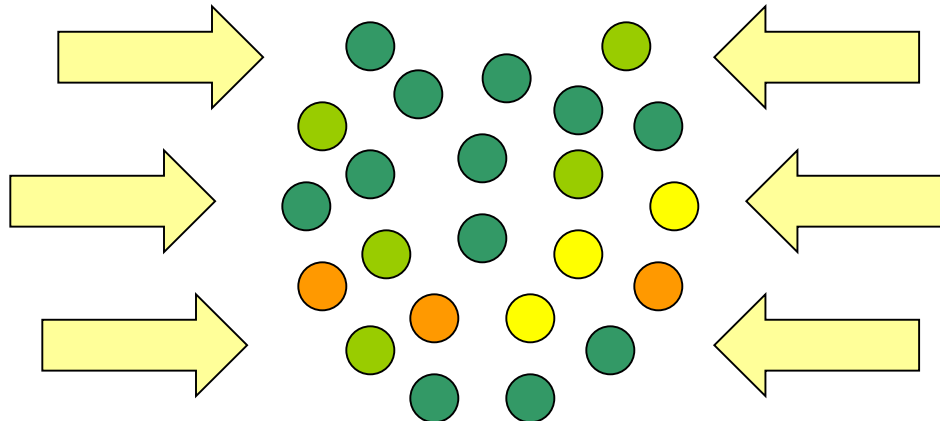
THYLAKOID



**ANTENNA
MOLECULES**



LTEGY



LTEGY

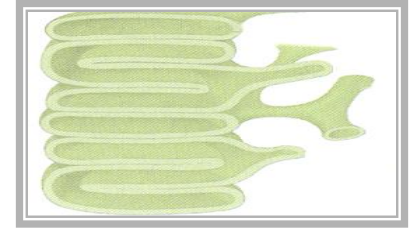
CHLOROPLAST

PS-I

THYLAKOID



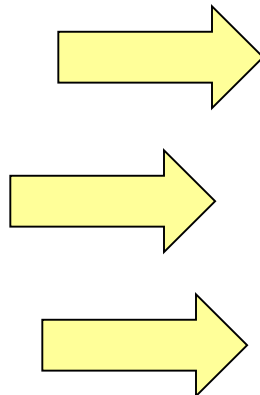
**ANTENNA
MOLECULES**



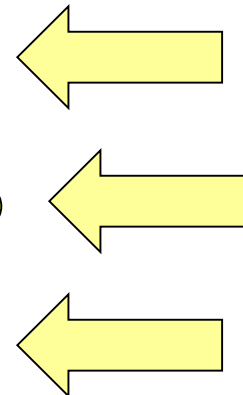
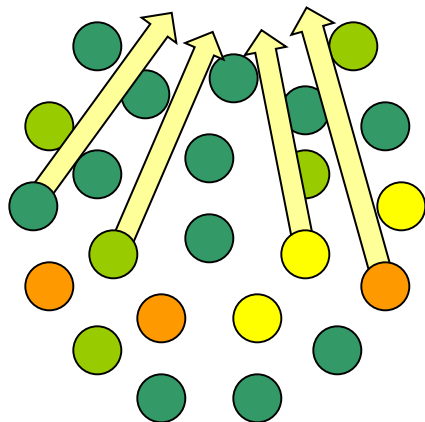
RC



LTEGY



LTEGY



LTEGY

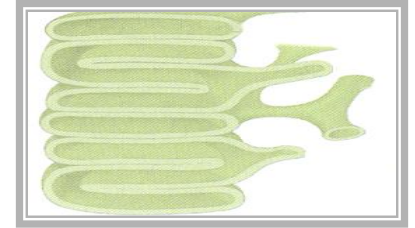
CHLOROPLAST

PS-I

THYLAKOID



**ANTENNA
MOLECULES**

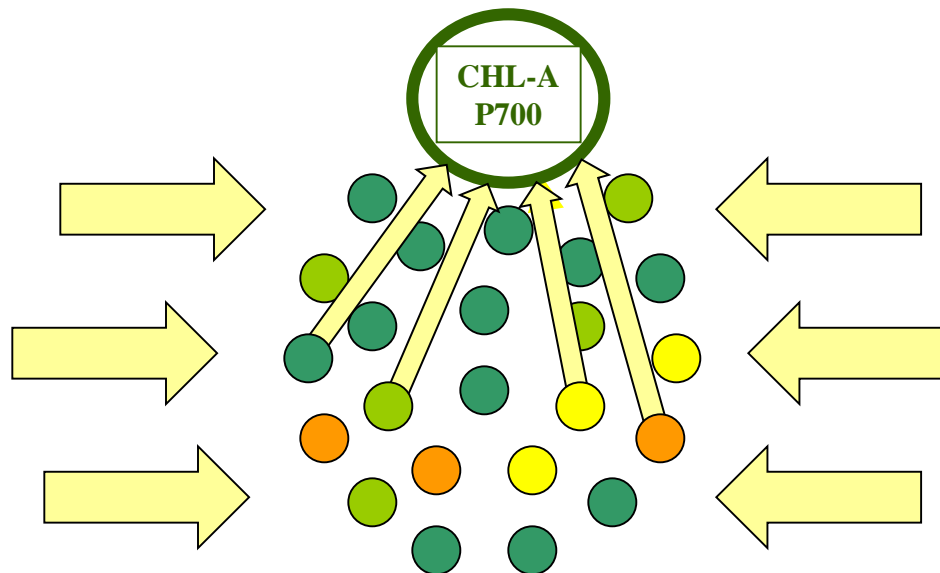


R

REACTION CENTER



LTEGY



LTEGY

**REACTION
CENTER
PS-I**



REACTION CENTER PS-I

CHL A/PROTEIN COMPLEX

PIGMENT 700

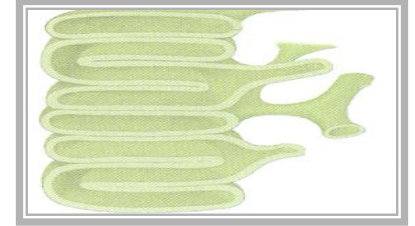
P700

REACTION CENTER PS-I

CHLOROPLAST

PS-I

THYLAKOID



E-



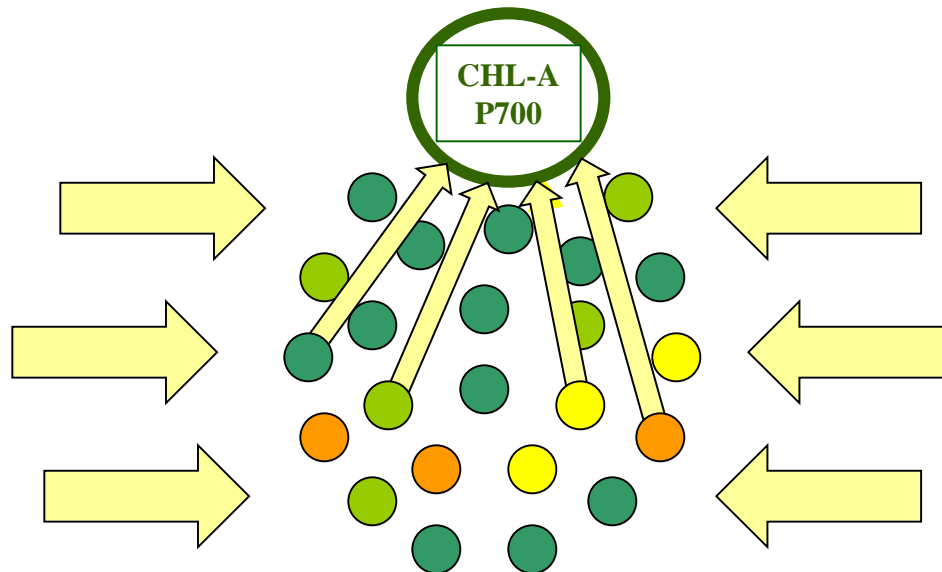
REACTION CENTER: ABSORBS SUFFICIENT LIGHT ENERGY

REACTION CENTER



LTEGY

LTEGY

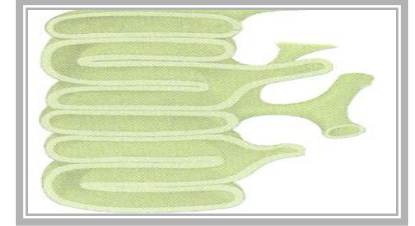


CHLOROPLAST



PS-I

THYLAKOID



 = ENERGY

ENERGIZED E-

A

Q2

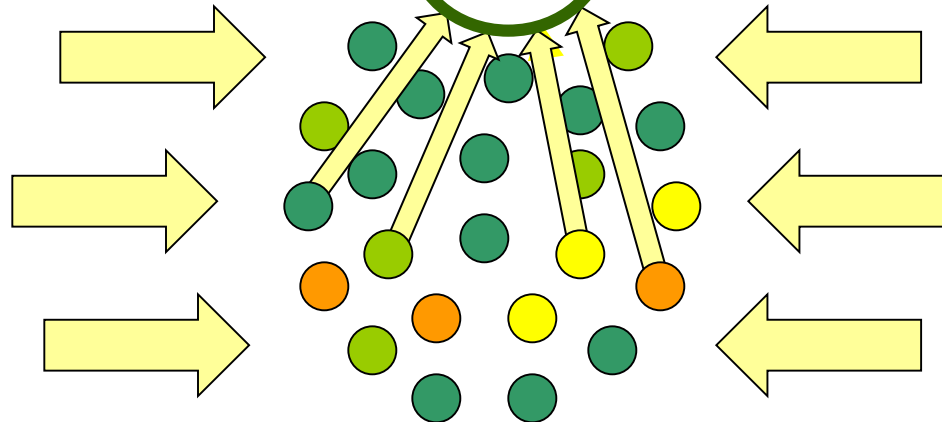
**CHL-A
P700**



LTEGY



LTEGY



CHLOROPLAST

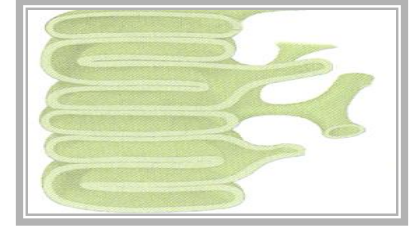


E- ACCEPTOR "Q2"

E-

LTEGY

THYLAKOID



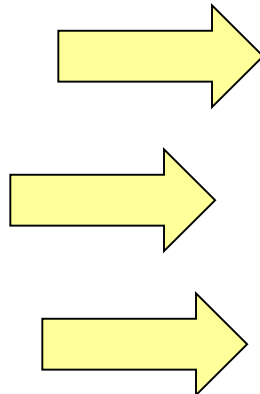
E- ACCEPTOR "Q2": ACCEPTS ENERGIZED E-

C

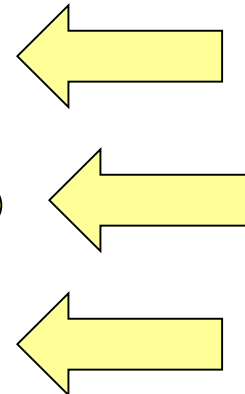
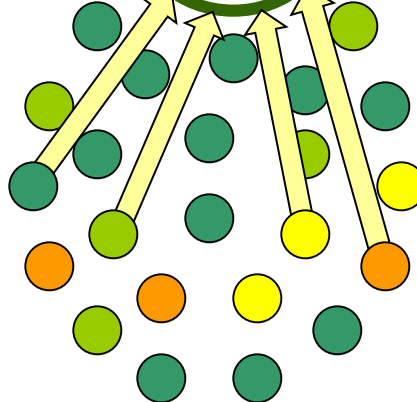
 = ENERGY



LTEGY



CHL-A
P700



LTEGY

CHLOROPLAST

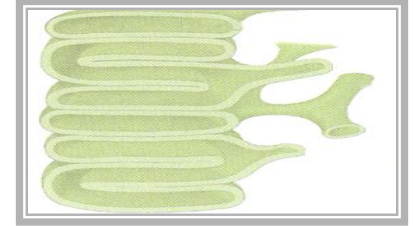


E- ACCEPTOR "Q2"



CHEM EGY

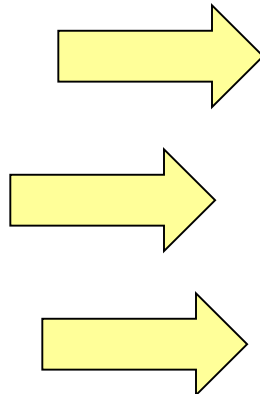
THYLAKOID



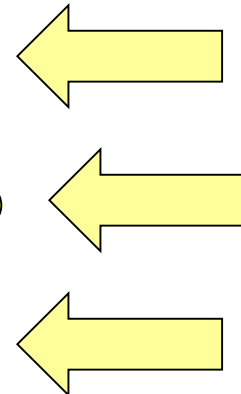
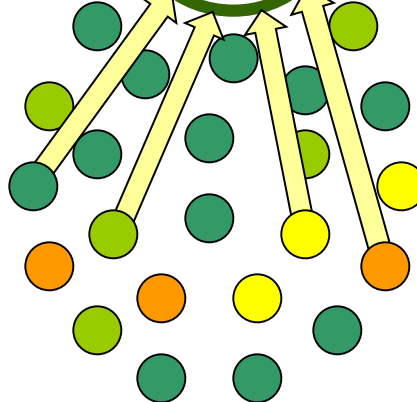
E- ACCEPTOR "Q2": ACCEPTS ENERGIZED E-



LTEGY



CHL-A
P700



LTEGY

P700

REDOX RXT

CHLOROPLAST

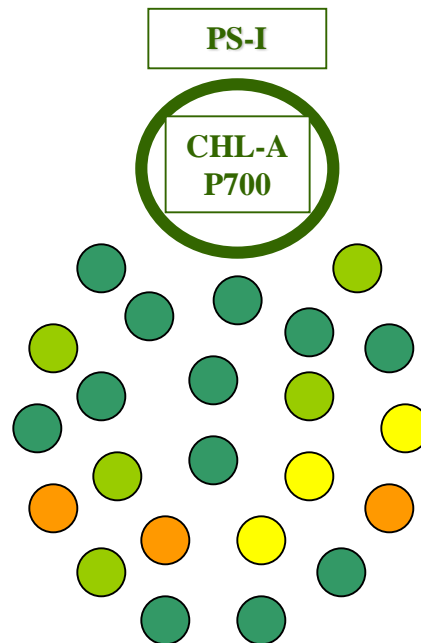
E- ACCEPTOR "Q2"



CHEM EGY

THYLAKOID

R



CHLOROPLAST

E- ACCEPTOR "Q2"

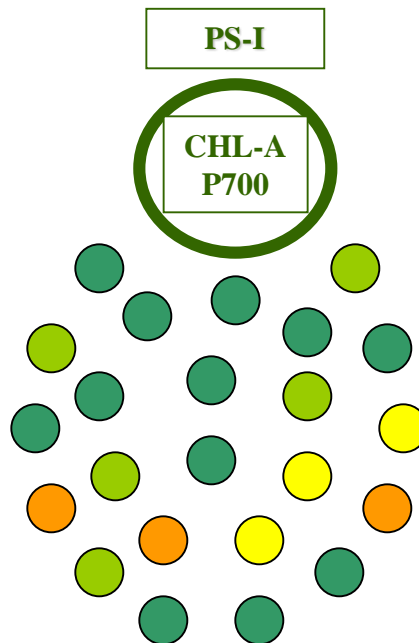


CHEM EGY

THYLAKOID

"Q2" REDUCED

O



CHLOROPLAST

E- ACCEPTOR "Q2"



CHEM EGY

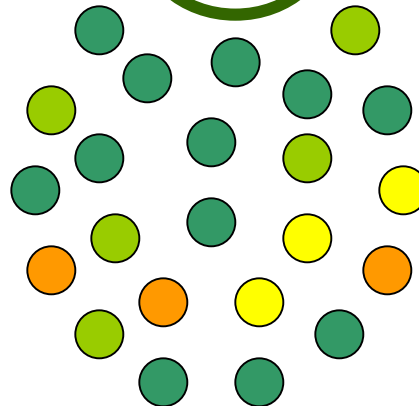
THYLAKOID

"Q2" REDUCED

C

PS-I

CHL-A
P700



P700 OXIDIZED

CHLOROPLAST

E- ACCEPTOR "Q2"



CHEM EGY

THYLAKOID

"Q2" REDUCED

?

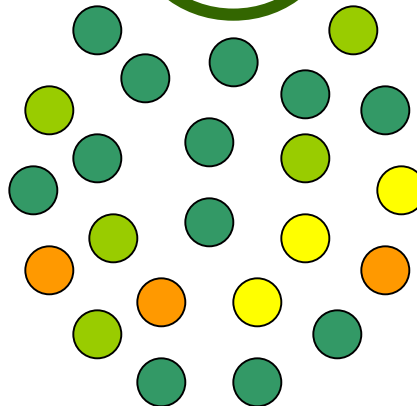
!

COUPLED

P700 OXIDIZED

PS-I

CHL-A
P700



CHLOROPLAST

E- ACCEPTOR "Q2"



CHEM EGY

THYLAKOID

ETC1

?

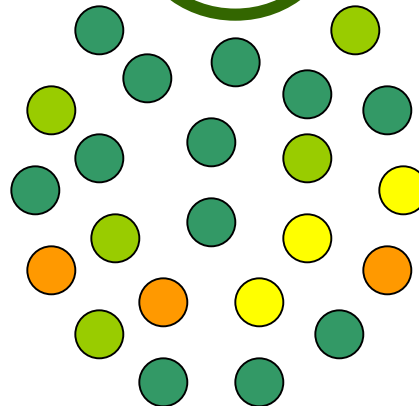
E-

PS-I

CHL-A
P700

P700 OXIDIZED

!
REMEBER



CHLOROPLAST

E- ACCEPTOR "Q2"



CHEM EGY

THYLAKOID

ETC1

+

E- TRANSPORT CHAIN #1

E-

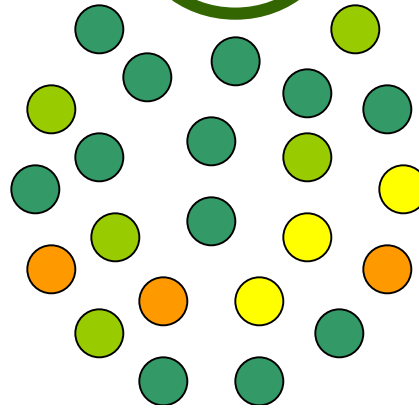
PS-I

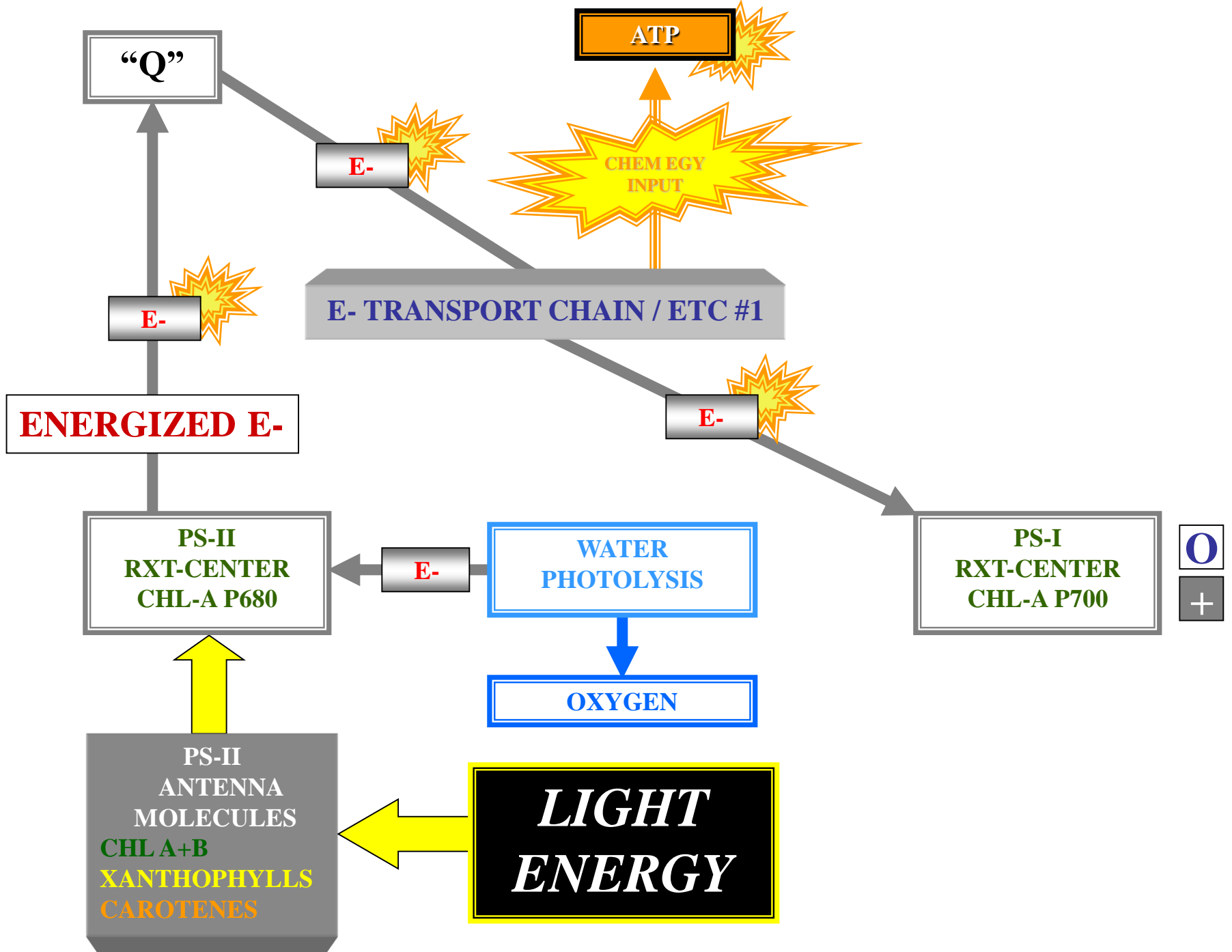
CHL-A
P700

P700 OXIDIZED



REMEBER





CHLOROPLAST

E- ACCEPTOR "Q2"



CHEM EGY

THYLAKOID

R

E- TRANSPORT CHAIN #1



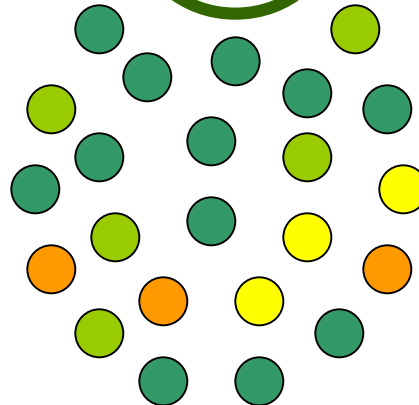
PS-I

**CHL-A
P700**

P700 OXIDIZED



REMEBER



CHLOROPLAST

E- ACCEPTOR "Q2"



CHEM EGY

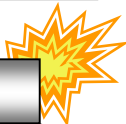
THYLAKOID

\$

NC

E- TRANSPORT CHAIN #1

E-



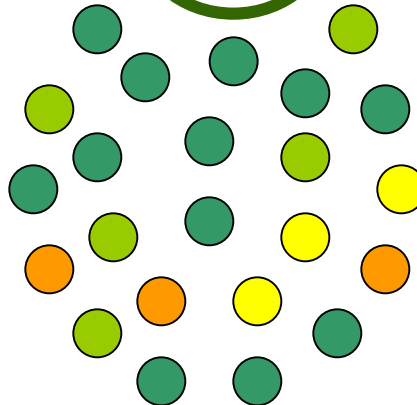
PS-I

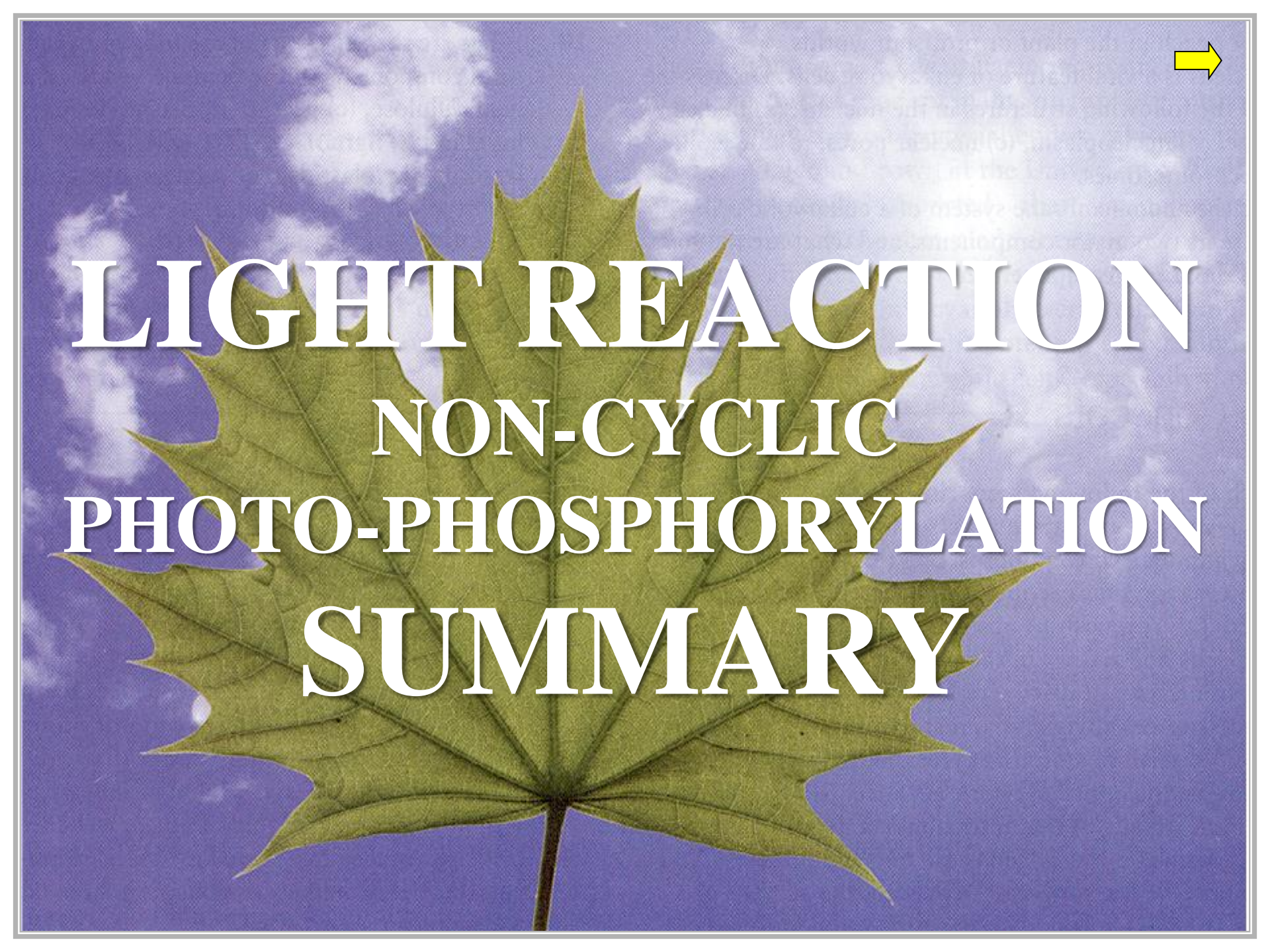
**CHL-A
P700**

P700 REDUCED



REMEBER

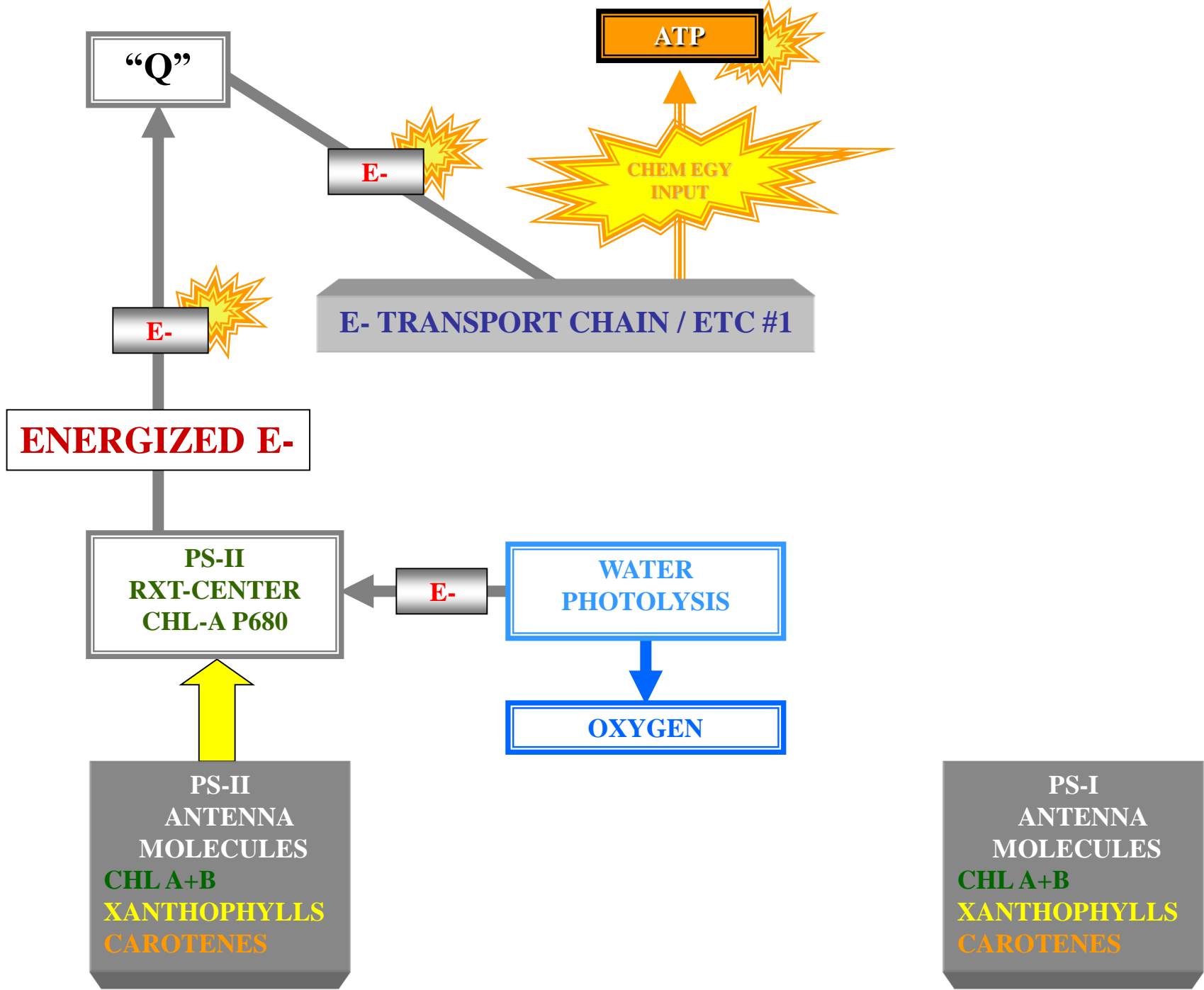


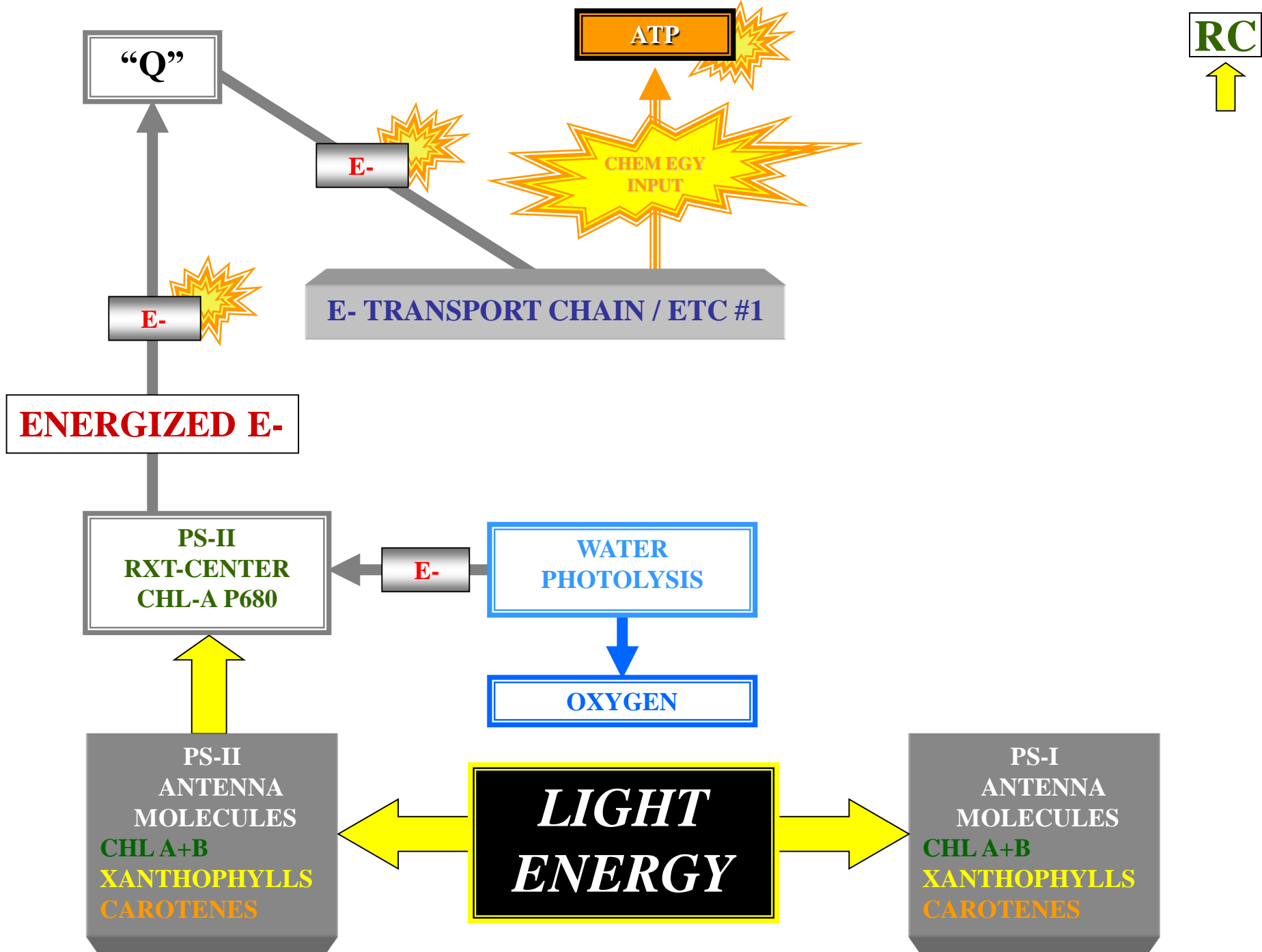
A large green maple leaf is centered in the background, set against a blue sky with white clouds. The text is overlaid on the leaf.

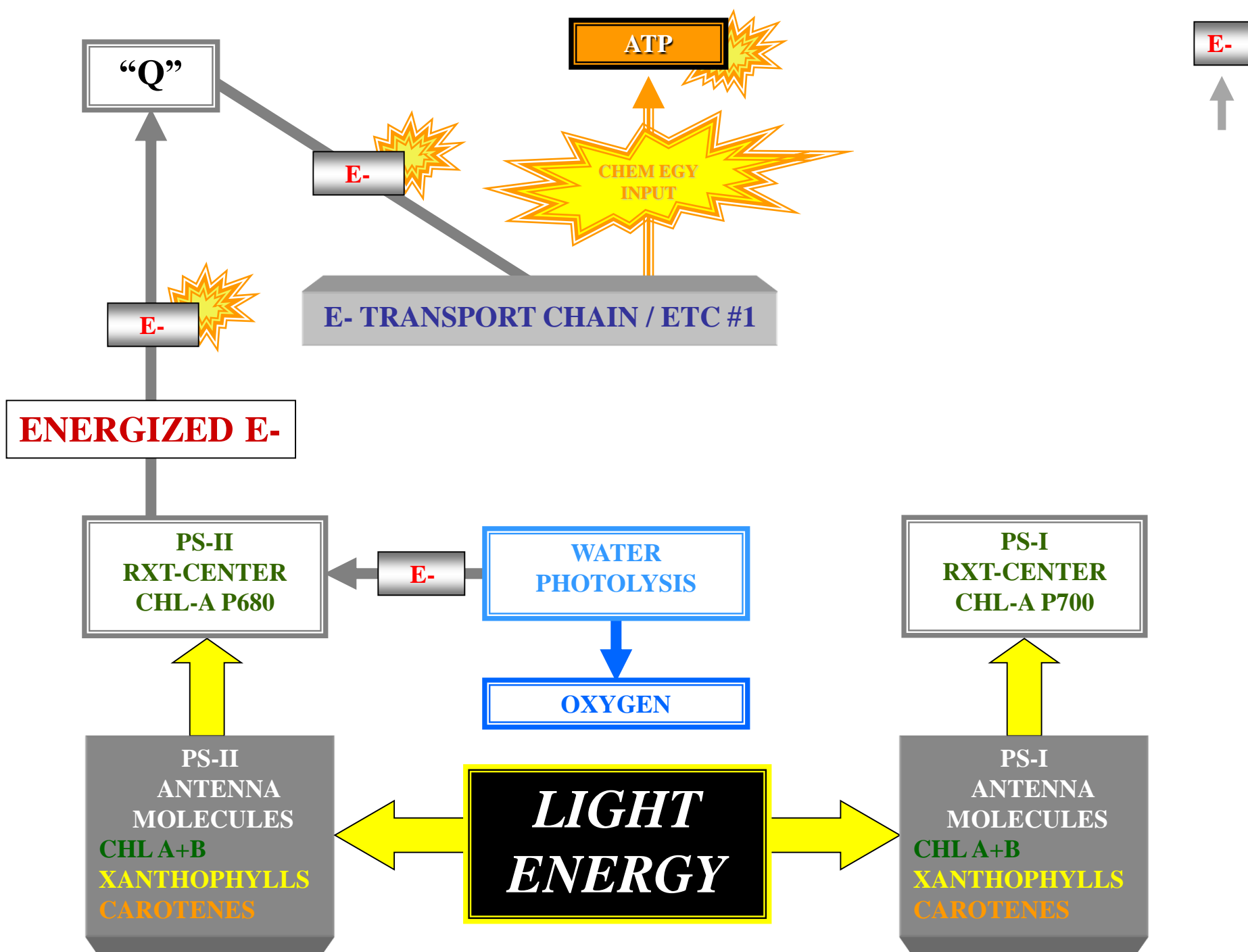
LIGHT REACTION

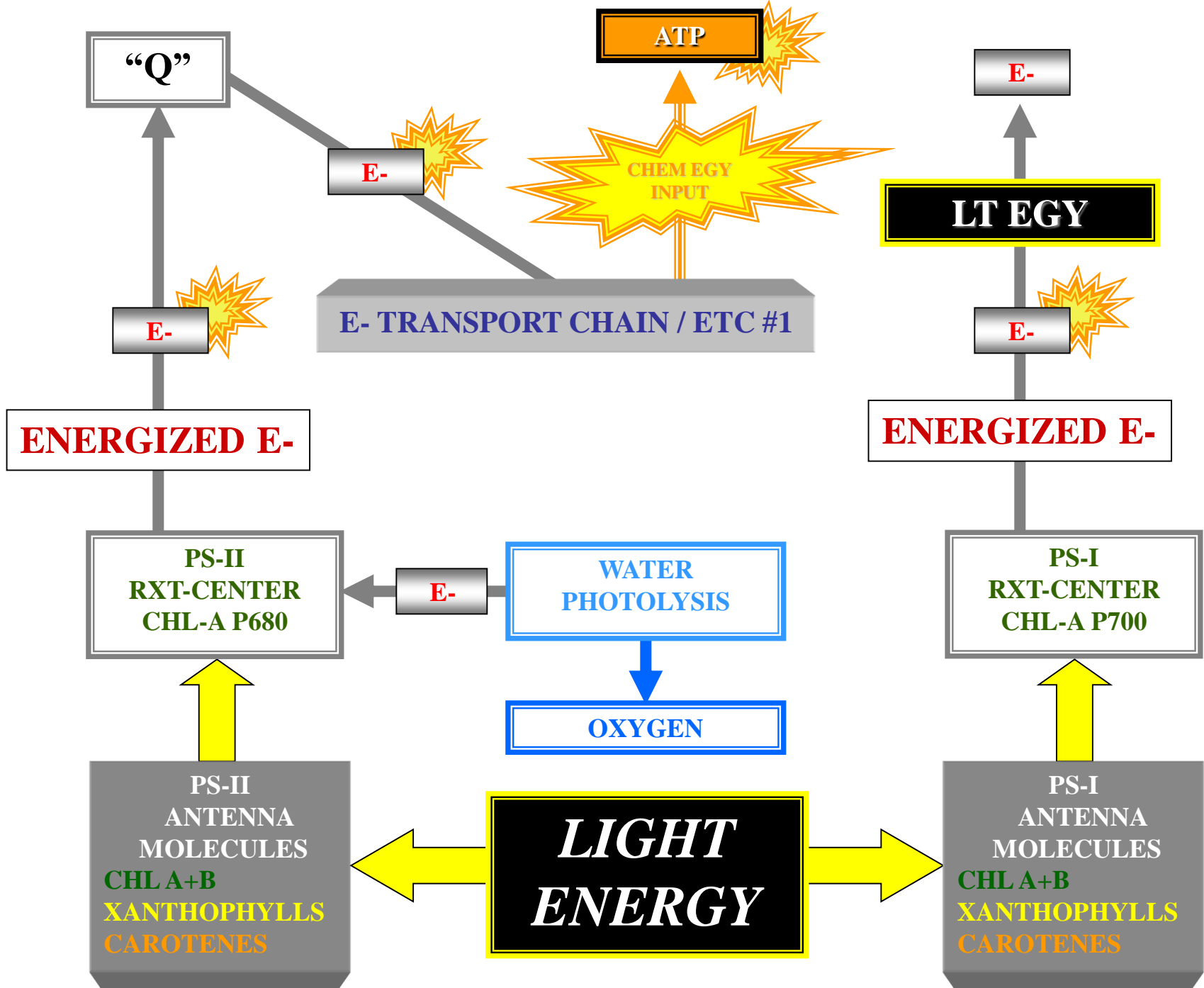
NON-CYCLIC PHOTO-PHOSPHORYLATION

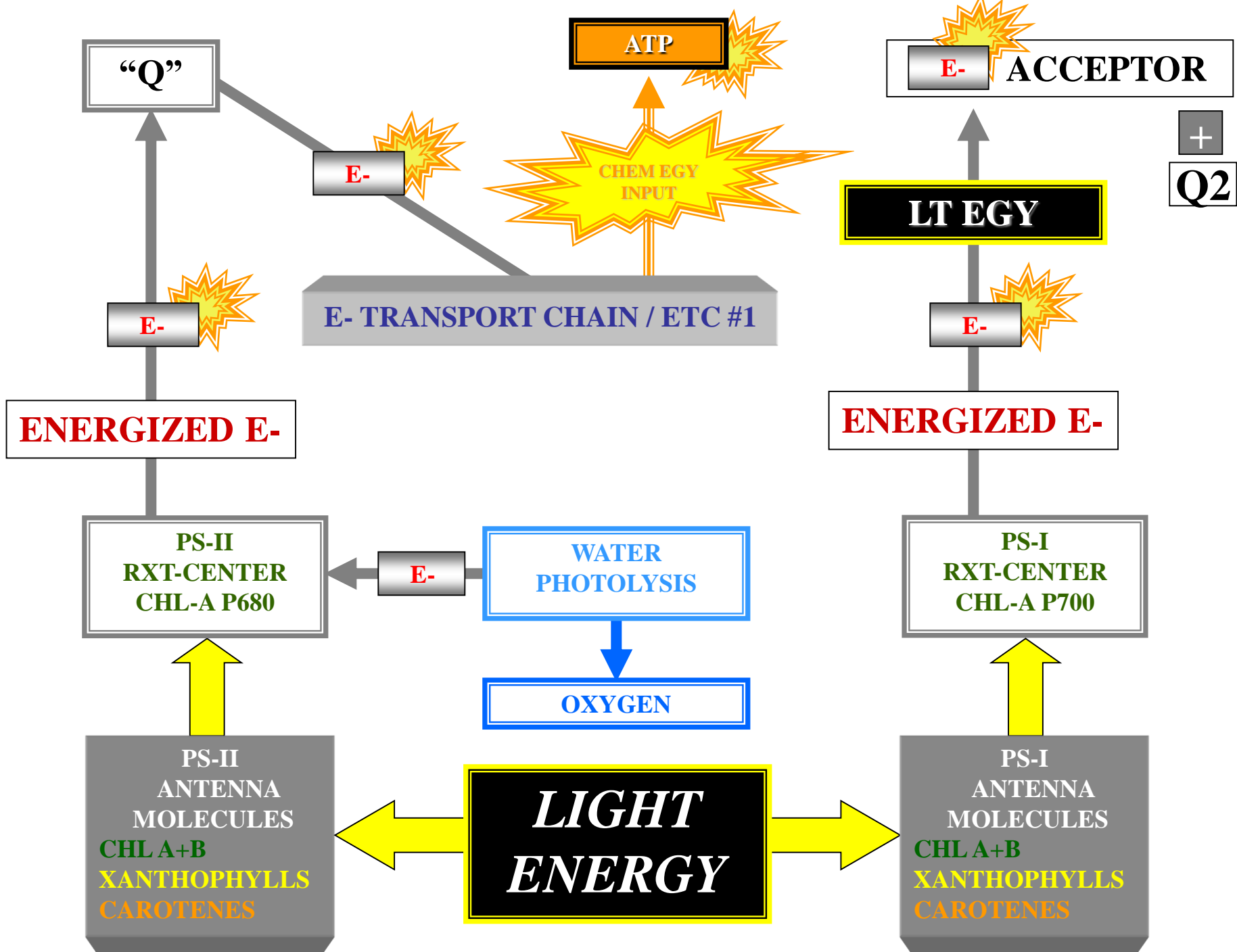
SUMMARY

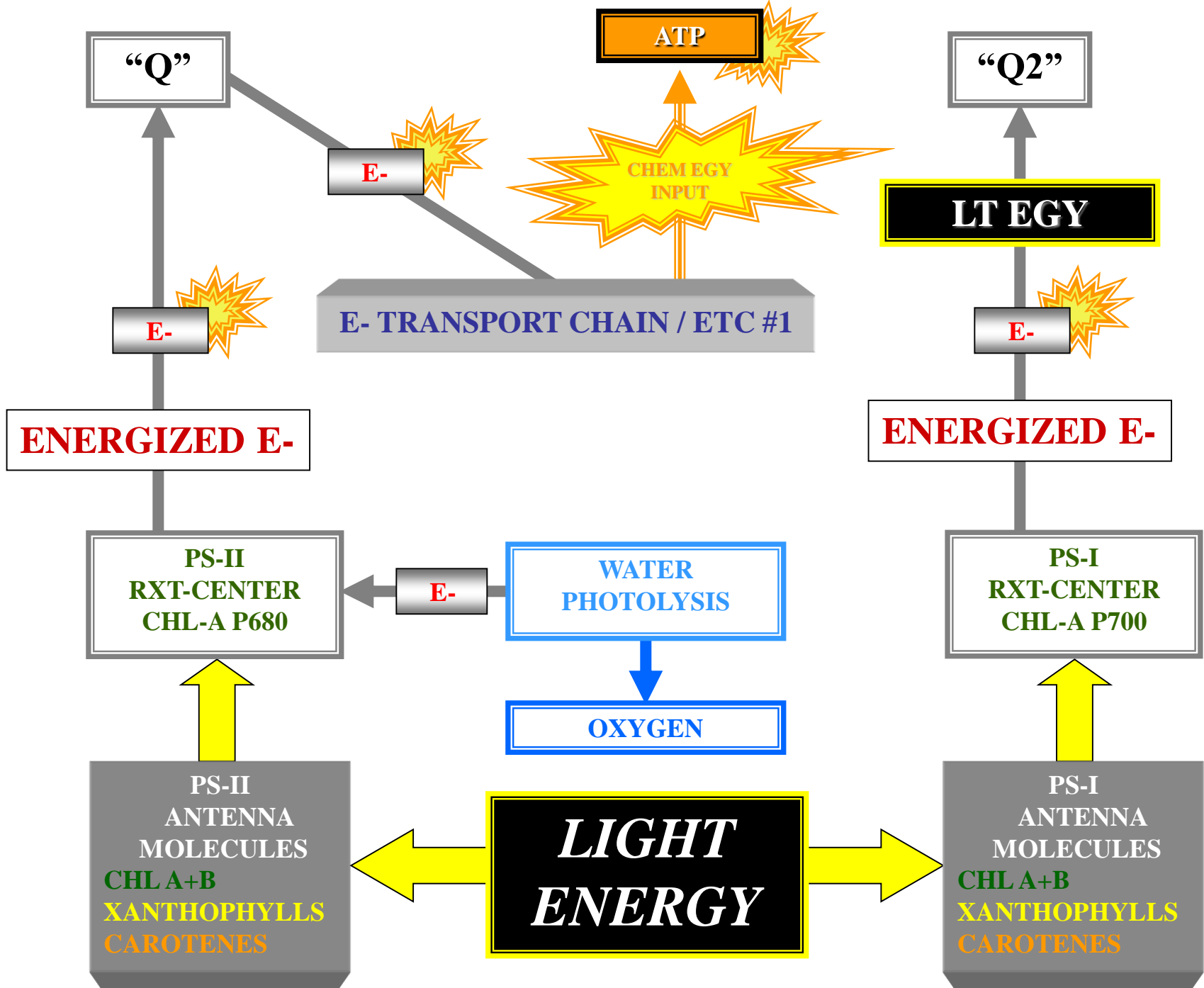


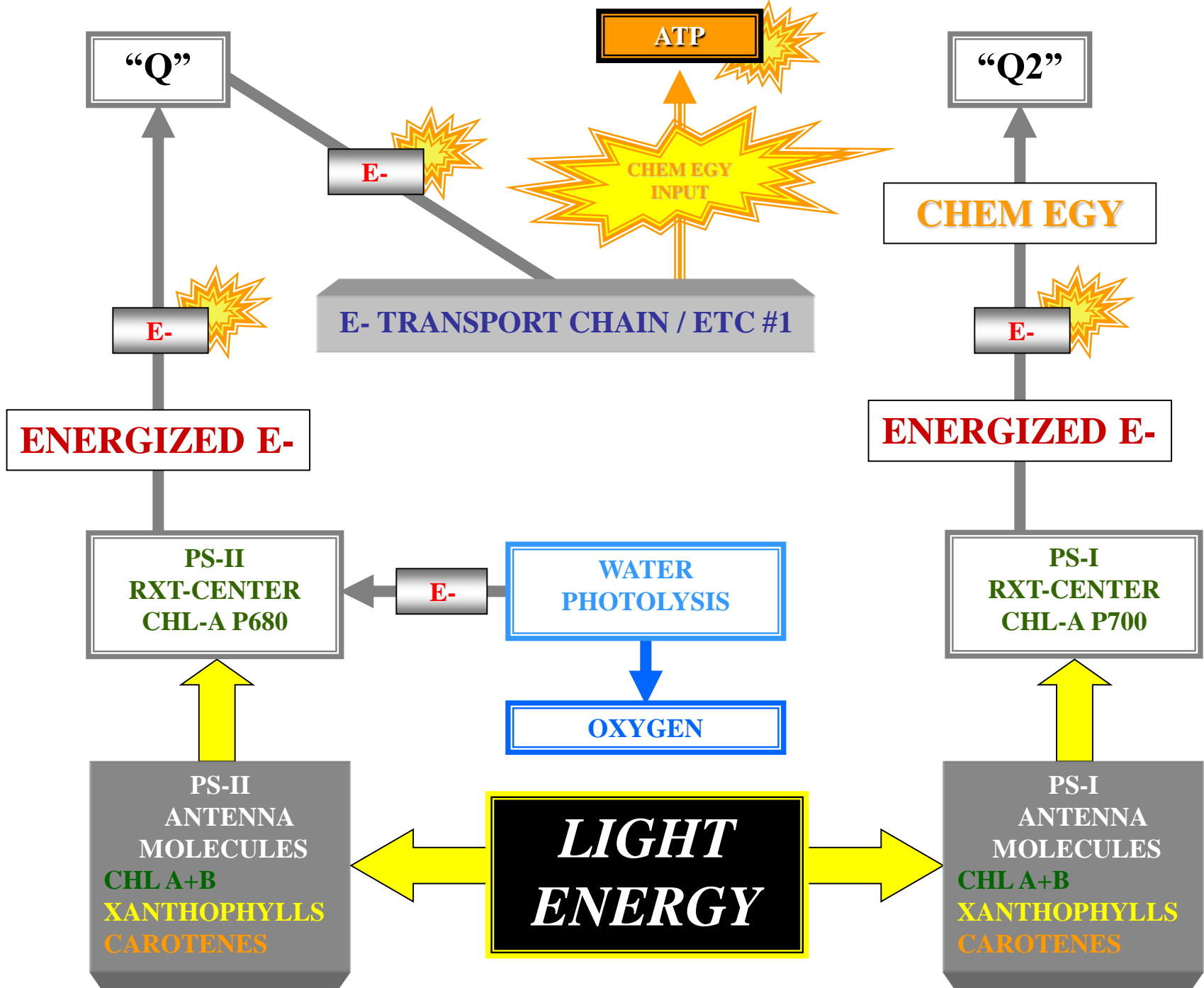


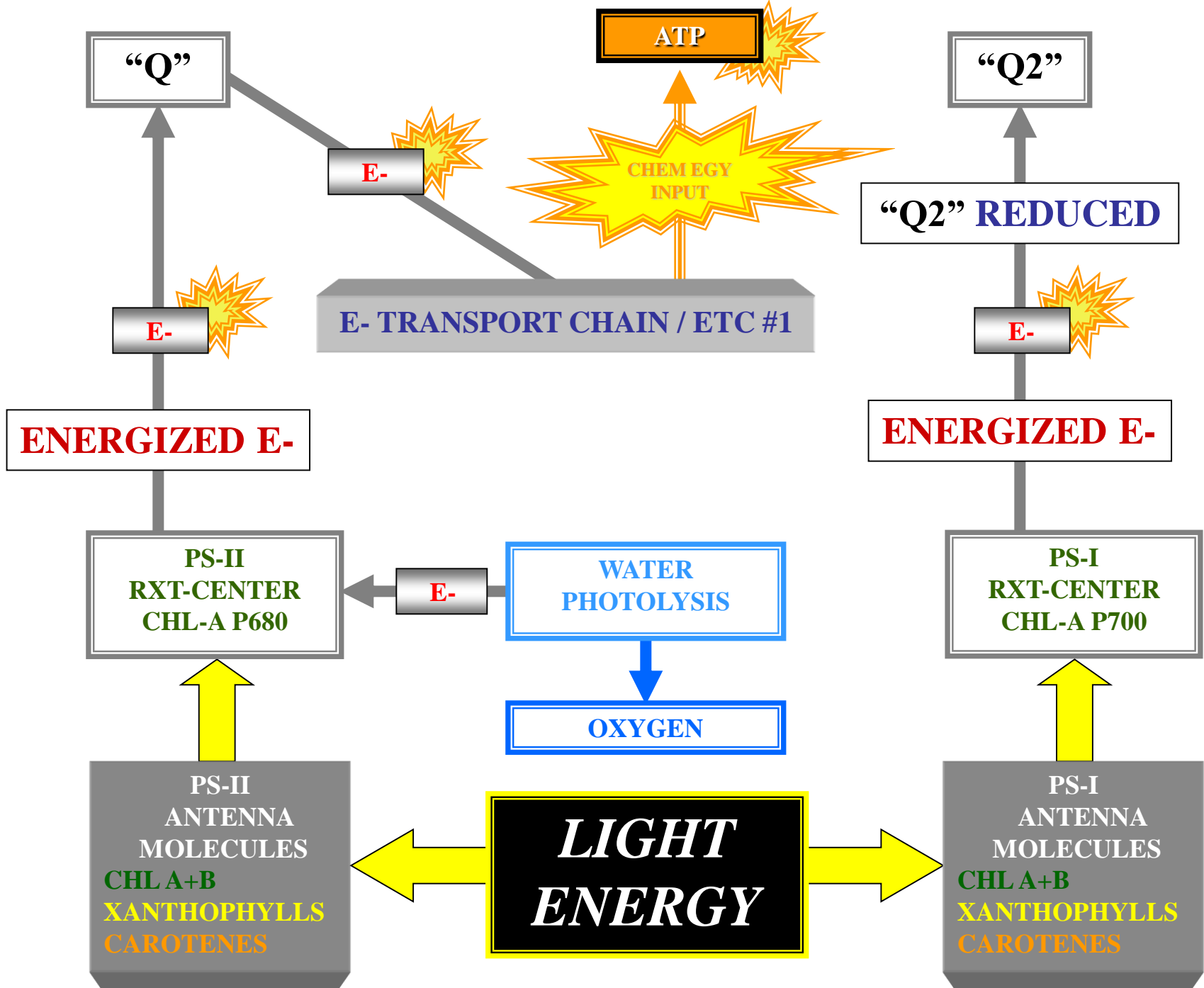


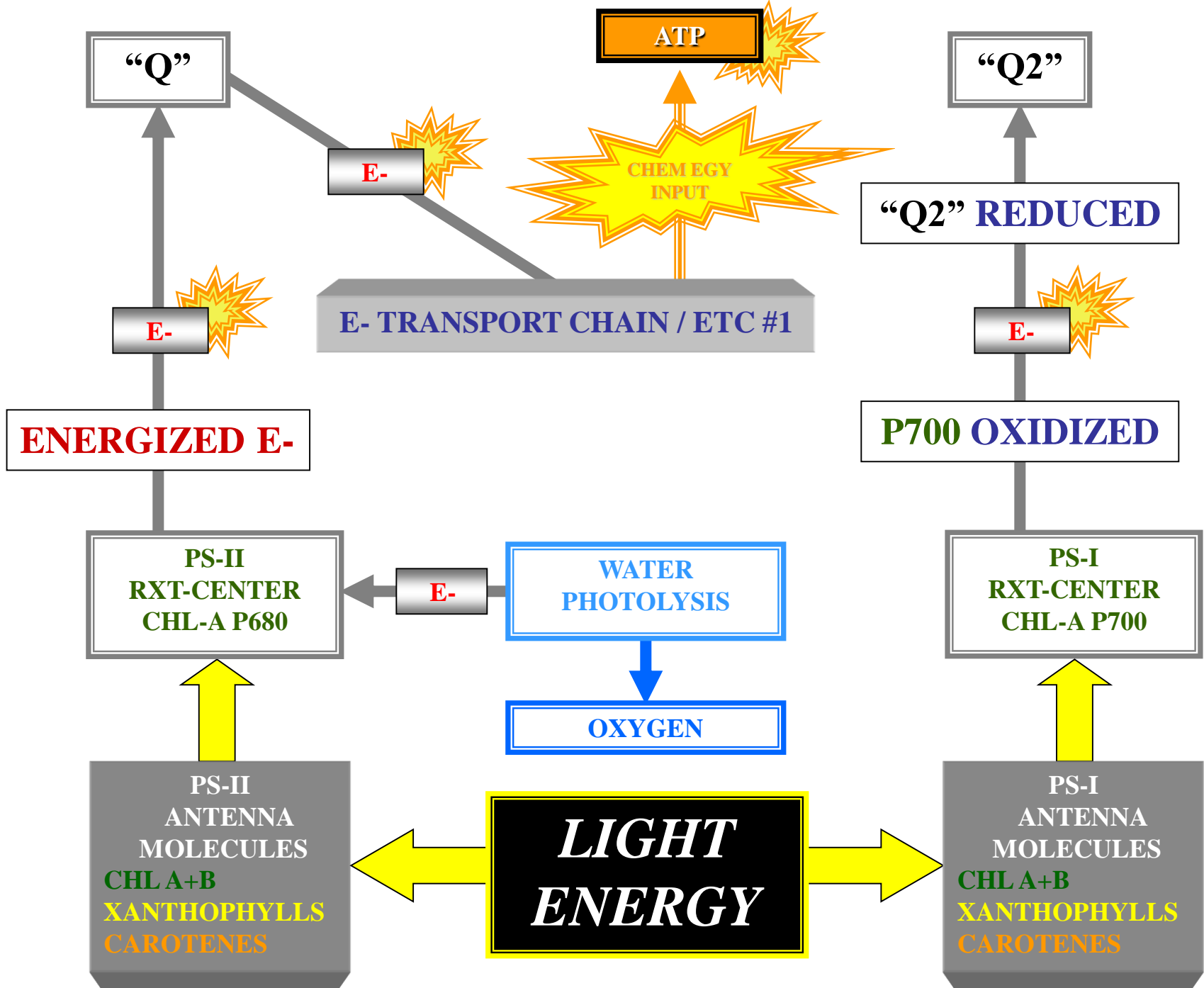


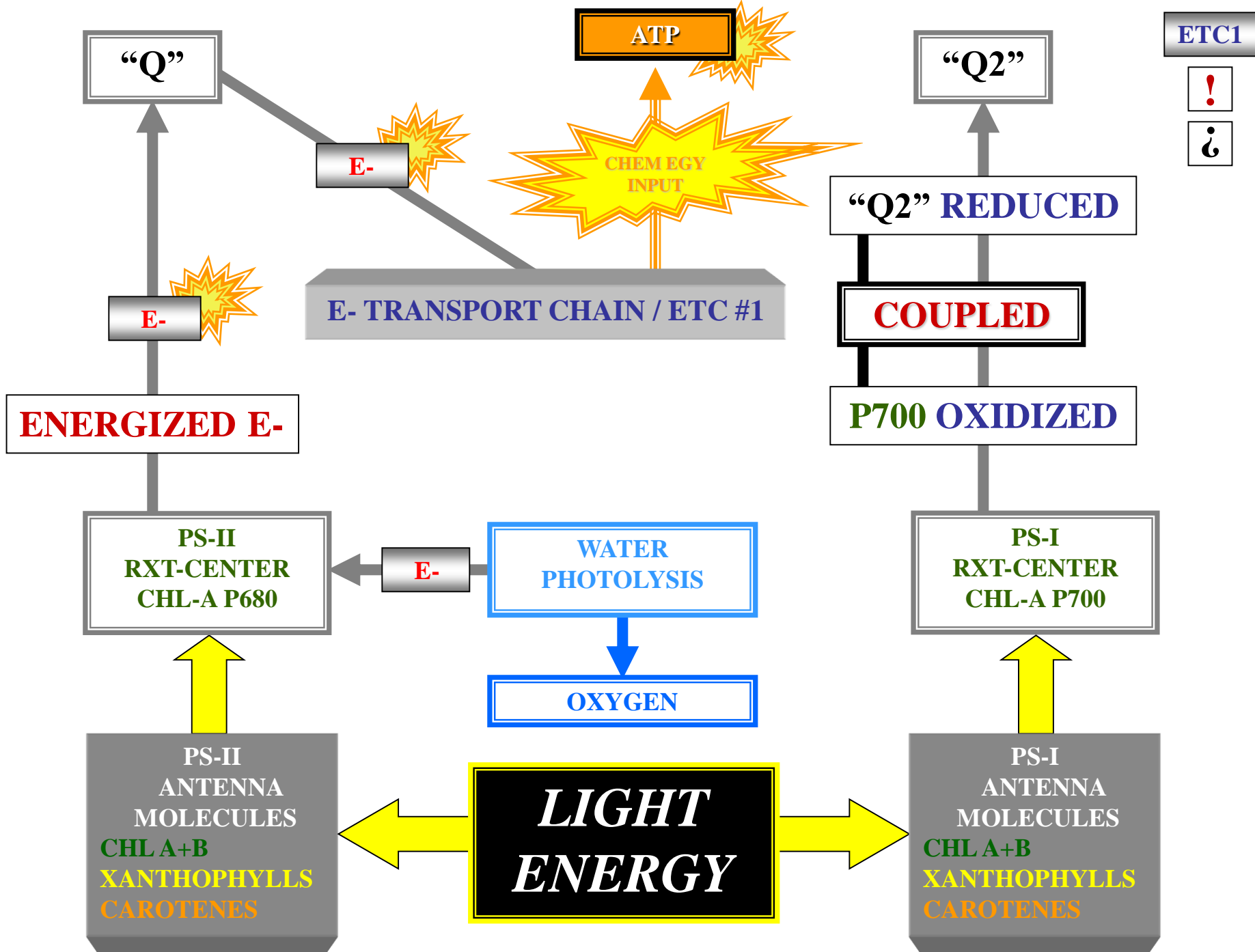


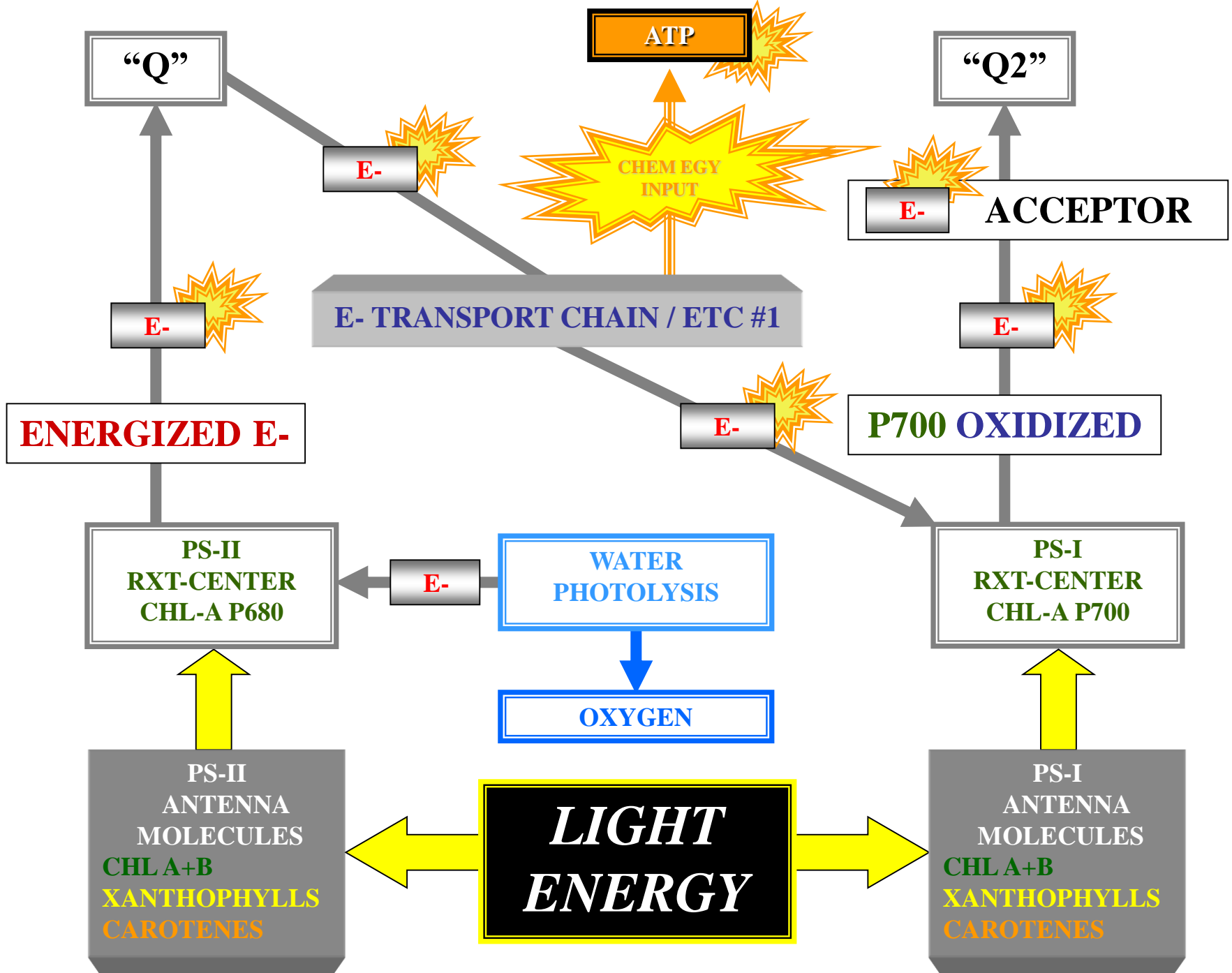


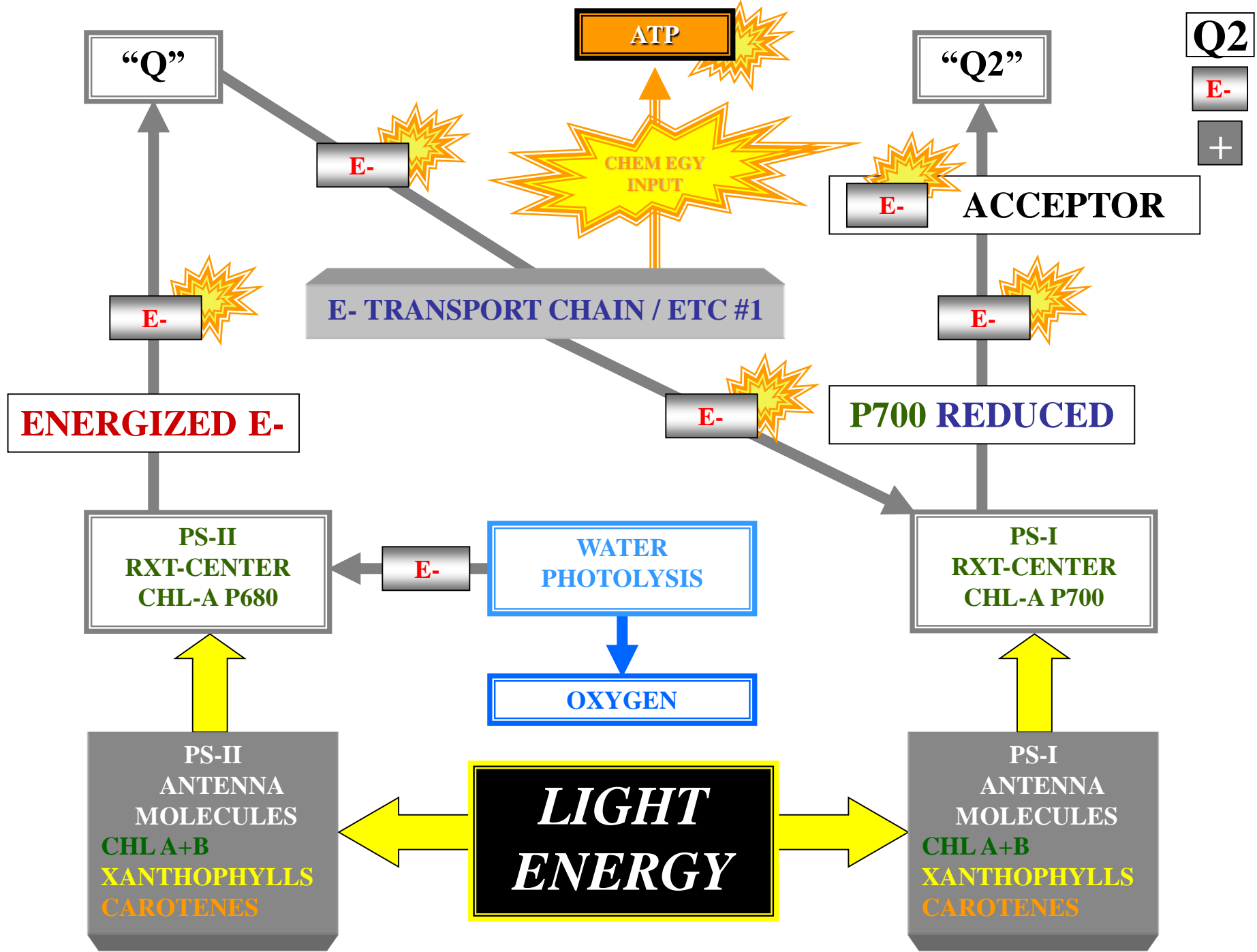


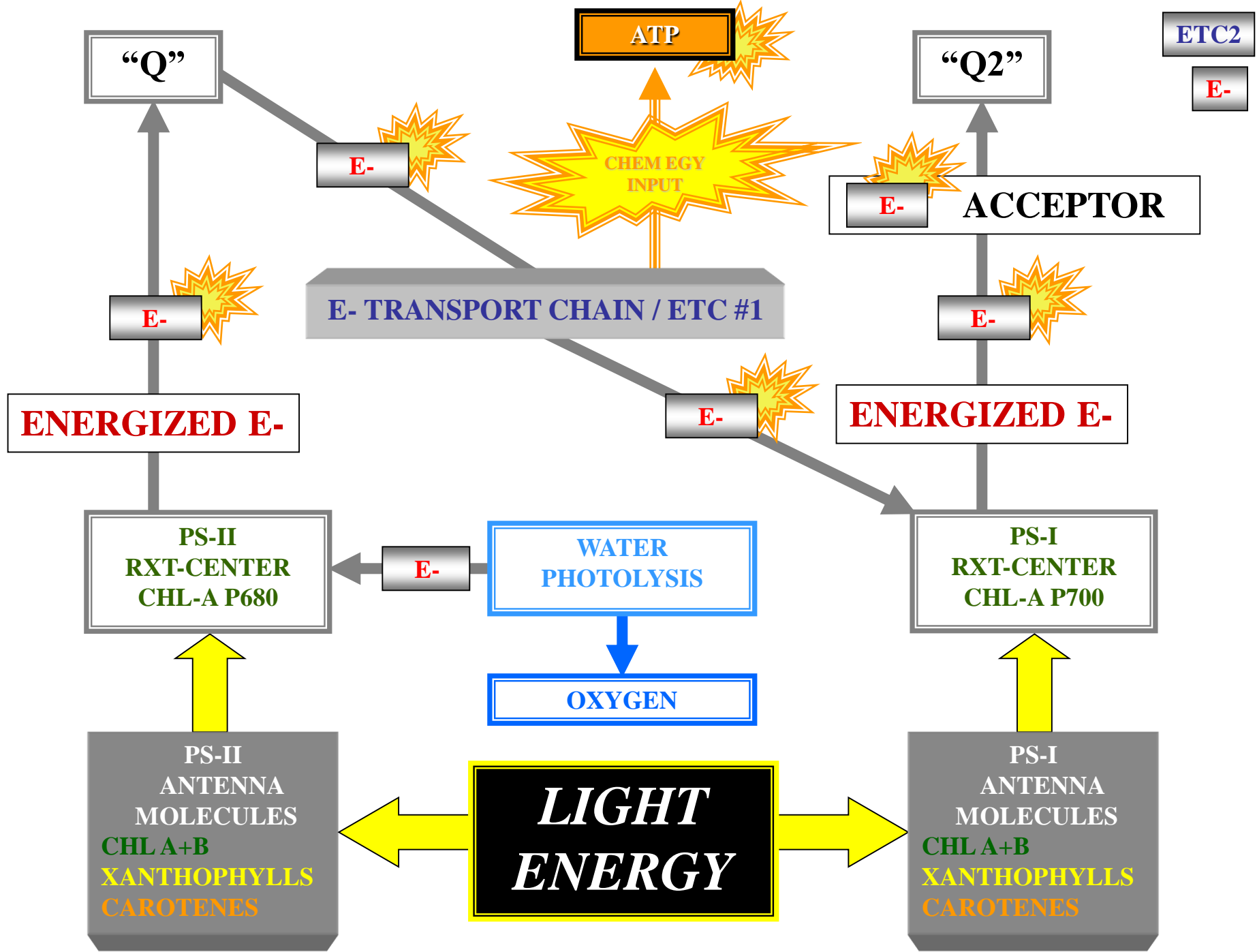


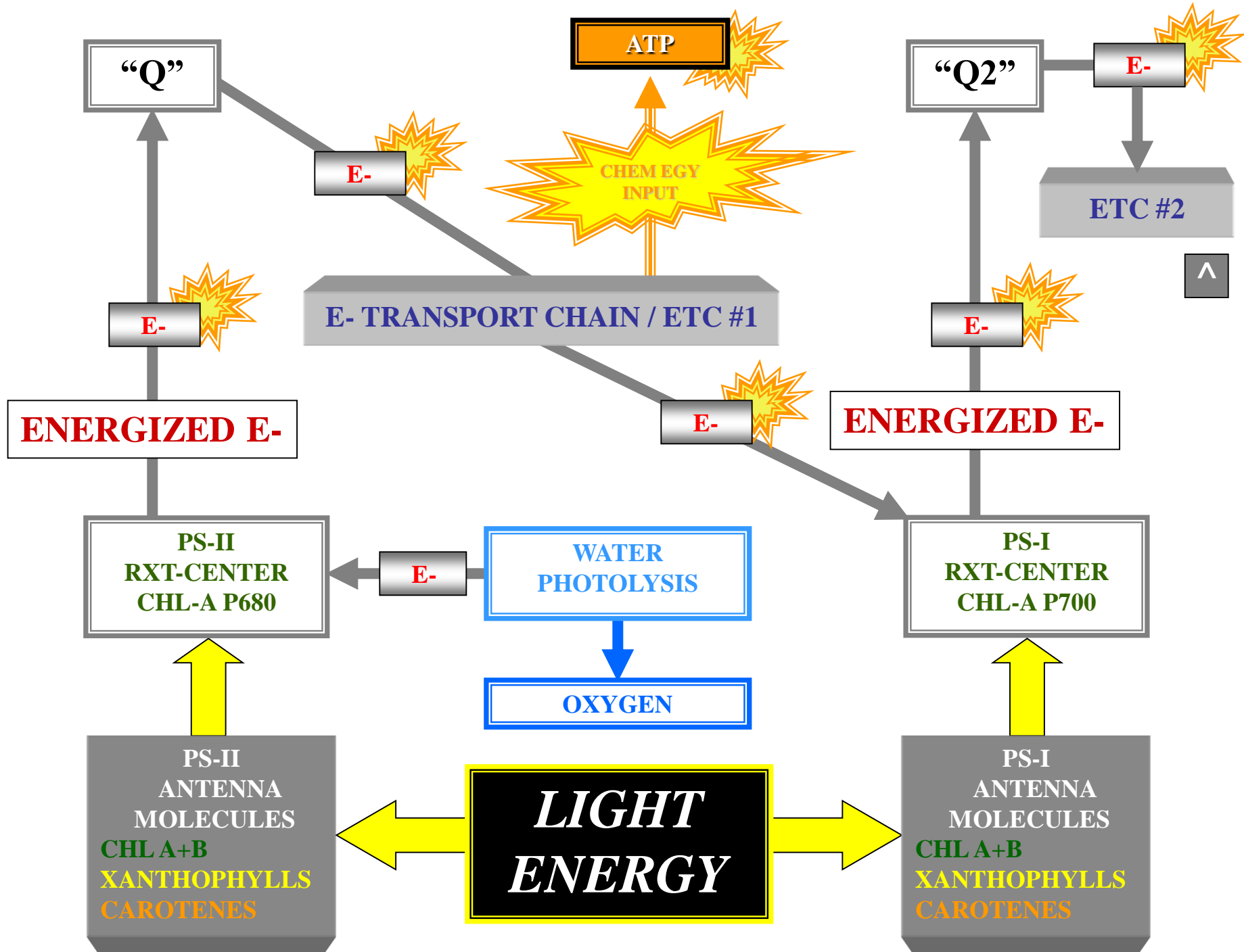










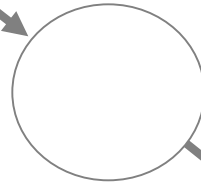
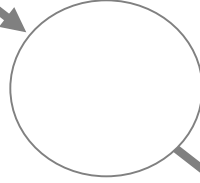
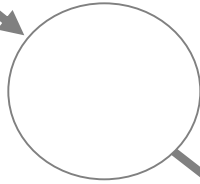
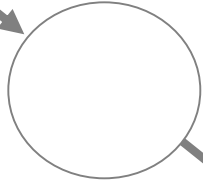


ELECTRON TRANSPORT CHAIN #2

ELECTRON TRANSPORT CHAIN #2



THYLAKOID GRANUM



 = ELECTRON TRANSPORT CHAIN COMPONENT

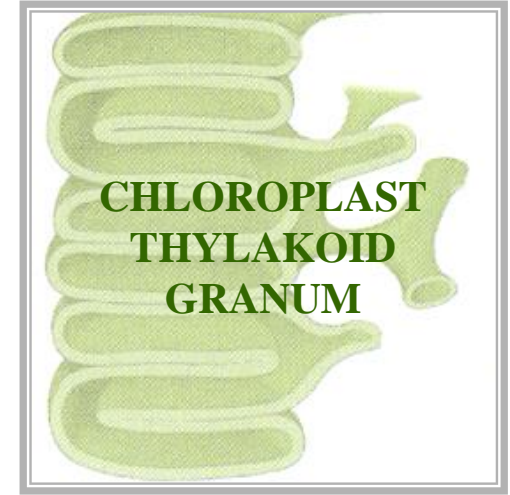
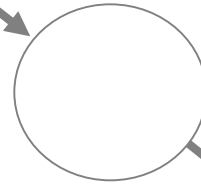
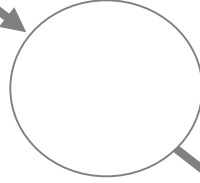
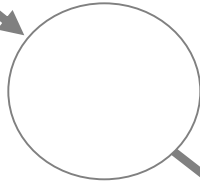
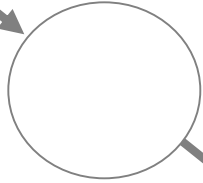
 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN #2



THYLAKOID GRANUM



REDOX RXTS



= **CHEMICAL ENERGY**

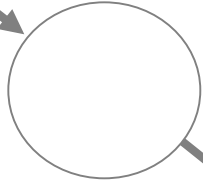
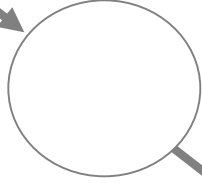
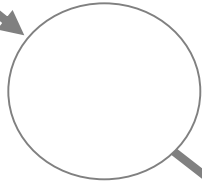
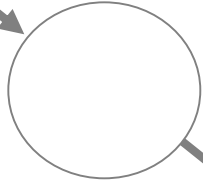


= **DISSIPATED HEAT ENERGY**

ELECTRON TRANSPORT CHAIN #2

E-

THYLAKOID GRANUM



REDOX RXTS



= CHEMICAL ENERGY

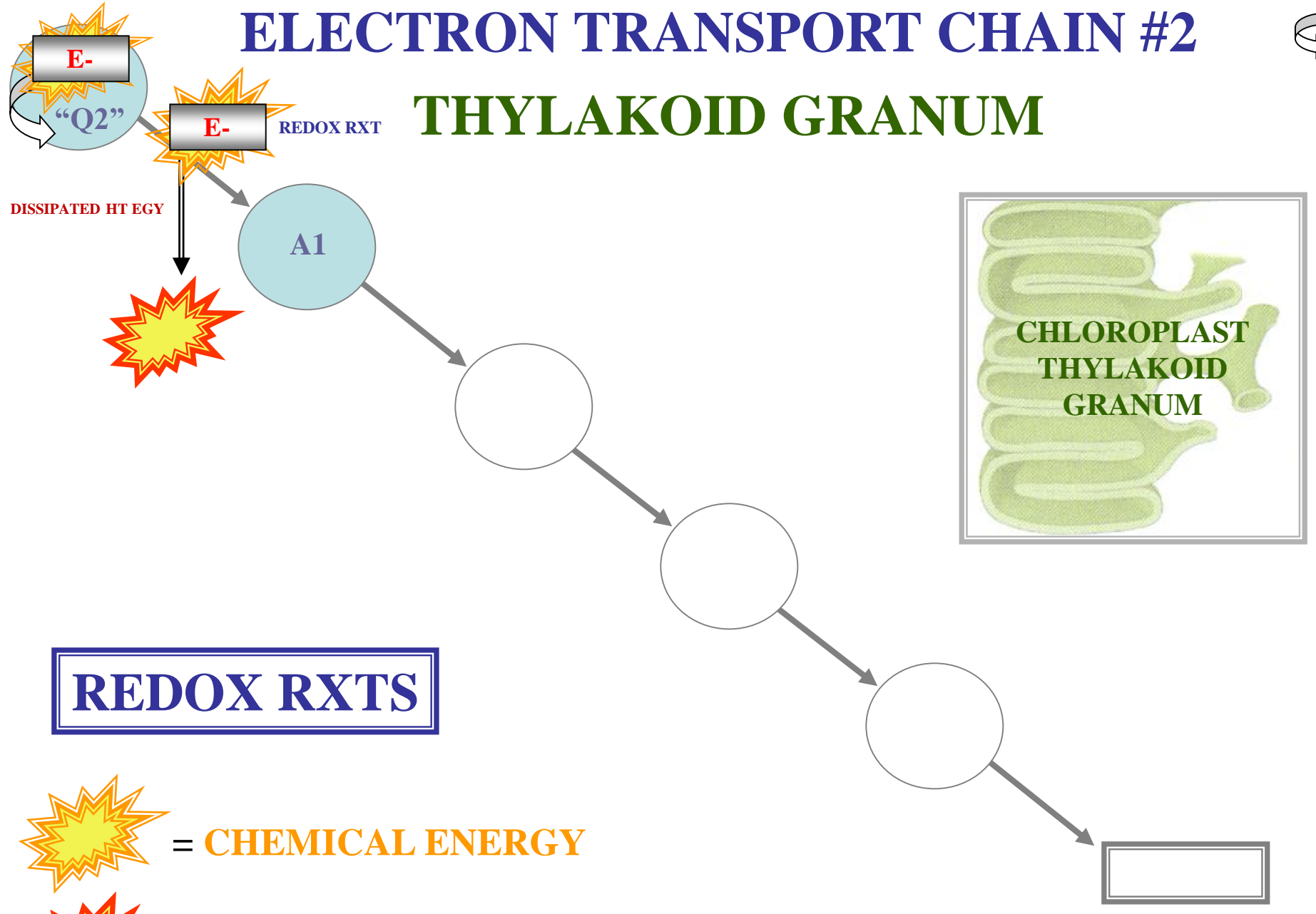


= DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN #2



THYLAKOID GRANUM



REDOX RXTS

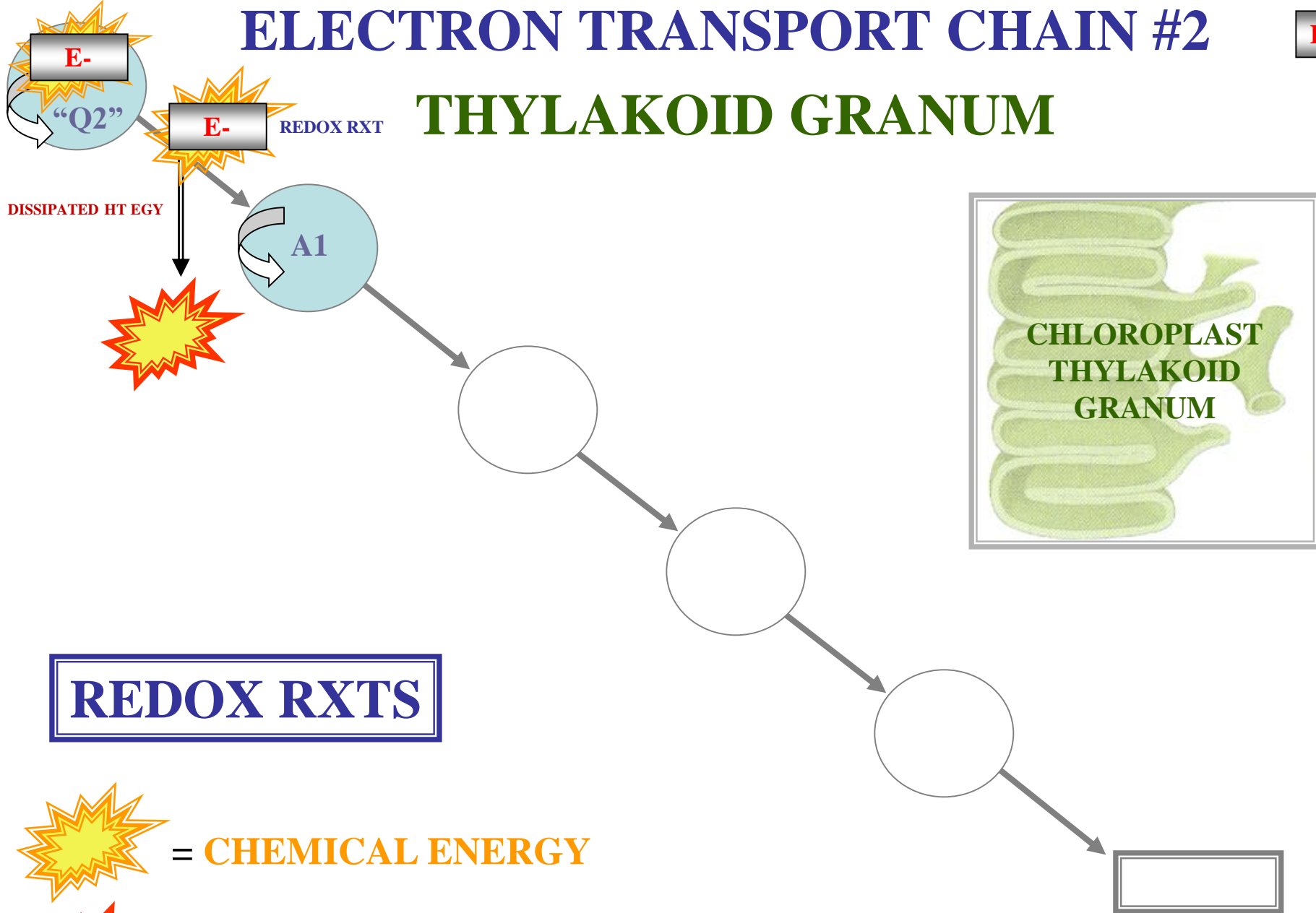
 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN #2

E-

THYLAKOID GRANUM



REDOX RXTS

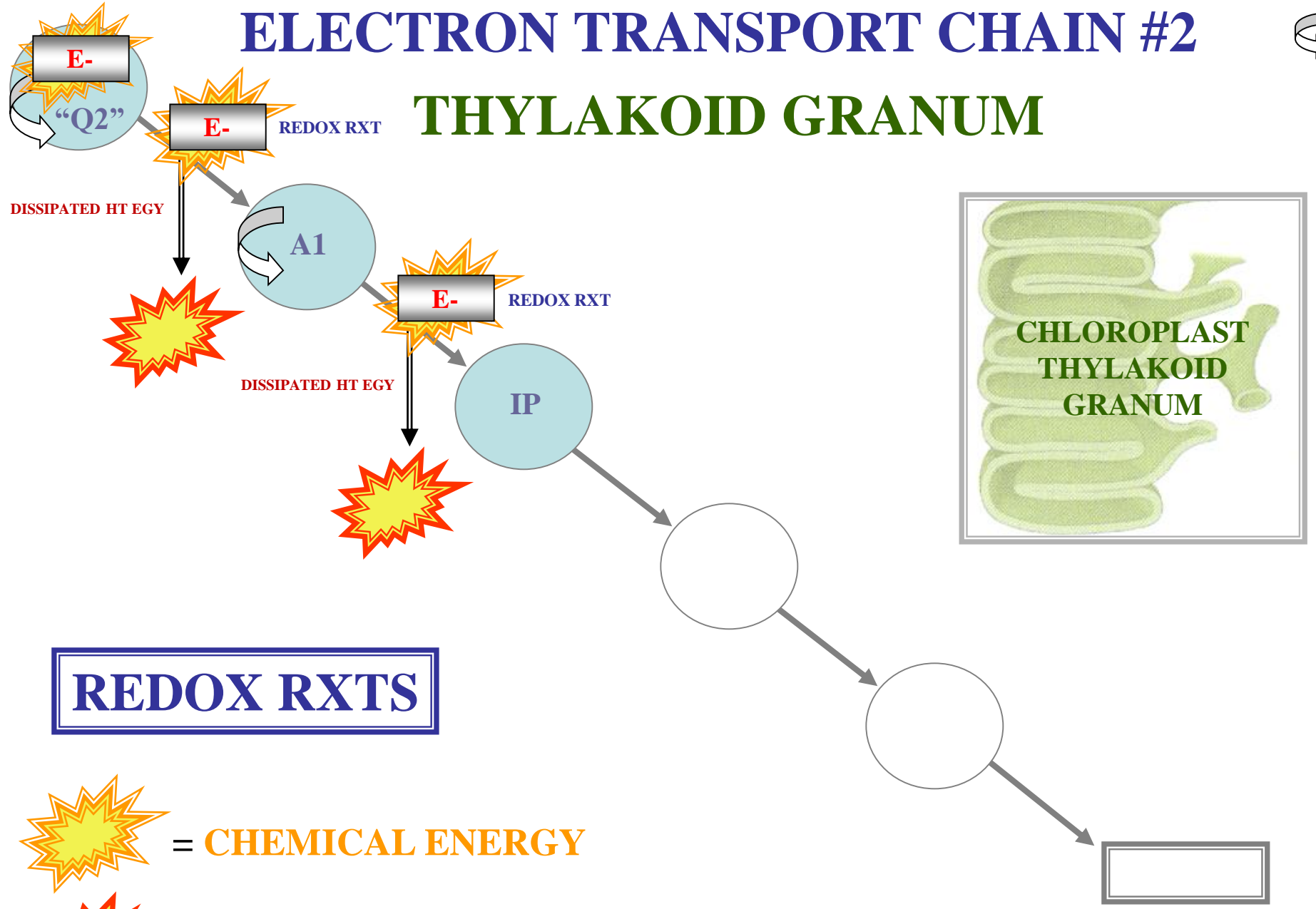
 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

ELECTRON TRANSPORT CHAIN #2



THYLAKOID GRANUM



REDOX RXTS

 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

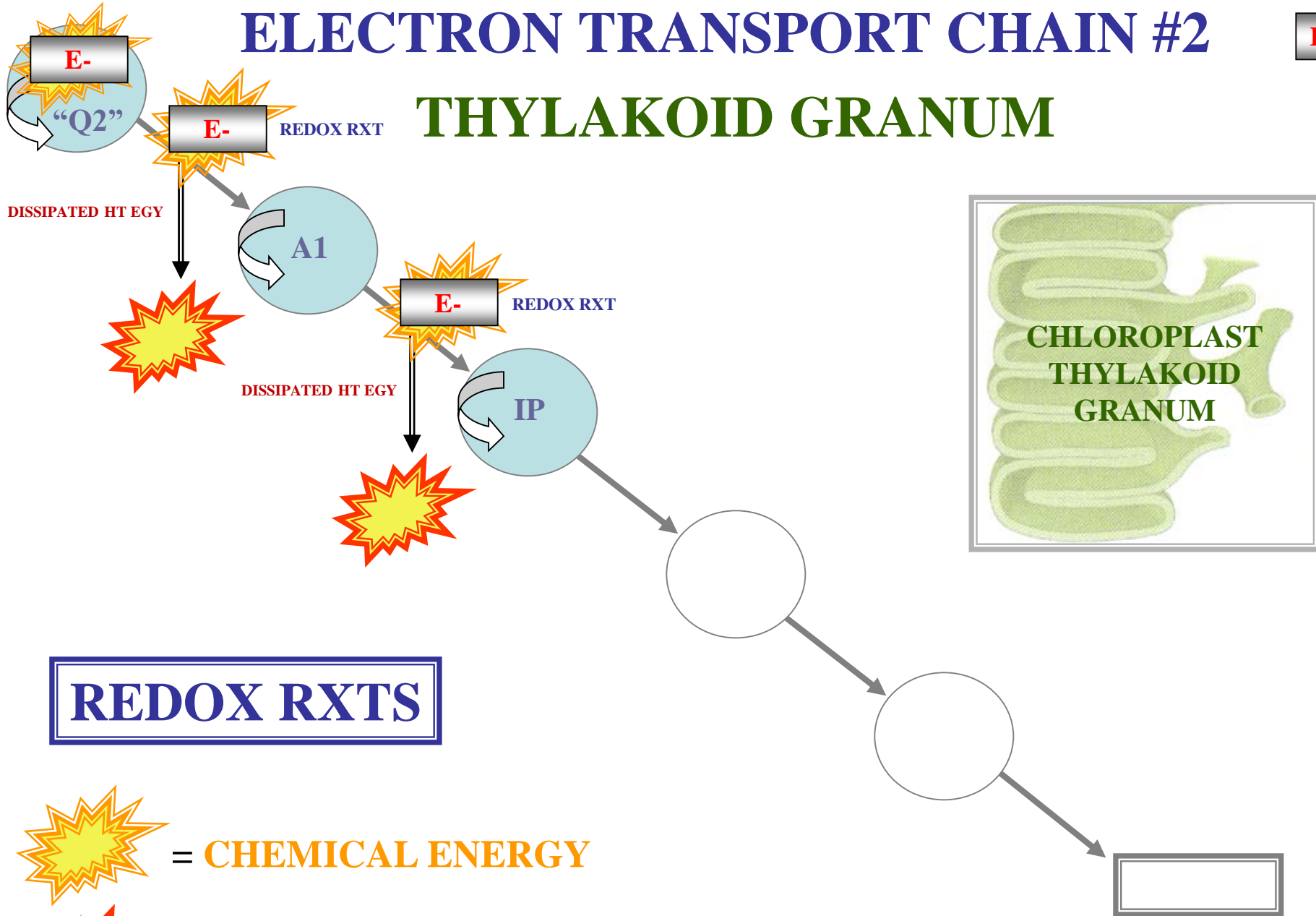


**CHLOROPLAST
THYLAKOID
GRANUM**

ELECTRON TRANSPORT CHAIN #2

E-

THYLAKOID GRANUM



REDOX RXTS

 = CHEMICAL ENERGY

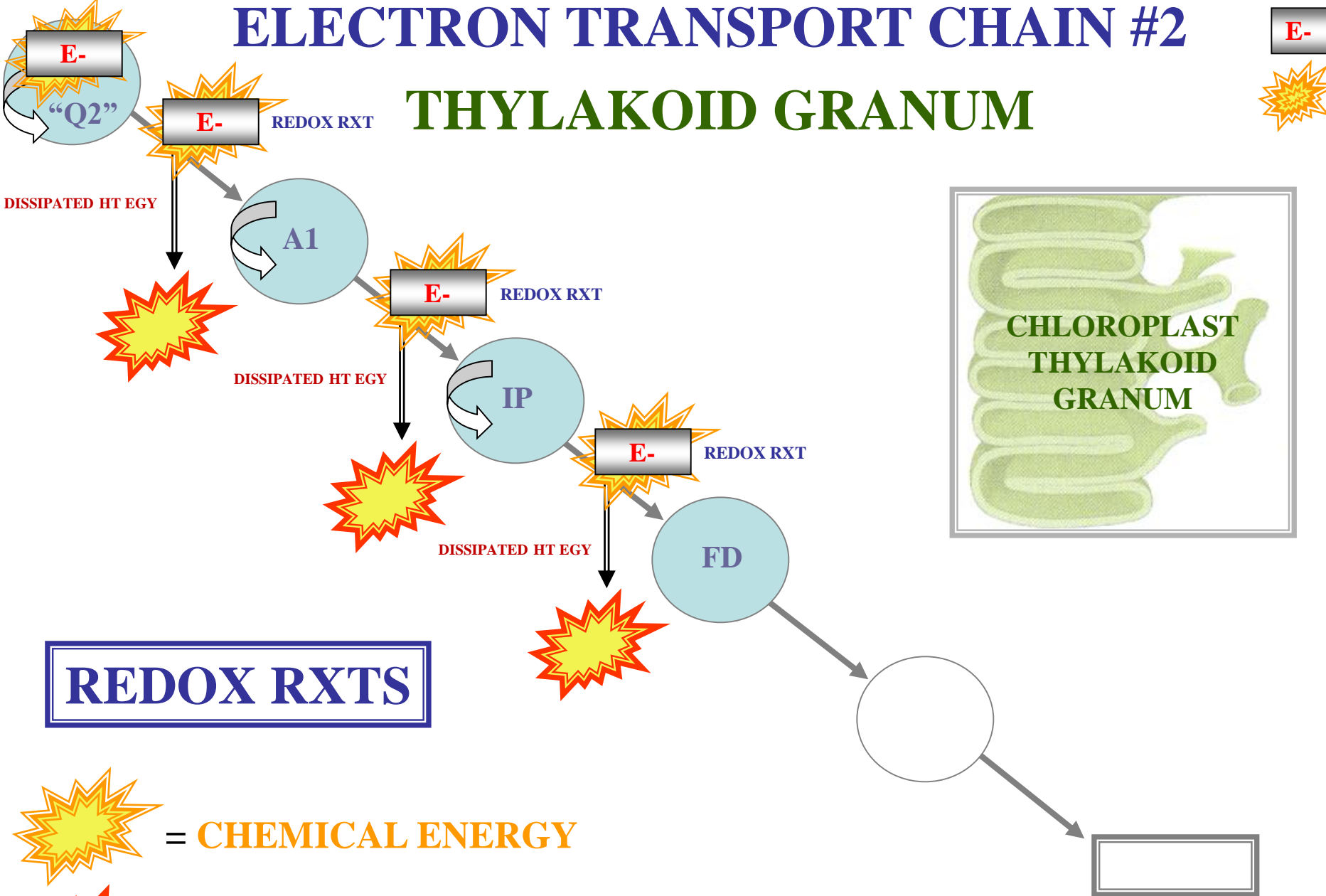
 = DISSIPATED HEAT ENERGY



ELECTRON TRANSPORT CHAIN #2

E-

THYLAKOID GRANUM



REDOX RXTS

 = CHEMICAL ENERGY

 = DISSIPATED HEAT ENERGY

