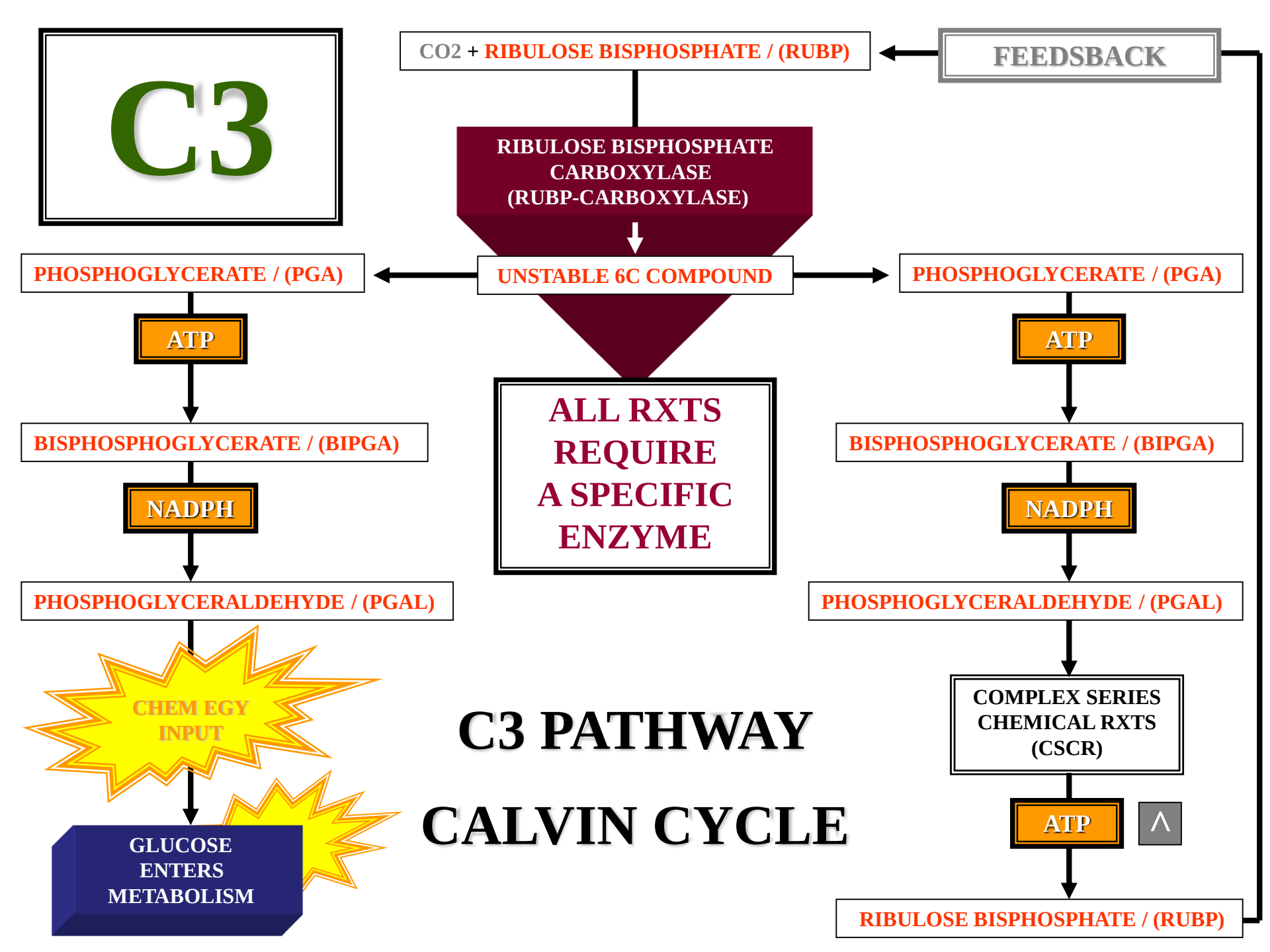
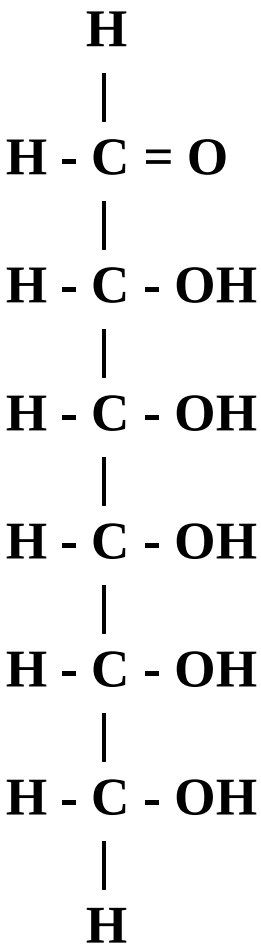

C3
CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
PHOSPHOGLYCERATE / (PGA)
PHOSPHOGLYCERATE / (PGA)
ATP
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
NADPH
ALL RXTS REQUIRE A SPECIFIC ENZYME
PHOSPHOGLYCERALDEHYDE / (PGAL)
PHOSPHOGLYCERALDEHYDE / (PGAL)
CHEM EGY INPUT
COMPLEX SERIES CHEMICAL RXTS (CSCR)
C3 PATHWAY
CALVIN CYCLE
GLUCOSE ENTERS METABOLISM
ATP
RIBULOSE BISPHOSPHATE / (RUBP)

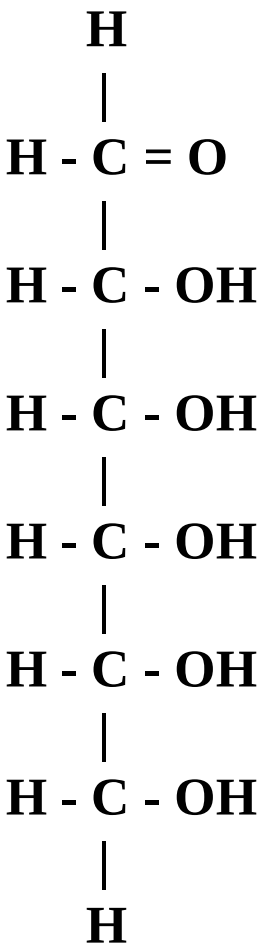
C3
PATHWAY
ENERGY COST

GLUCOSE



C6H12O6

GLUCOSE



C6H12O6

GLUCOSE
6C
SUGAR

GLUCOSE
6C
SUGAR

QUESTION

WHAT COMPOUND CONTRIBUTES C ATOMS TO THE SYNTHESIS OF GLUCOSE?

QUESTION

PHOTOSYNTHESIS

WATER

CO2

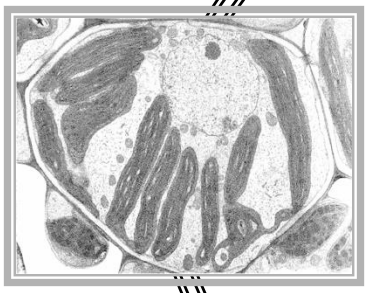
LIGHT EGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT

THYLAKOID GRANUM

CHEMICAL ENERGY

DK RXT

STROMA

SYNTHESIS

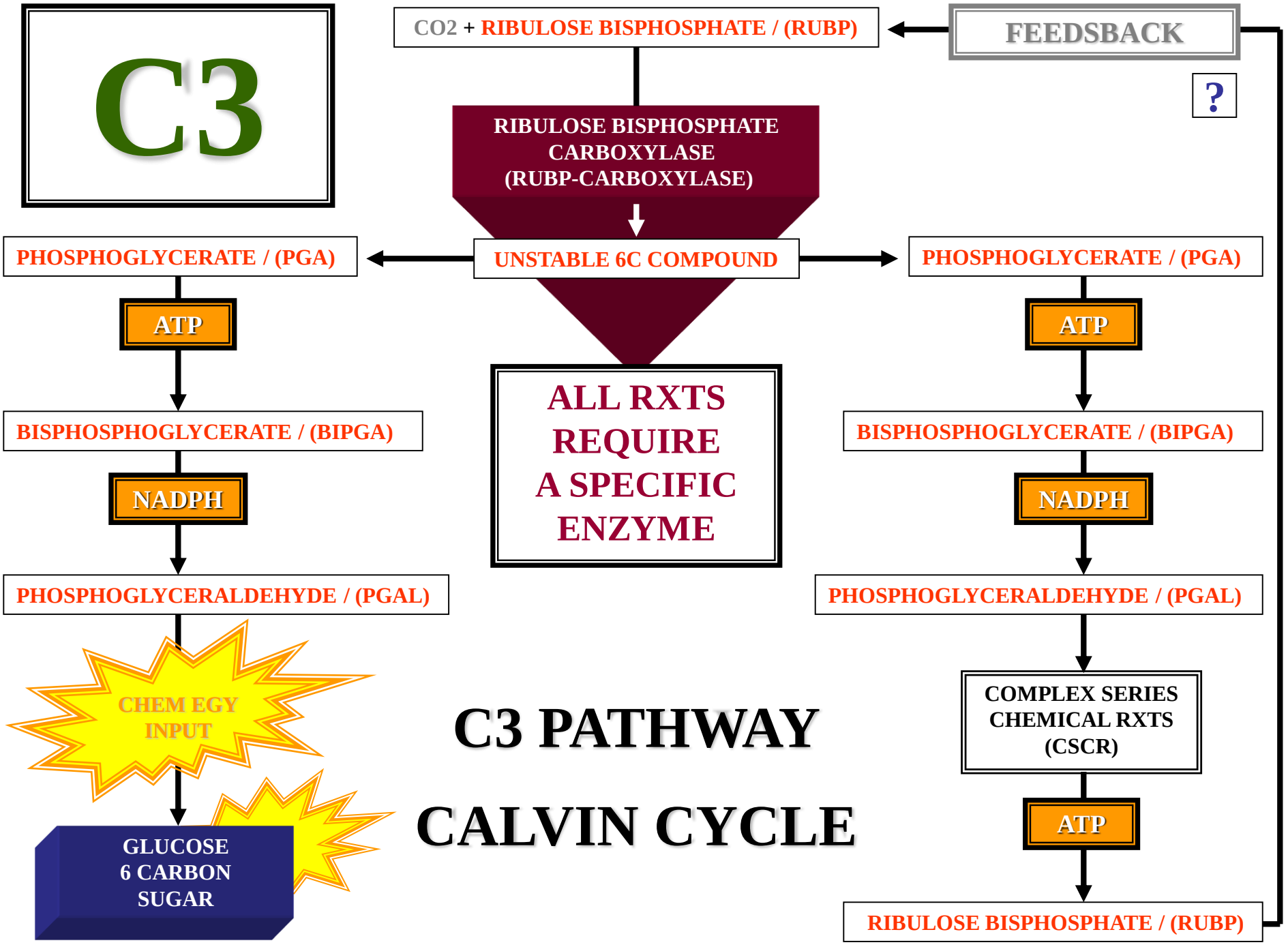
CHEM EGY INPUT

CHLOROPLAST

ATMOSPHERE

OXYGEN

GLUCOSE


C3
CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
?
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
PHOSPHOGLYCERATE / (PGA)
PHOSPHOGLYCERATE / (PGA)
ATP
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
NADPH
ALL RXTS REQUIRE A SPECIFIC ENZYME
PHOSPHOGLYCERALDEHYDE / (PGAL)
PHOSPHOGLYCERALDEHYDE / (PGAL)
CHEM EGY INPUT
COMPLEX SERIES CHEMICAL RXTS (CSCR)
C3 PATHWAY
CALVIN CYCLE
ATP
GLUCOSE 6 CARBON SUGAR
RIBULOSE BISPHOSPHATE / (RUBP)

QUESTION

A

WHAT COMPOUND CONTRIBUTES C ATOMS TO THE SYNTHESIS OF GLUCOSE?

QUESTION

ANSWER

CO2

ANSWER

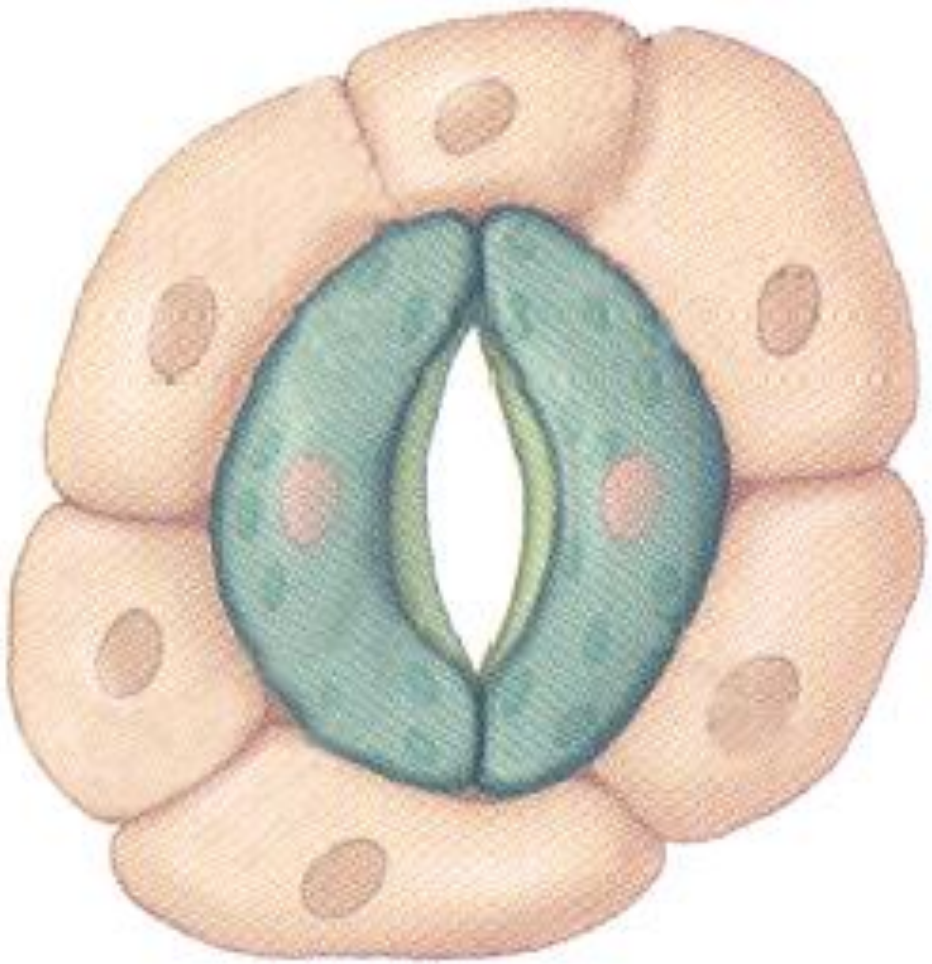
LEAF STOMATE

ATMOSPHERE

ATMOSPHERE

CO2

CO2



CO2

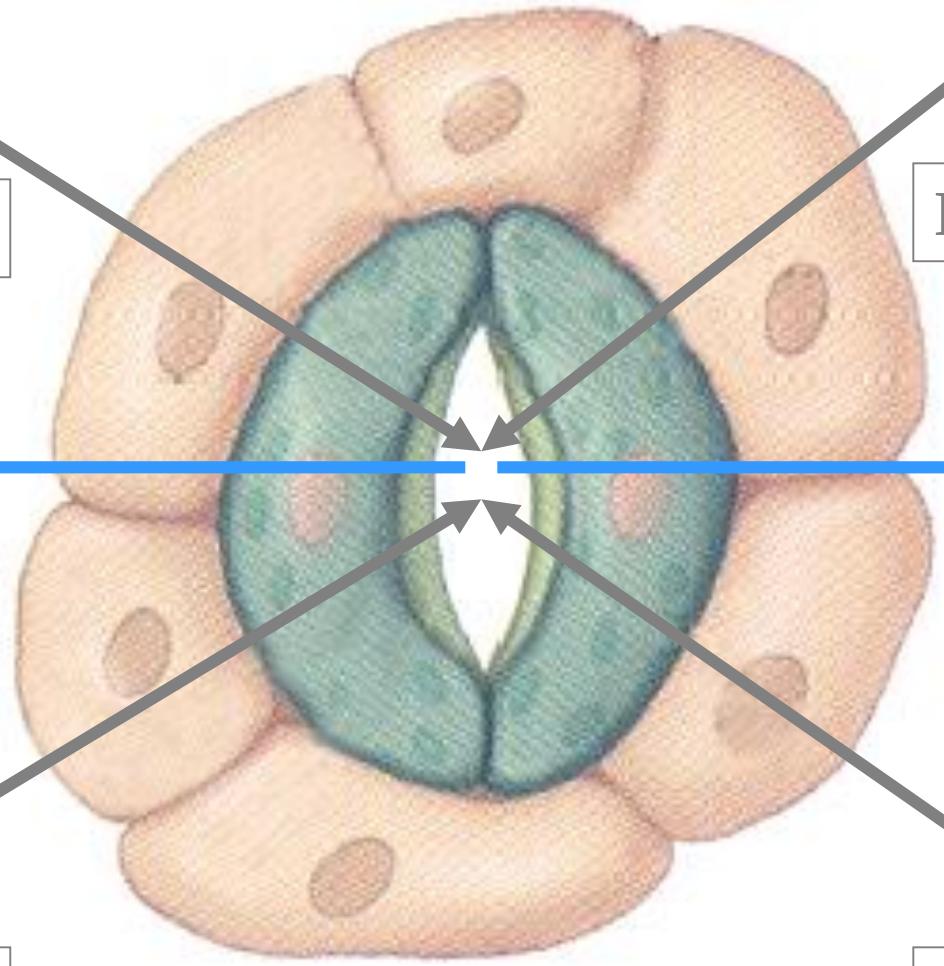
CO2

CO2

LEAF STOMATE

ATMOSPHERE

ATMOSPHERE



CO2

DIFFUSION

CO2

DIFFUSION

H2O

DIFFUSION

H2O

DIFFUSION

CO2

DIFFUSION

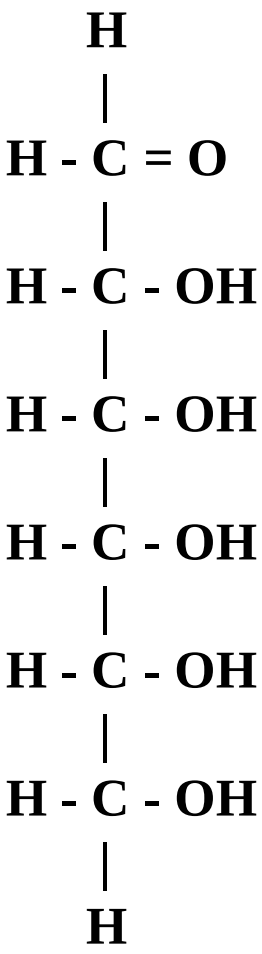
CO2

DIFFUSION

PHOTOSYNTHESIS

CO2
CO2
CO2
CO2
CO2
CO2

SYNTHESIZE



CARBON DIOXIDE

BUILDING BLOCK

C6H12O6

GLUCOSE

PHOTOSYNTHESIS

CO2
1

¿

CO2
CO2
CO2
CO2
CO2
CO2

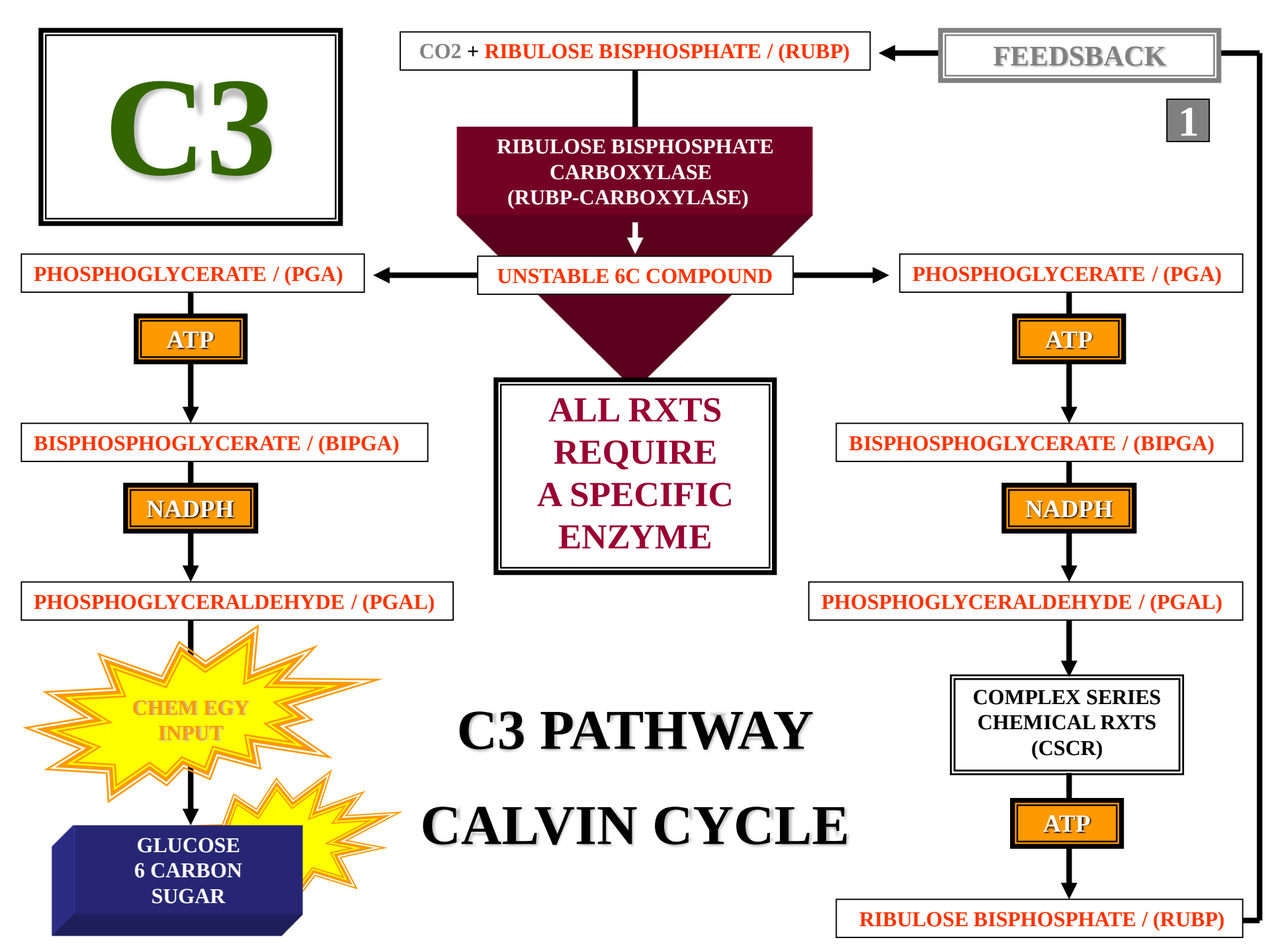
H
H - C = O
H - C - OH
H - C - OH
H - C - OH
H - C - OH
H - C - OH
H

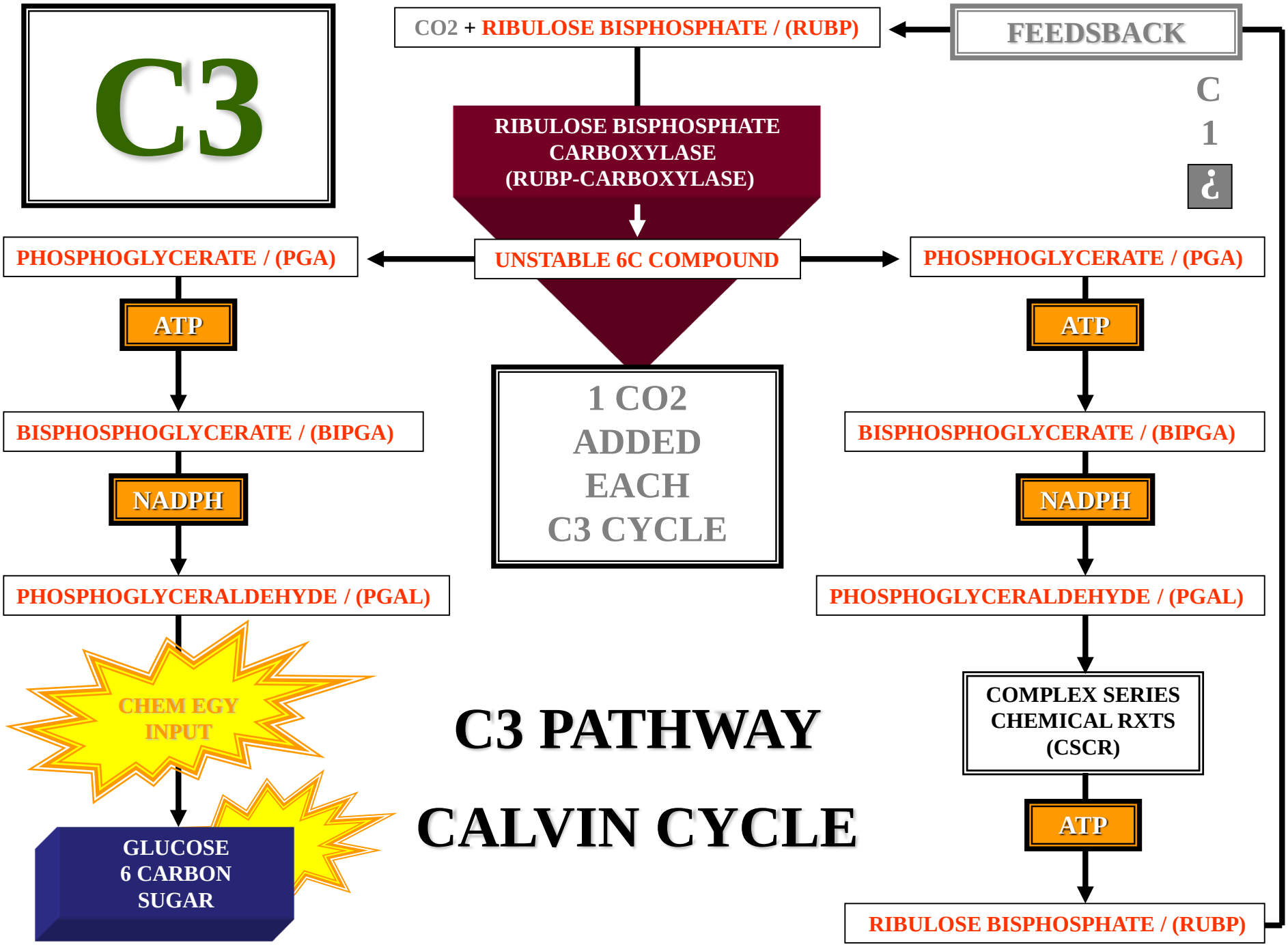
CARBON DIOXIDE

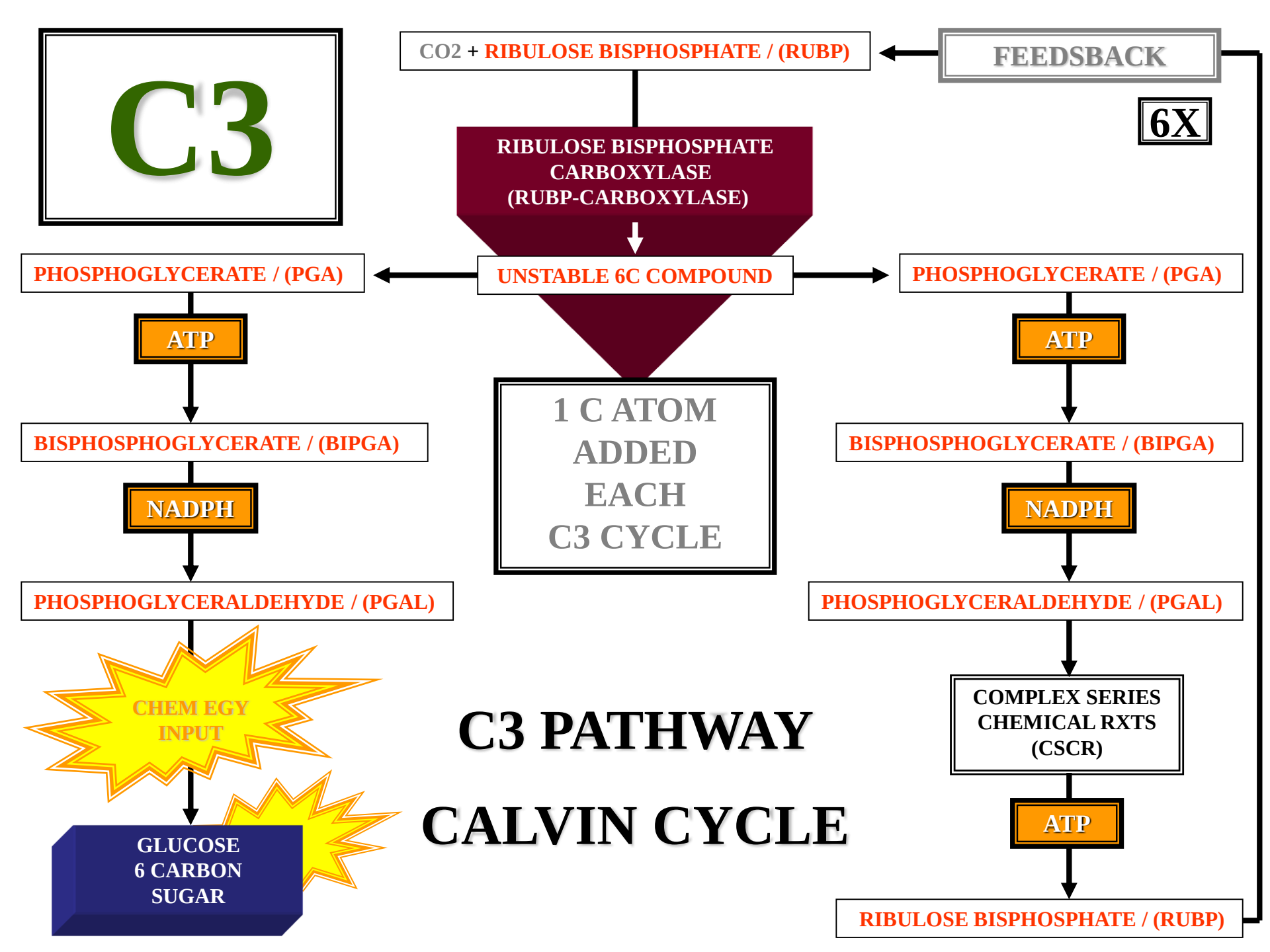
BUILDING BLOCK

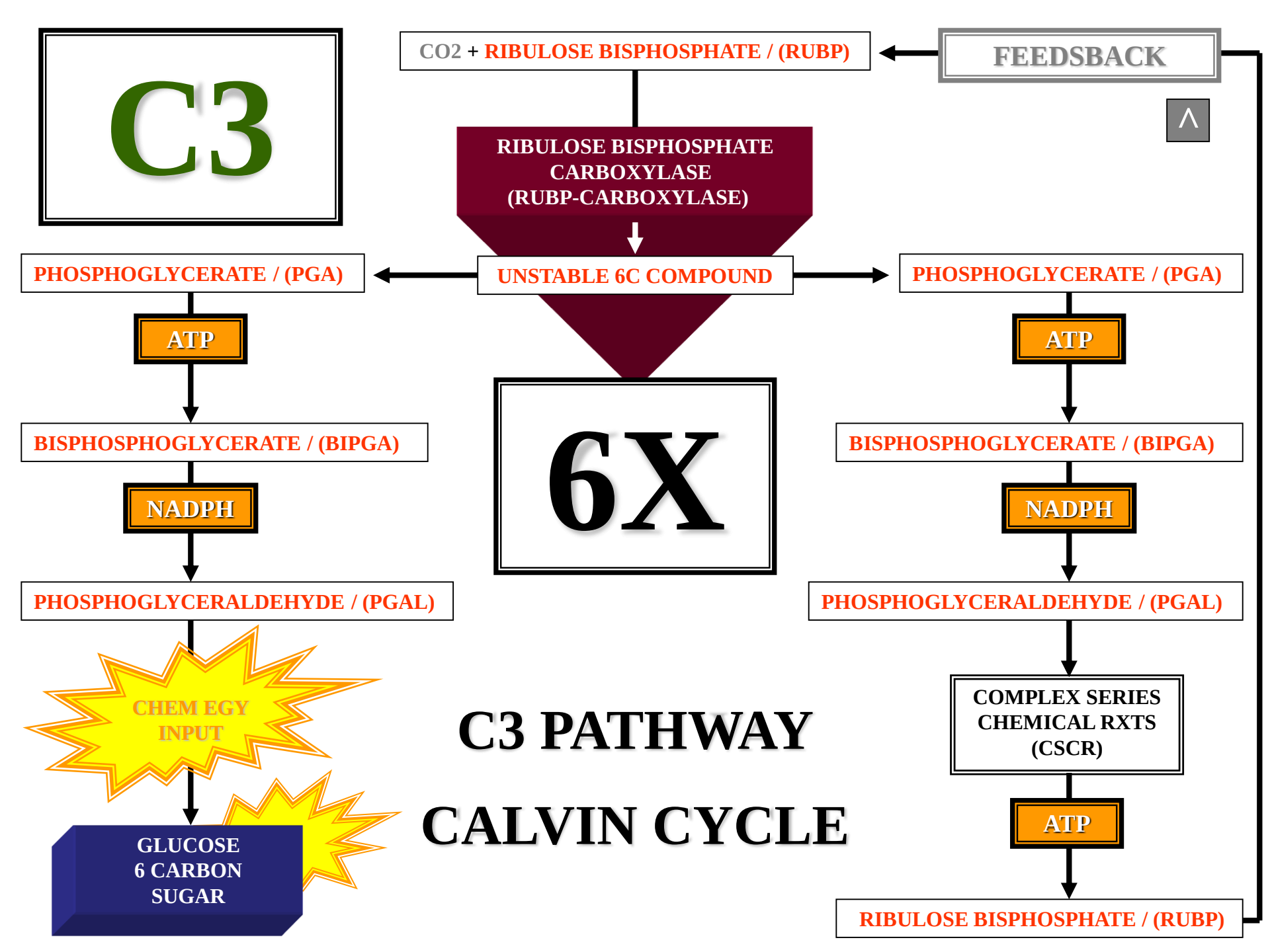
C6H12O6

GLUCOSE


C3
CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
1
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
PHOSPHOGLYCERATE / (PGA)
PHOSPHOGLYCERATE / (PGA)
ATP
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
NADPH
ALL RXTS REQUIRE A SPECIFIC ENZYME
PHOSPHOGLYCERALDEHYDE / (PGAL)
PHOSPHOGLYCERALDEHYDE / (PGAL)
CHEM EGY INPUT
COMPLEX SERIES CHEMICAL RXTS (CSCR)
C3 PATHWAY
CALVIN CYCLE
GLUCOSE 6 CARBON SUGAR
ATP
RIBULOSE BISPHOSPHATE / (RUBP)


C3
CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
C
1
¿
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
PHOSPHOGLYCERATE / (PGA)
PHOSPHOGLYCERATE / (PGA)
ATP
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
NADPH
1 CO2 ADDED EACH C3 CYCLE
PHOSPHOGLYCERALDEHYDE / (PGAL)
PHOSPHOGLYCERALDEHYDE / (PGAL)
CHEM EGY INPUT
COMPLEX SERIES CHEMICAL RXTS (CSCR)
ATP
GLUCOSE 6 CARBON SUGAR
RIBULOSE BISPHOSPHATE / (RUBP)
C3 PATHWAY
CALVIN CYCLE


C3
CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
6X
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
PHOSPHOGLYCERATE / (PGA)
PHOSPHOGLYCERATE / (PGA)
ATP
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
NADPH
1 C ATOM ADDED EACH C3 CYCLE
PHOSPHOGLYCERALDEHYDE / (PGAL)
PHOSPHOGLYCERALDEHYDE / (PGAL)
CHEM EGY INPUT
COMPLEX SERIES CHEMICAL RXTS (CSCR)
ATP
GLUCOSE 6 CARBON SUGAR
RIBULOSE BISPHOSPHATE / (RUBP)
C3 PATHWAY
CALVIN CYCLE


C3
CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
6X
PHOSPHOGLYCERATE / (PGA)
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
PHOSPHOGLYCERALDEHYDE / (PGAL)
CHEM EGY INPUT
GLUCOSE 6 CARBON SUGAR
PHOSPHOGLYCERATE / (PGA)
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
PHOSPHOGLYCERALDEHYDE / (PGAL)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
ATP
RIBULOSE BISPHOSPHATE / (RUBP)
C3 PATHWAY
CALVIN CYCLE

ENERGY EXPENSE

PHOTOSYNTHESIS

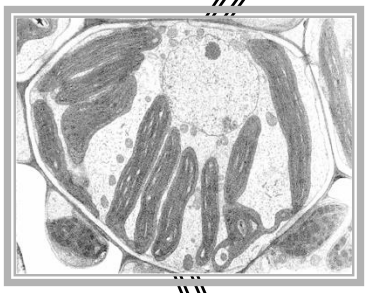
A

WATER

LIGHT EGY

E-

PHOTOLYSIS



LT RXT

THYLAKOID
GRANUM

?

DK RXT

STROMA

CHLOROPLAST

ATMOSPHERE

OXYGEN

PHOTOSYNTHESIS

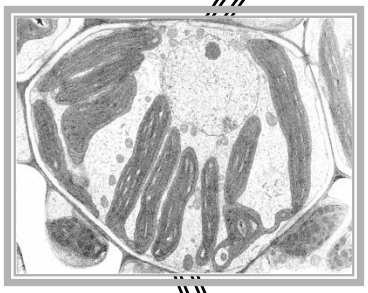
N

WATER

LIGHT EGY

E-

PHOTOLYSIS



LT RXT

THYLAKOID GRANUM

ATP

DK RXT

STROMA

NON-CYCLIC P-P

CYCLIC P-P

CHLOROPLAST

ATMOSPHERE

OXYGEN

PHOTOSYNTHESIS

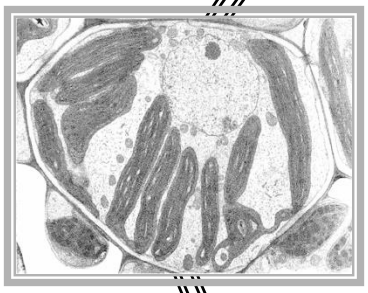
A

WATER

LIGHT EGY

E-

PHOTOLYSIS



LT RXT

THYLAKOID GRANUM

ATP NADPH

DK RXT

STROMA

NON-CYCLIC P-P

CYCLIC P-P

CHLOROPLAST

ATMOSPHERE

OXYGEN

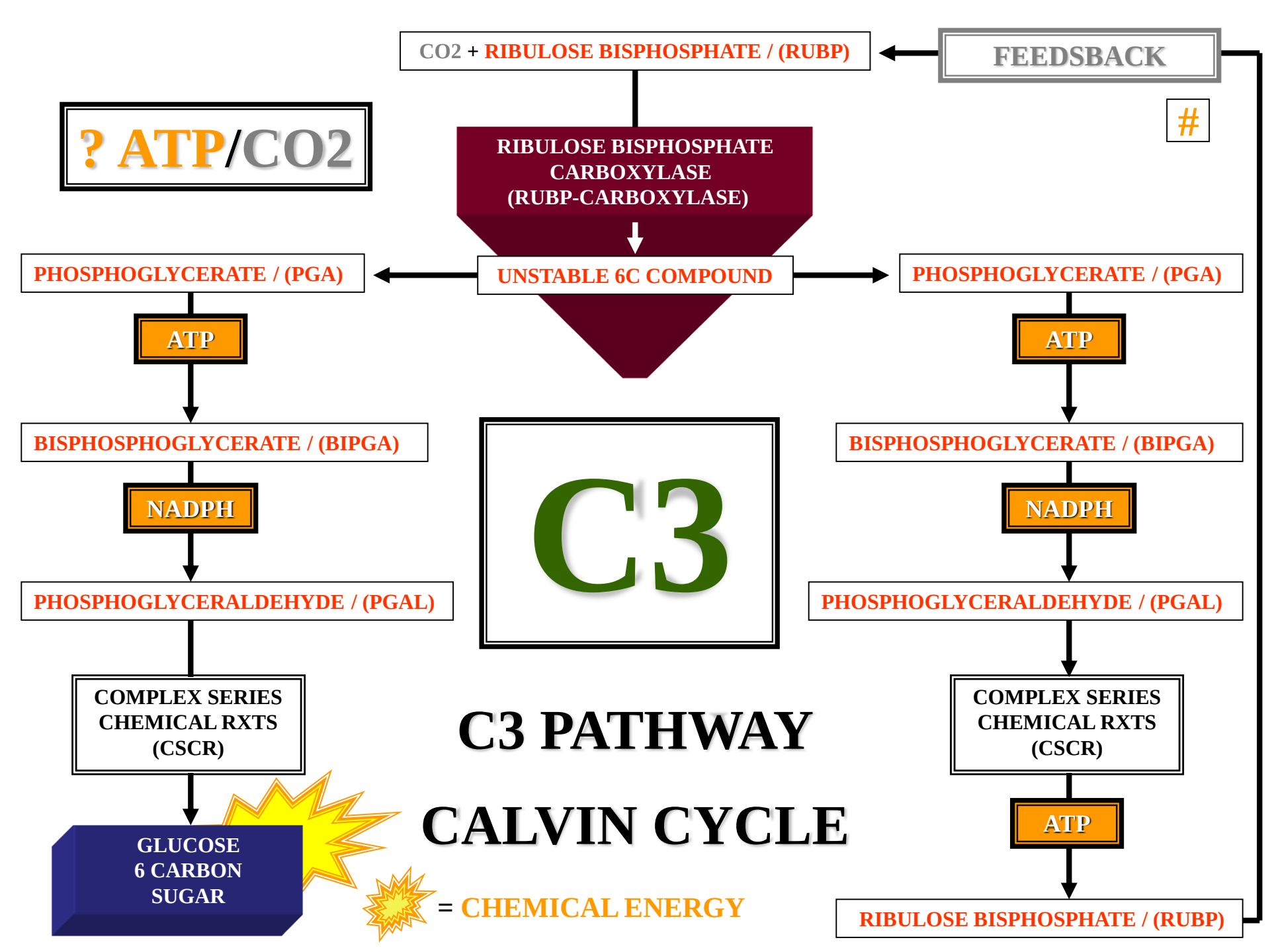
?

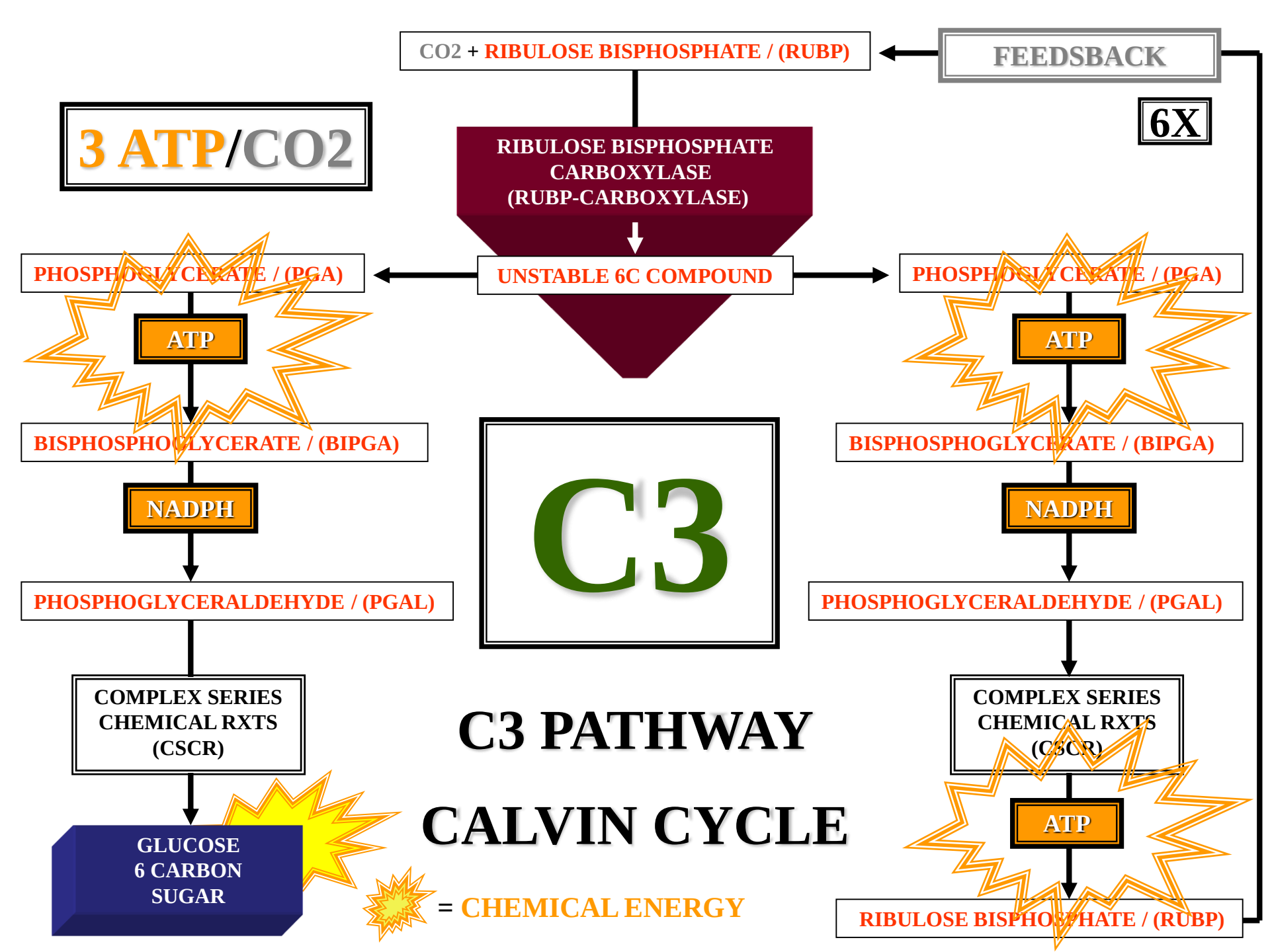
ATP

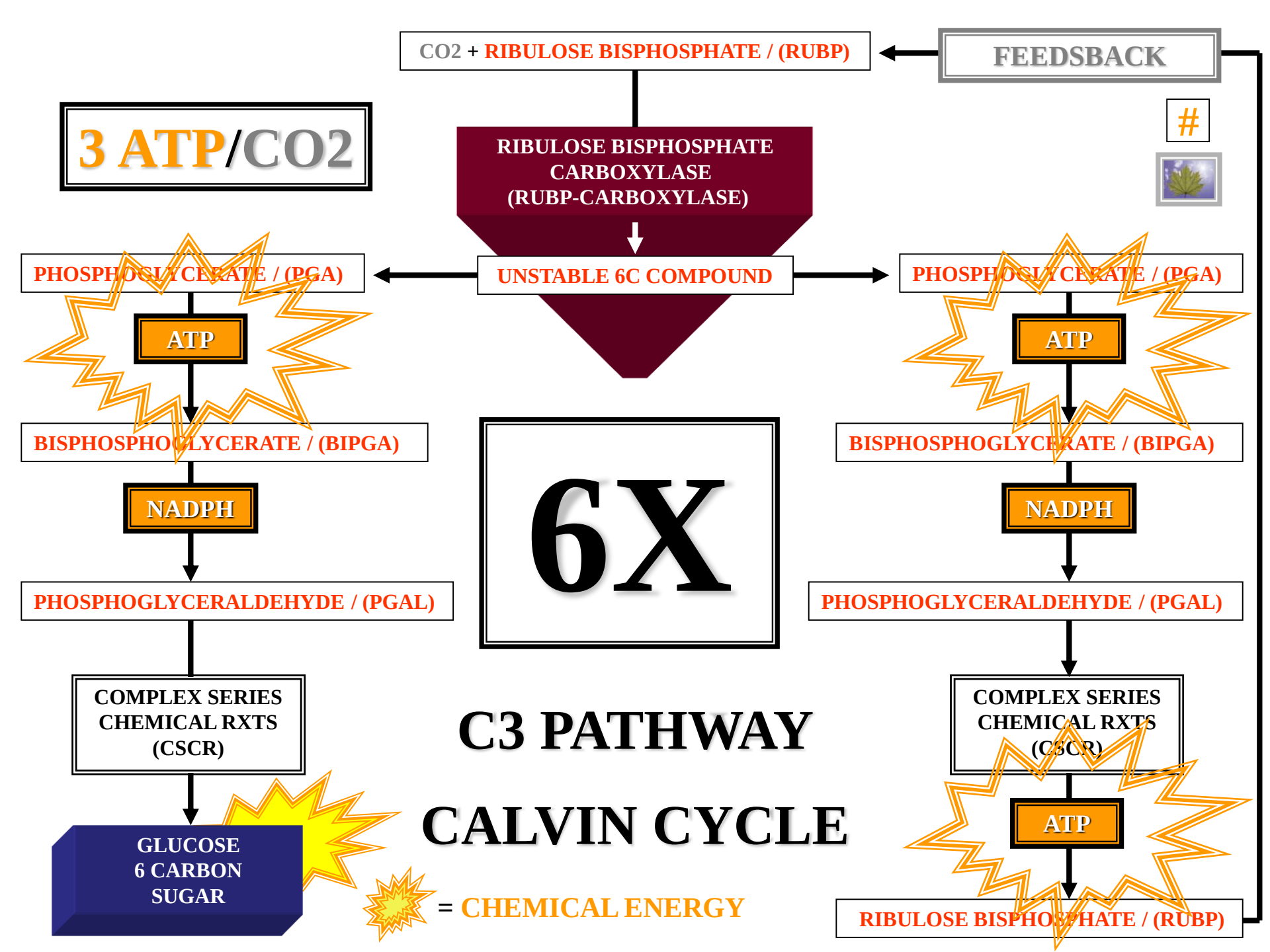
ENERGY EXPENSE

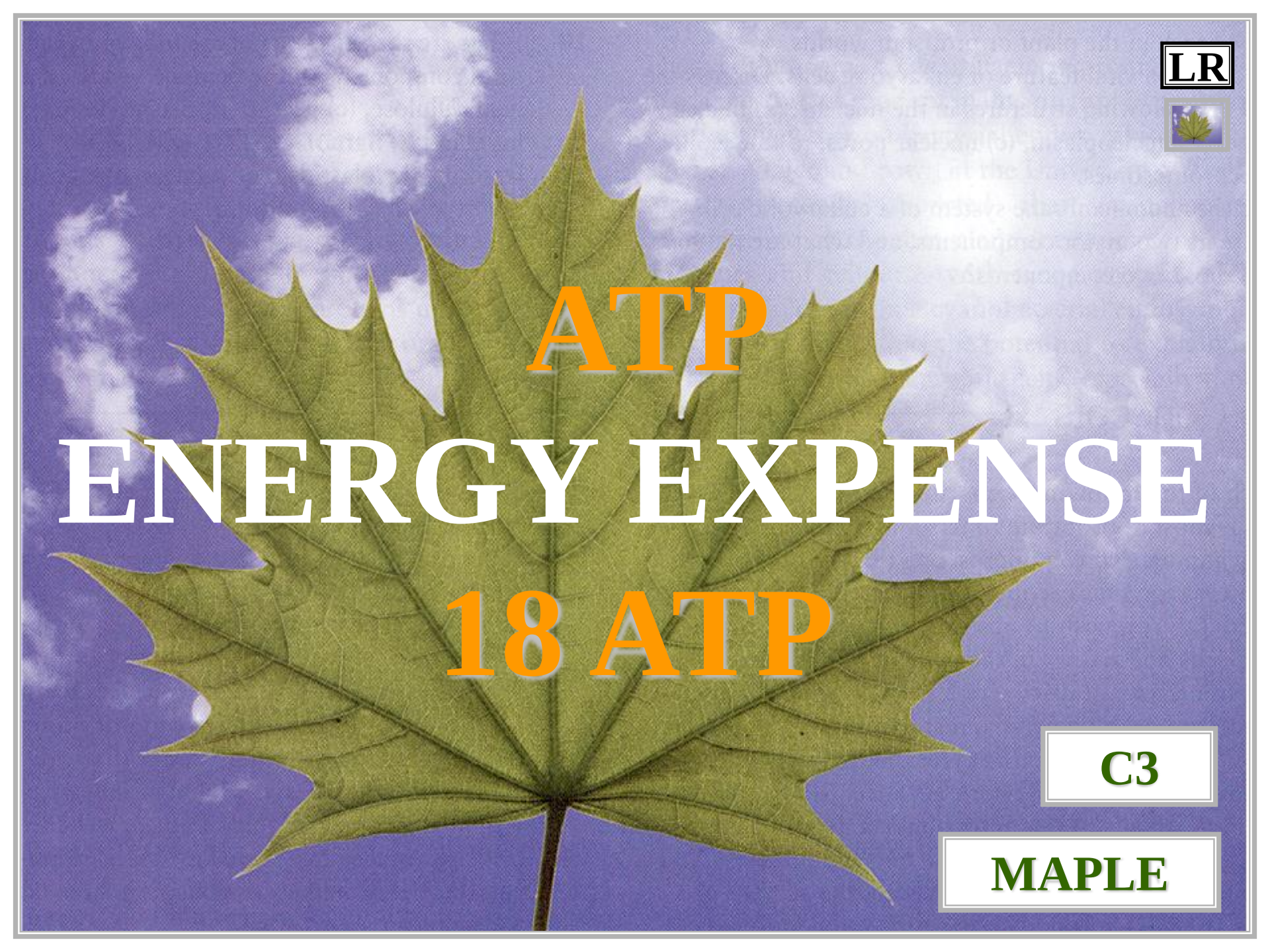
C3

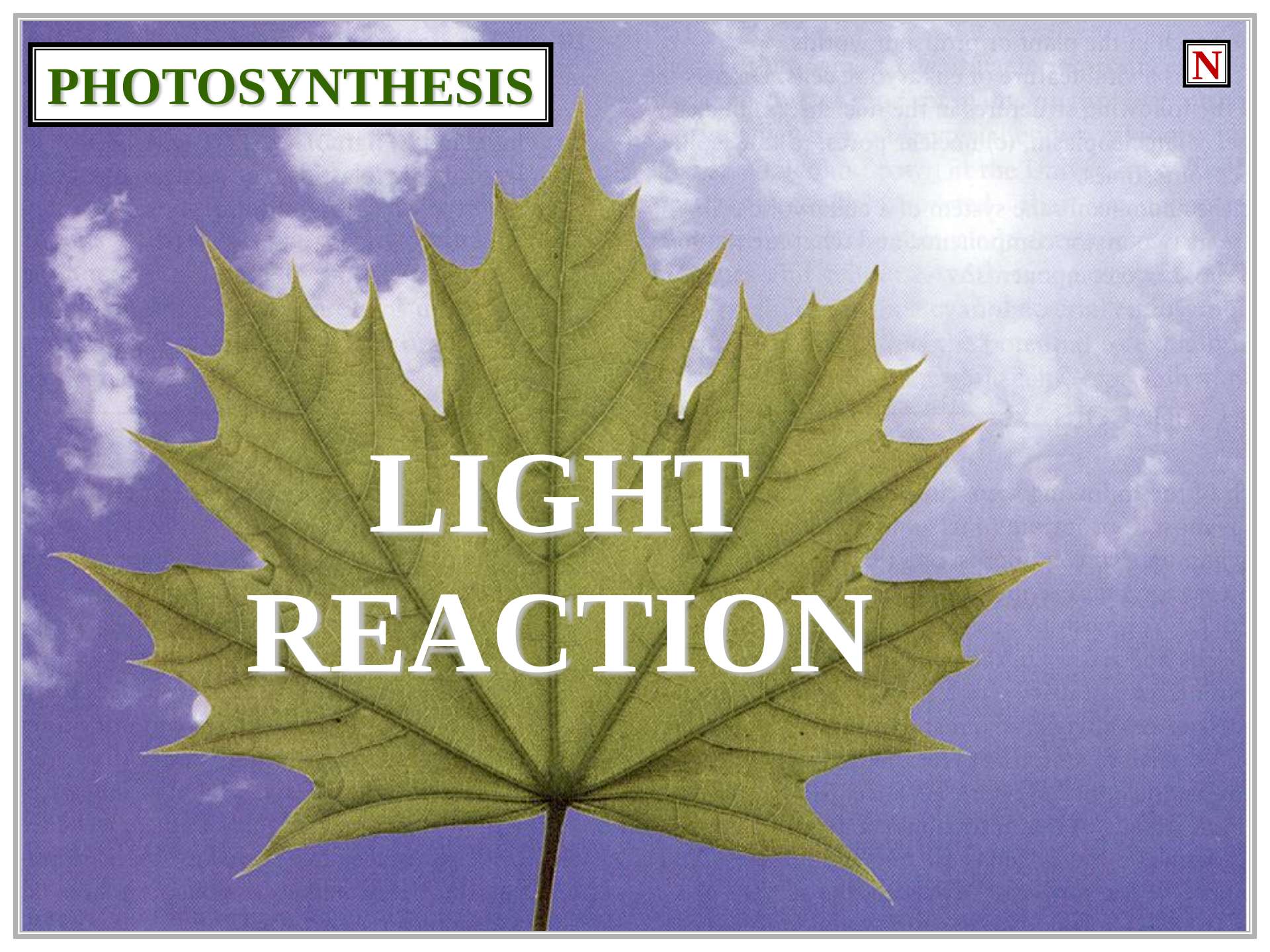
MAPLE

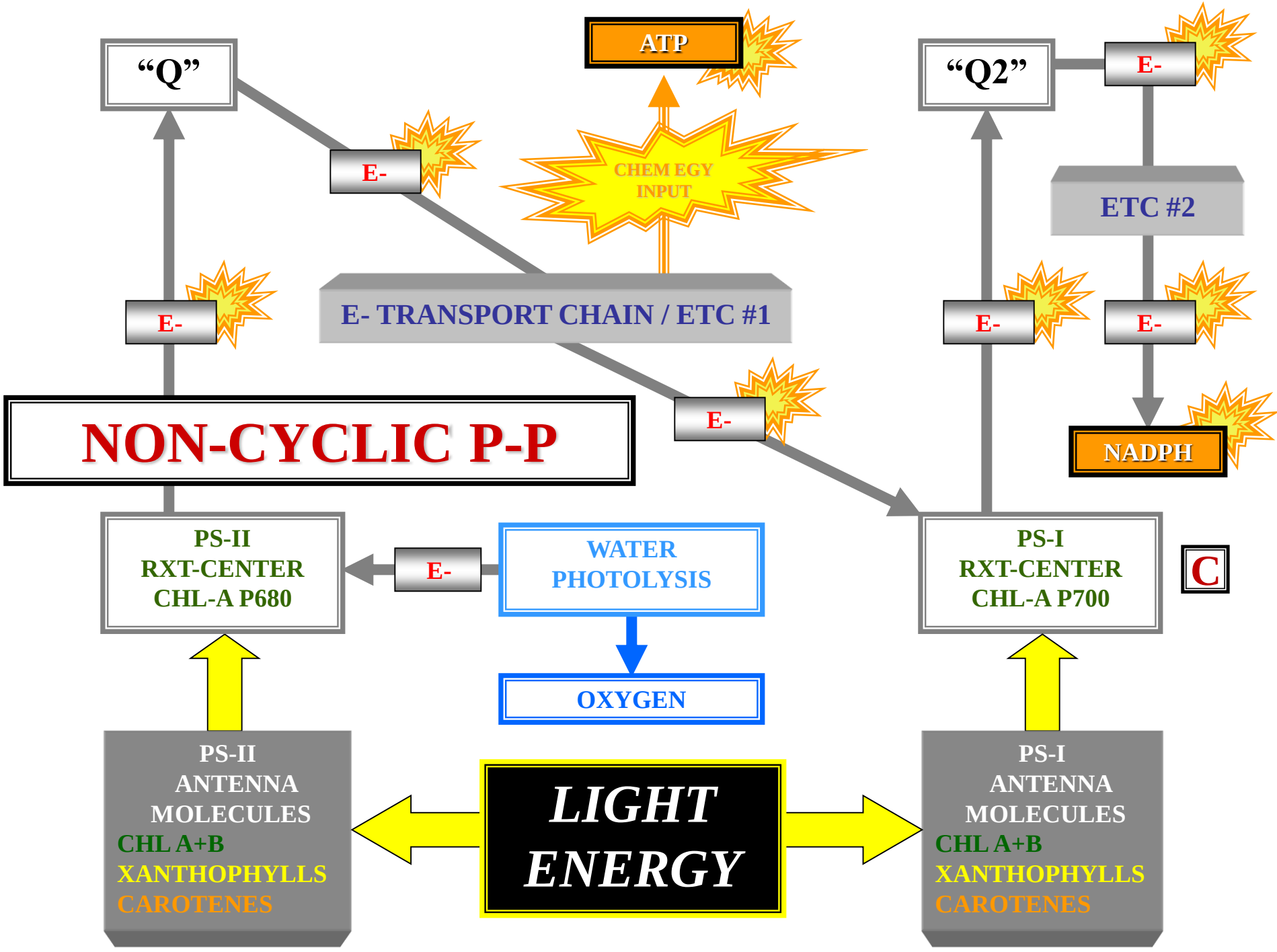

CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
#
? ATP/CO2
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
PHOSPHOGLYCERATE / (PGA)
PHOSPHOGLYCERATE / (PGA)
ATP
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
NADPH
C3
PHOSPHOGLYCERALDEHYDE / (PGAL)
PHOSPHOGLYCERALDEHYDE / (PGAL)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
C3 PATHWAY
CALVIN CYCLE
ATP
GLUCOSE 6 CARBON SUGAR
= CHEMICAL ENERGY
RIBULOSE BISPHOSPHATE / (RUBP)

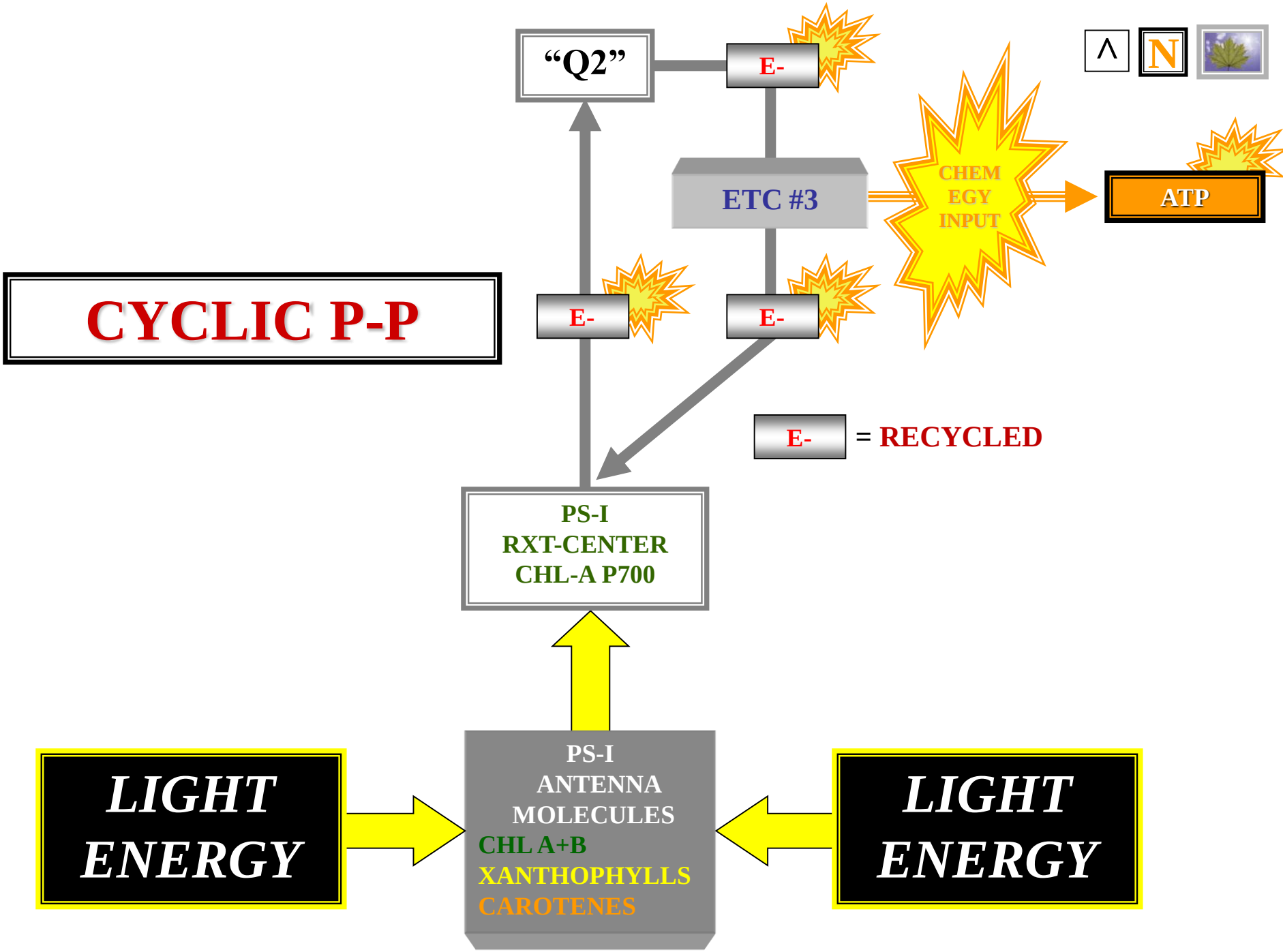

CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
6X
3 ATP/CO2
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
PHOSPHOGLYCERATE / (PGA)
PHOSPHOGLYCERATE / (PGA)
ATP
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
NADPH
C3
PHOSPHOGLYCERALDEHYDE / (PGAL)
PHOSPHOGLYCERALDEHYDE / (PGAL)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
C3 PATHWAY
CALVIN CYCLE
ATP
GLUCOSE 6 CARBON SUGAR
= CHEMICAL ENERGY
RIBULOSE BISPHOSPHATE / (RUBP)


CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
3 ATP/CO2
#
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
PHOSPHOGLYCERATE / (PGA)
PHOSPHOGLYCERATE / (PGA)
ATP
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
NADPH
6X
PHOSPHOGLYCERALDEHYDE / (PGAL)
PHOSPHOGLYCERALDEHYDE / (PGAL)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
C3 PATHWAY
CALVIN CYCLE
ATP
GLUCOSE 6 CARBON SUGAR
= CHEMICAL ENERGY
RIBULOSE BISPHOSPHATE / (RUBP)


LR
ATP
ENERGY EXPENSE
18 ATP
C3
MAPLE


PHOTOSYNTHESIS
N
LIGHT
REACTION


"Q"
ATP
"Q2"
E-
CHEM EGY INPUT
ETC #2
E- TRANSPORT CHAIN / ETC #1
NON-CYCLIC P-P
NADPH
PS-II RXT-CENTER CHL-A P680
WATER PHOTOLYSIS
PS-I RXT-CENTER CHL-A P700
C
OXYGEN
PS-II ANTENNA MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES
LIGHT ENERGY
PS-I ANTENNA MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES


"Q2"
E-
ETC #3
CHEM EGY INPUT
ATP
CYCLIC P-P
E-
E-
E- = RECYCLED
PS-I
RXT-CENTER
CHL-A P700
LIGHT ENERGY
PS-I
ANTENNA
MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES
LIGHT ENERGY

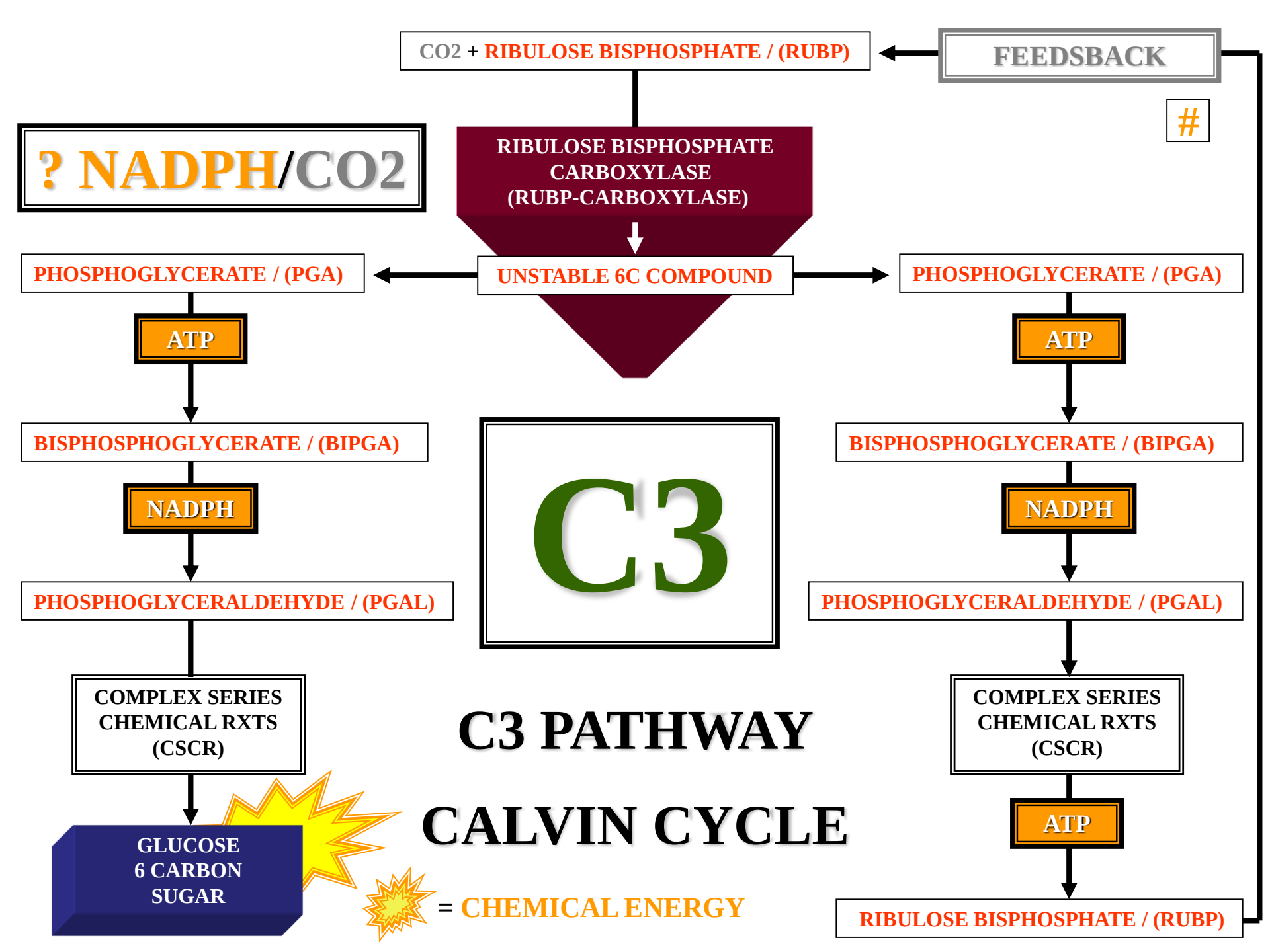
?

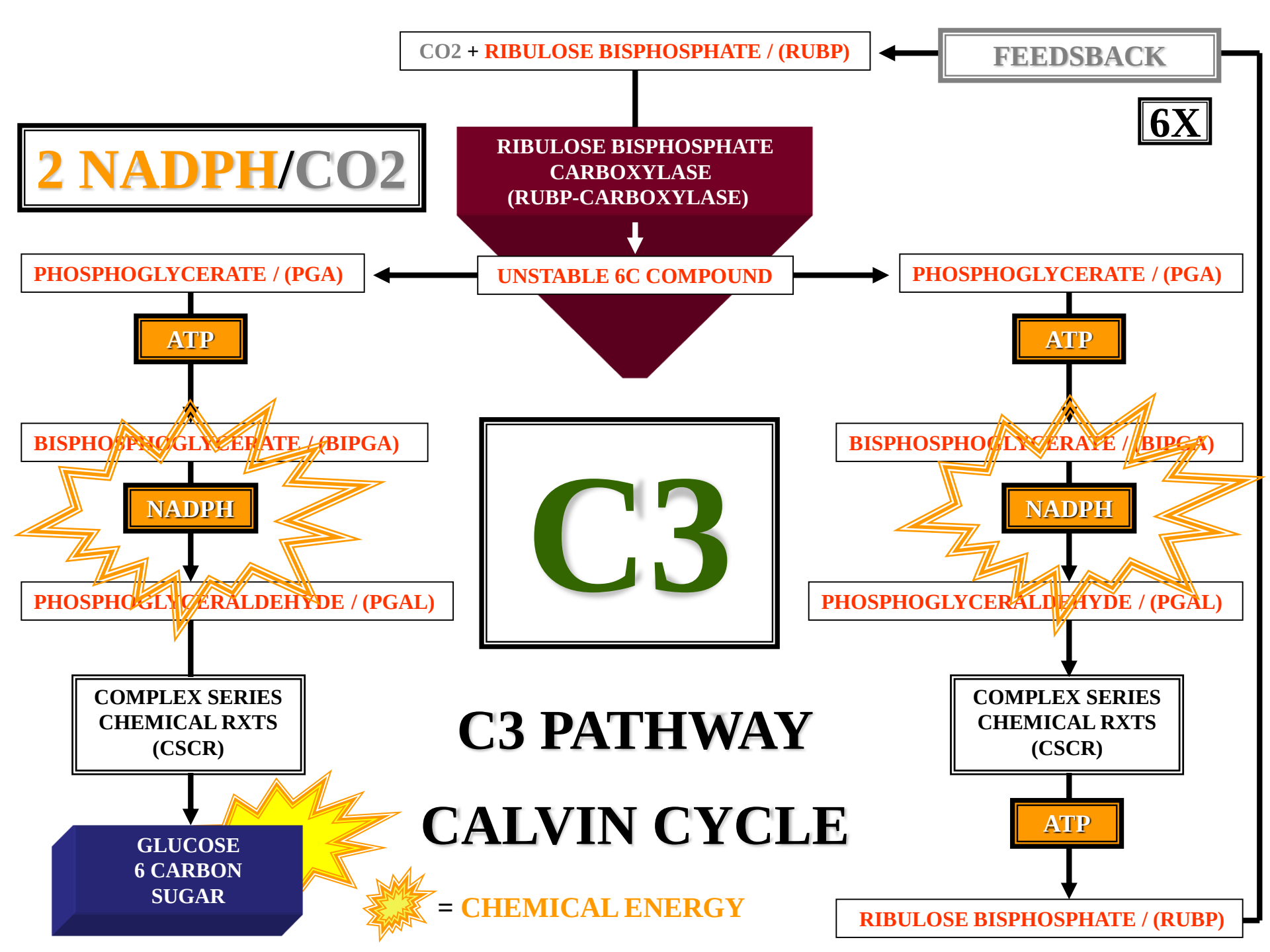
NADPH

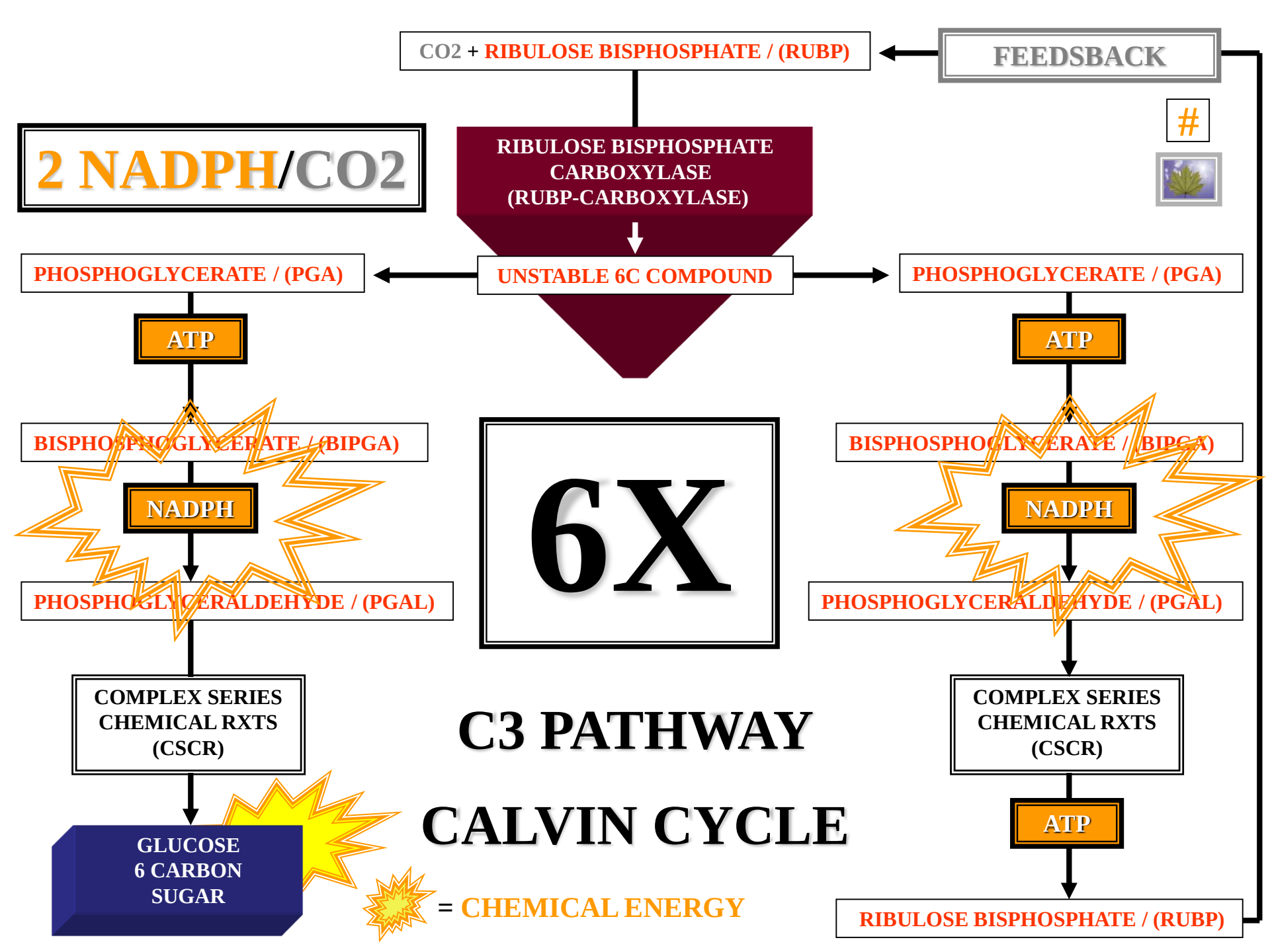
ENERGY EXPENSE

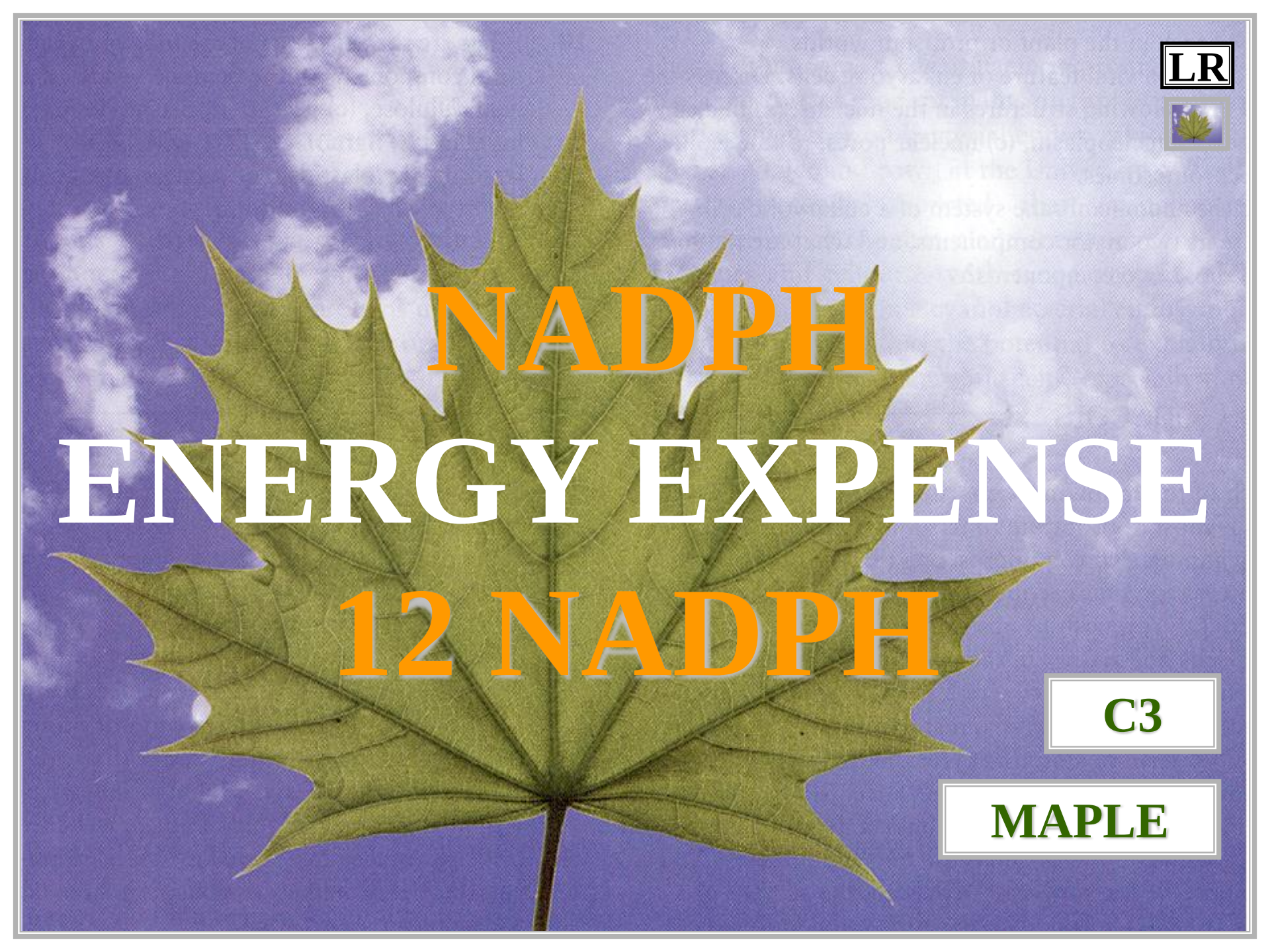
C3

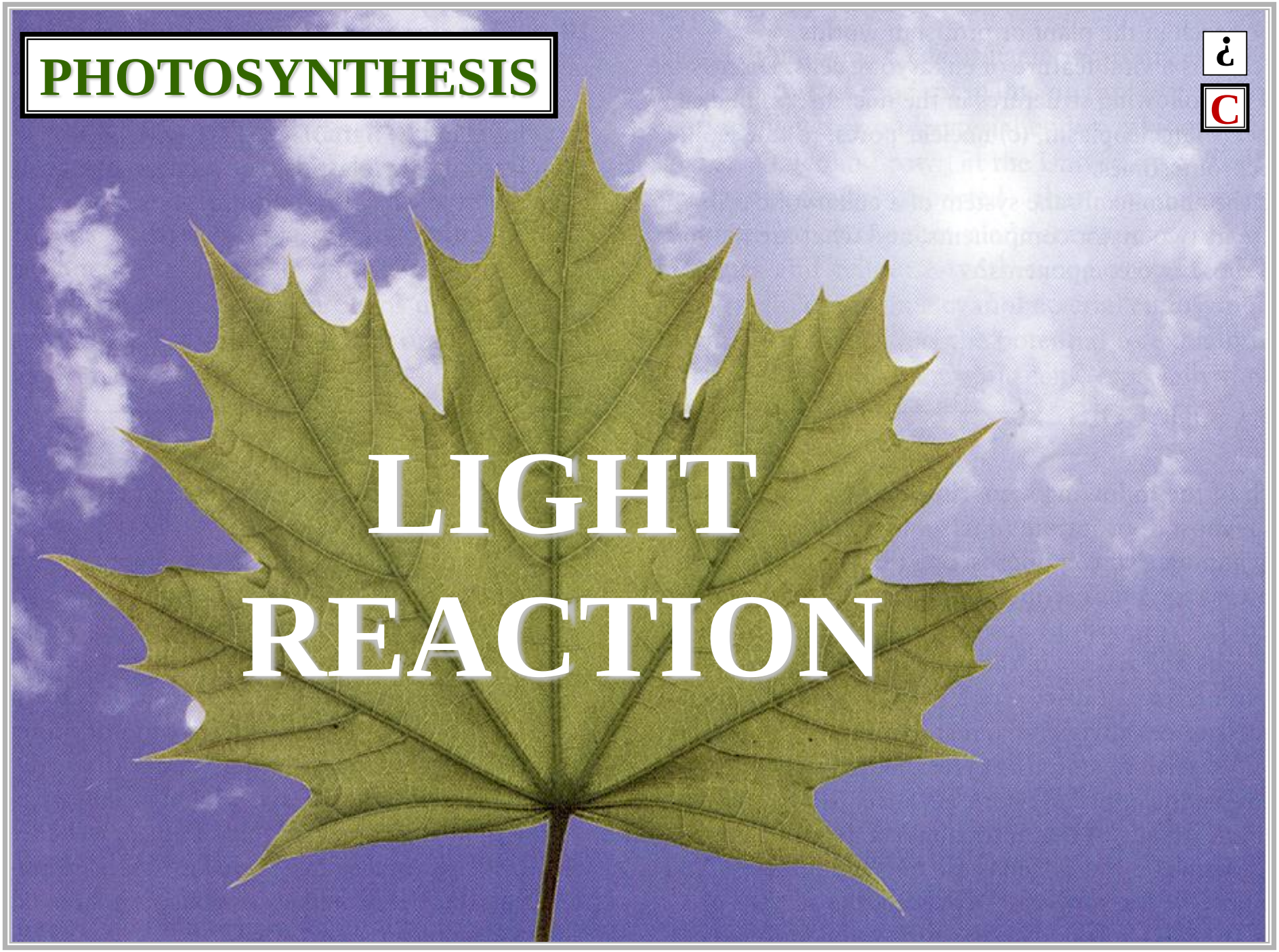
MAPLE

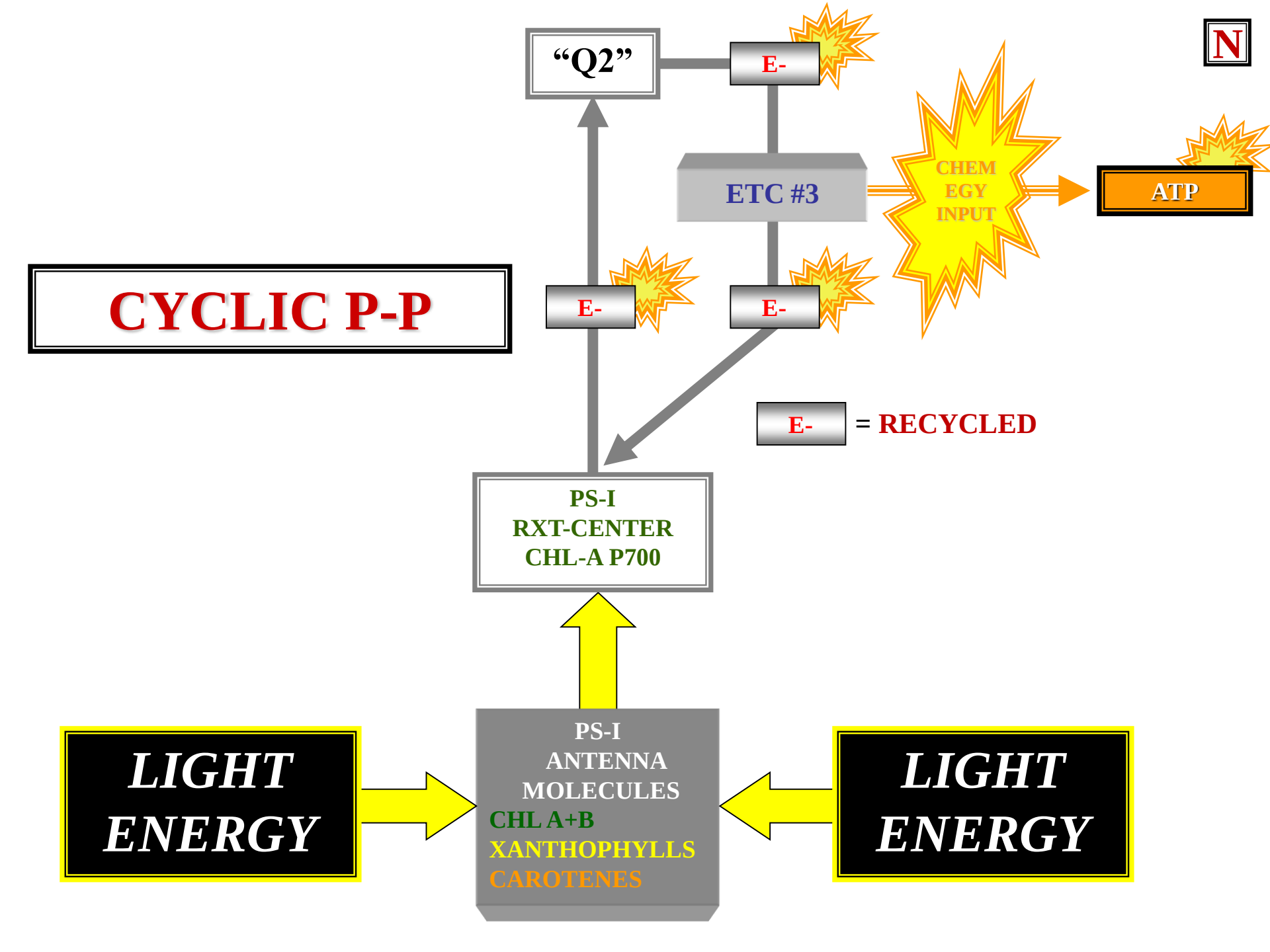

CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
#
? NADPH/CO2
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
PHOSPHOGLYCERATE / (PGA)
PHOSPHOGLYCERATE / (PGA)
ATP
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
NADPH
C3
PHOSPHOGLYCERALDEHYDE / (PGAL)
PHOSPHOGLYCERALDEHYDE / (PGAL)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
C3 PATHWAY
CALVIN CYCLE
ATP
GLUCOSE 6 CARBON SUGAR
= CHEMICAL ENERGY
RIBULOSE BISPHOSPHATE / (RUBP)

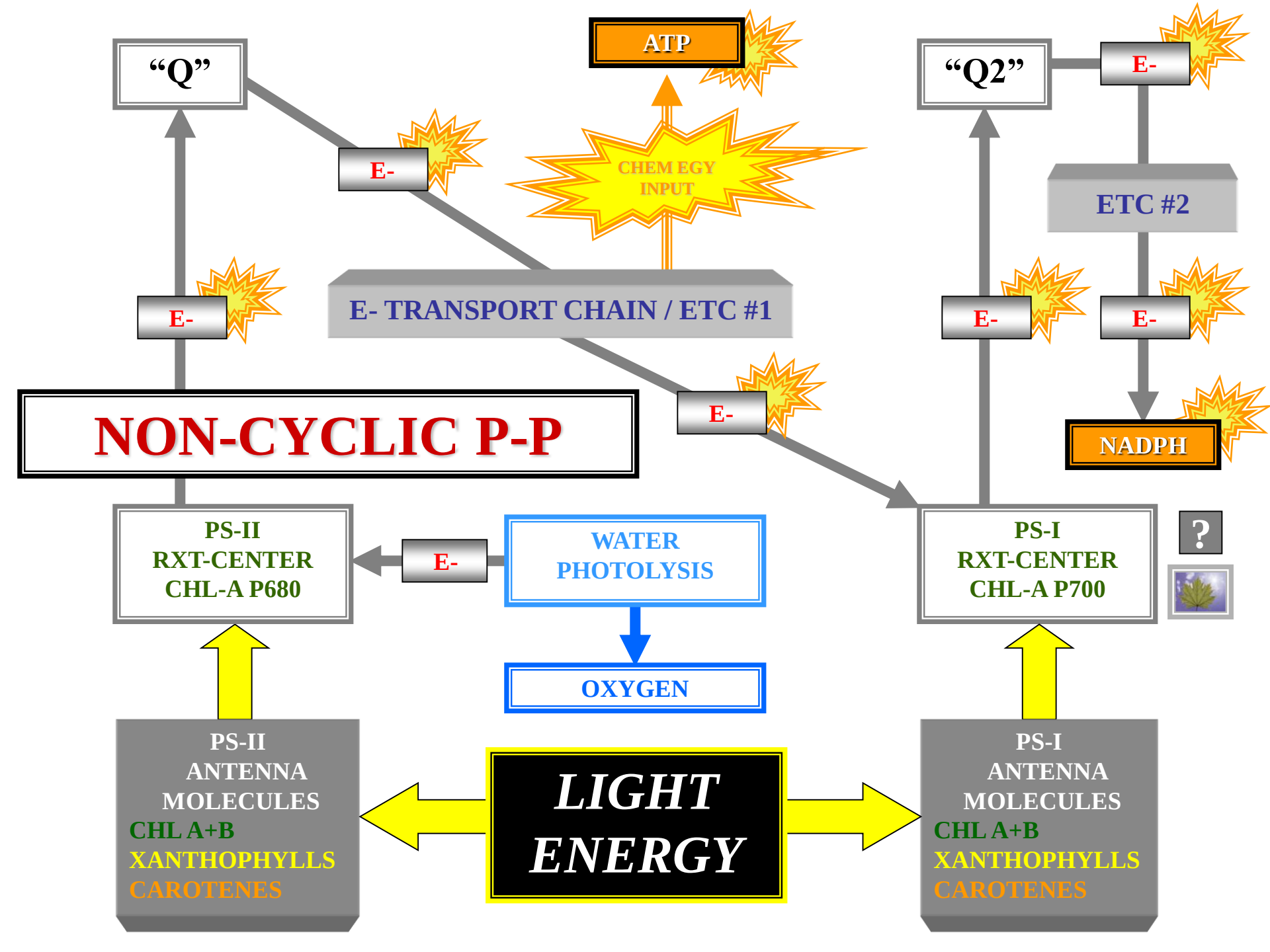

CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
6X
2 NADPH/CO2
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
PHOSPHOGLYCERATE / (PGA)
PHOSPHOGLYCERATE / (PGA)
ATP
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
NADPH
C3
PHOSPHOGLYCERALDEHYDE / (PGAL)
PHOSPHOGLYCERALDEHYDE / (PGAL)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
C3 PATHWAY
CALVIN CYCLE
ATP
GLUCOSE 6 CARBON SUGAR
= CHEMICAL ENERGY
RIBULOSE BISPHOSPHATE / (RUBP)


CO2 + RIBULOSE BISPHOSPHATE / (RUBP)
FEEDSBACK
#
2 NADPH/CO2
RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)
UNSTABLE 6C COMPOUND
PHOSPHOGLYCERATE / (PGA)
PHOSPHOGLYCERATE / (PGA)
ATP
ATP
BISPHOSPHOGLYCERATE / (BIPGA)
BISPHOSPHOGLYCERATE / (BIPGA)
NADPH
NADPH
6X
PHOSPHOGLYCERALDEHYDE / (PGAL)
PHOSPHOGLYCERALDEHYDE / (PGAL)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
COMPLEX SERIES CHEMICAL RXTS (CSCR)
C3 PATHWAY
CALVIN CYCLE
ATP
GLUCOSE 6 CARBON SUGAR
= CHEMICAL ENERGY
RIBULOSE BISPHOSPHATE / (RUBP)


LR
NADPH
ENERGY EXPENSE
12 NADPH
C3
MAPLE


PHOTOSYNTHESIS
¿
C
LIGHT
REACTION


N
"Q2"
E-
ETC #3
CHEM
EGY
INPUT
ATP
CYCLIC P-P
E-
E-
E- = RECYCLED
PS-I
RXT-CENTER
CHL-A P700
PS-I
ANTENNA
MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES
LIGHT
ENERGY
LIGHT
ENERGY


"Q"
ATP
"Q2"
E-
CHEM EGY INPUT
ETC #2
E- TRANSPORT CHAIN / ETC #1
NON-CYCLIC P-P
NADPH
PS-II RXT-CENTER CHL-A P680
WATER PHOTOLYSIS
PS-I RXT-CENTER CHL-A P700
?
OXYGEN
PS-II ANTENNA MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES
LIGHT ENERGY
PS-I ANTENNA MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES

A

>

DARK REACTION REQUIRES MORE OR LESS ATP THAN NADPH?

G

DARK REACTION REQUIRES MORE ATP THAN NADPH

CO2 + RIBULOSE BISPHOSPHATE / (RUBP)

FEEDSBACK

?

P

RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)

UNSTABLE 6C COMPOUND

PHOSPHOGLYCERATE / (PGA)

PHOSPHOGLYCERATE / (PGA)

ATP

ATP

BISPHOSPHOGLYCERATE / (BIPGA)

BISPHOSPHOGLYCERATE / (BIPGA)

NADPH

NADPH

PHOSPHOGLYCERALDEHYDE / (PGAL)

PHOSPHOGLYCERALDEHYDE / (PGAL)

C3

COMPLEX SERIES CHEMICAL RXTS (CSCR)

COMPLEX SERIES CHEMICAL RXTS (CSCR)

C3 PATHWAY

CALVIN CYCLE

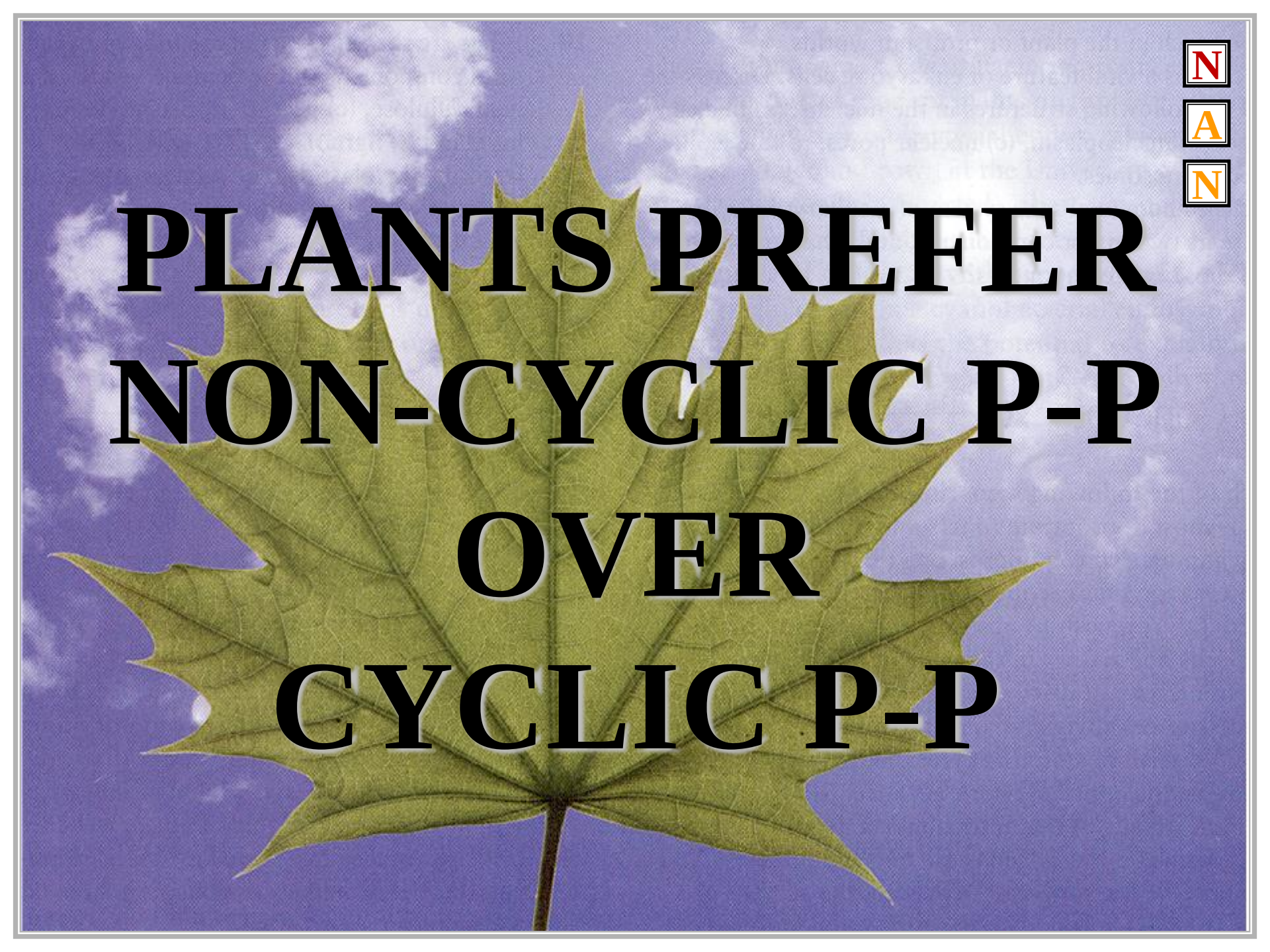
ATP

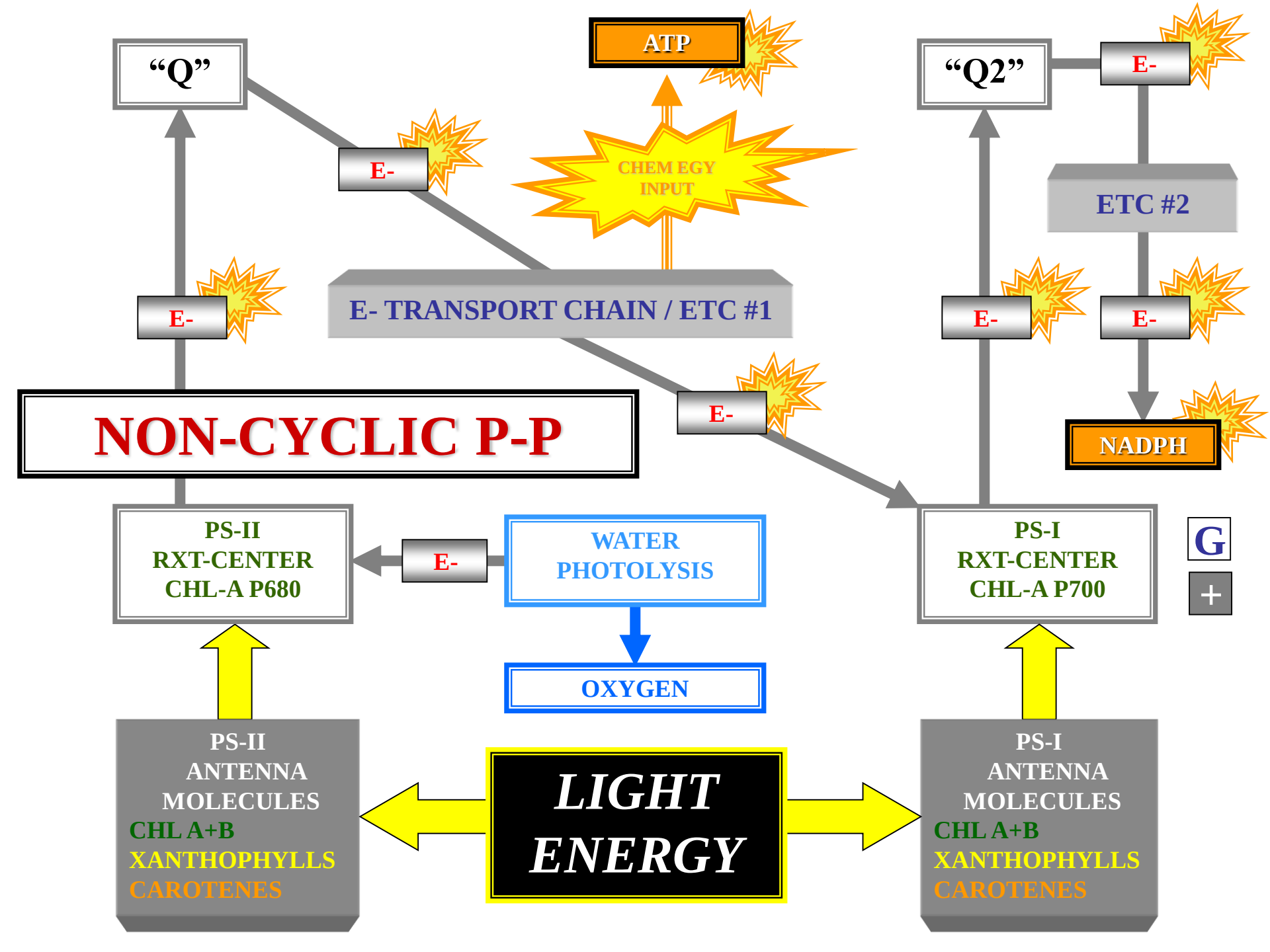
GLUCOSE

= CHEMICAL ENERGY

RIBULOSE BISPHOSPHATE / (RUBP)

WHAT DO PLANTS PREFER NON-CYCLIC P-P OR CYCLIC P-P?


N
A
N
PLANTS PREFER
NON-CYCLIC P-P
OVER
CYCLIC P-P


"Q"
ATP
"Q2"
E-
CHEM EGY INPUT
ETC #2
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NON-CYCLIC P-P
NADPH
PS-II
RXT-CENTER
CHL-A P680
WATER
PHOTOLYSIS
PS-I
RXT-CENTER
CHL-A P700
G
+
OXYGEN
PS-II
ANTENNA
MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES
LIGHT
ENERGY
PS-I
ANTENNA
MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES

CO_2 + RIBULOSE BISPHOSPHATE / (RUBP)

FEEDSBACK

RIBULOSE BISPHOSPHATE CARBOXYLASE (RUBP-CARBOXYLASE)

UNSTABLE 6C COMPOUND

PHOSPHOGLYCERATE / (PGA)

ATP

BISPHOSPHOGLYCERATE / (BIPGA)

NADPH

PHOSPHOGLYCERALDEHYDE / (PGAL)

COMPLEX SERIES CHEMICAL RXTS (CSCR)

GLUCOSE

PHOSPHOGLYCERATE / (PGA)

ATP

BISPHOSPHOGLYCERATE / (BIPGA)

NADPH

PHOSPHOGLYCERALDEHYDE / (PGAL)

COMPLEX SERIES CHEMICAL RXTS (CSCR)

ATP

RIBULOSE BISPHOSPHATE / (RUBP)

2

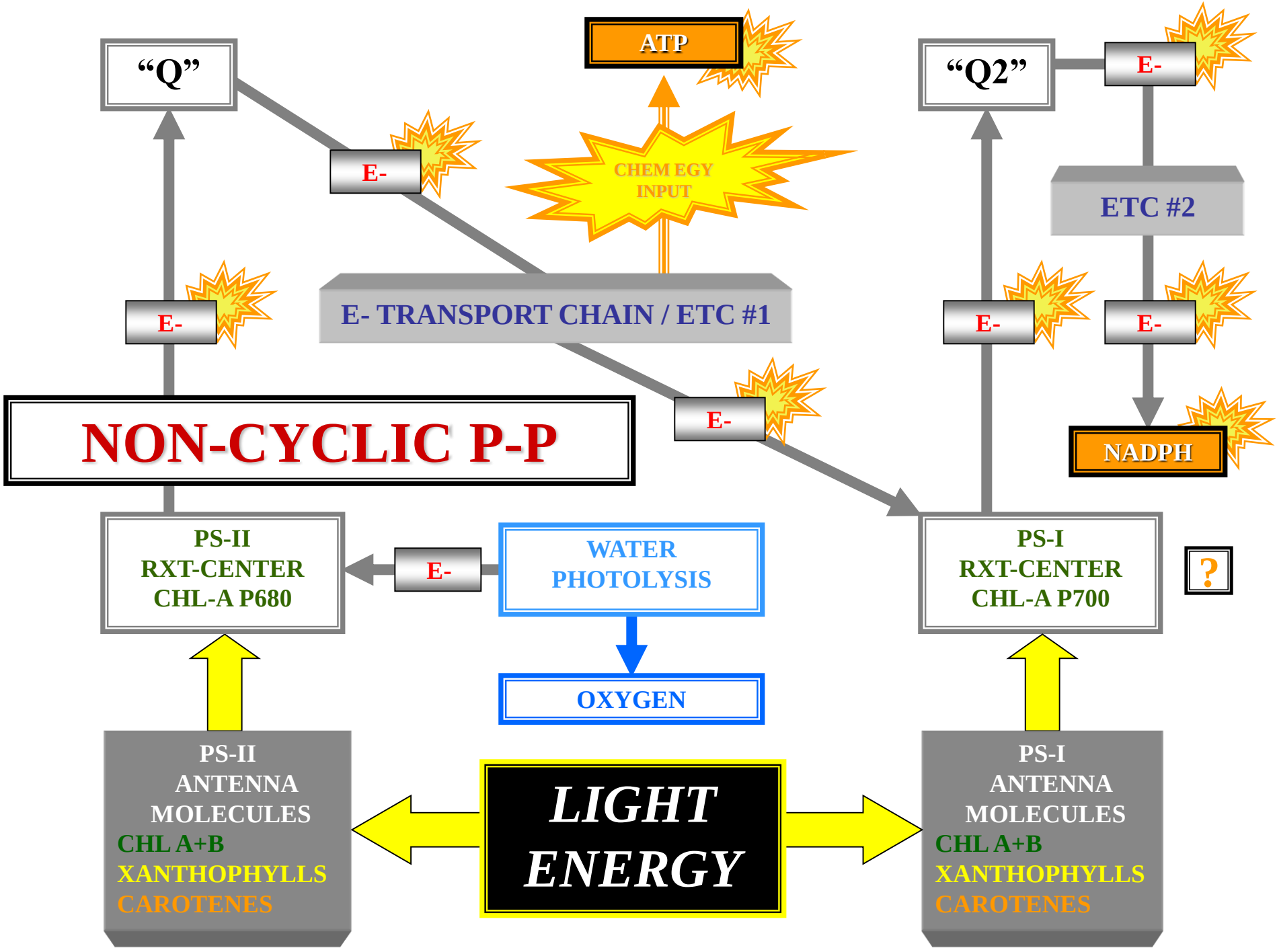
C3

C3 PATHWAY

CALVIN CYCLE

= CHEMICAL ENERGY

DARK REACTION REQUIRES MORE ATP THAN NADPH


"Q"
ATP
"Q2"
E-
CHEM EGY INPUT
ETC #2
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NON-CYCLIC P-P
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?
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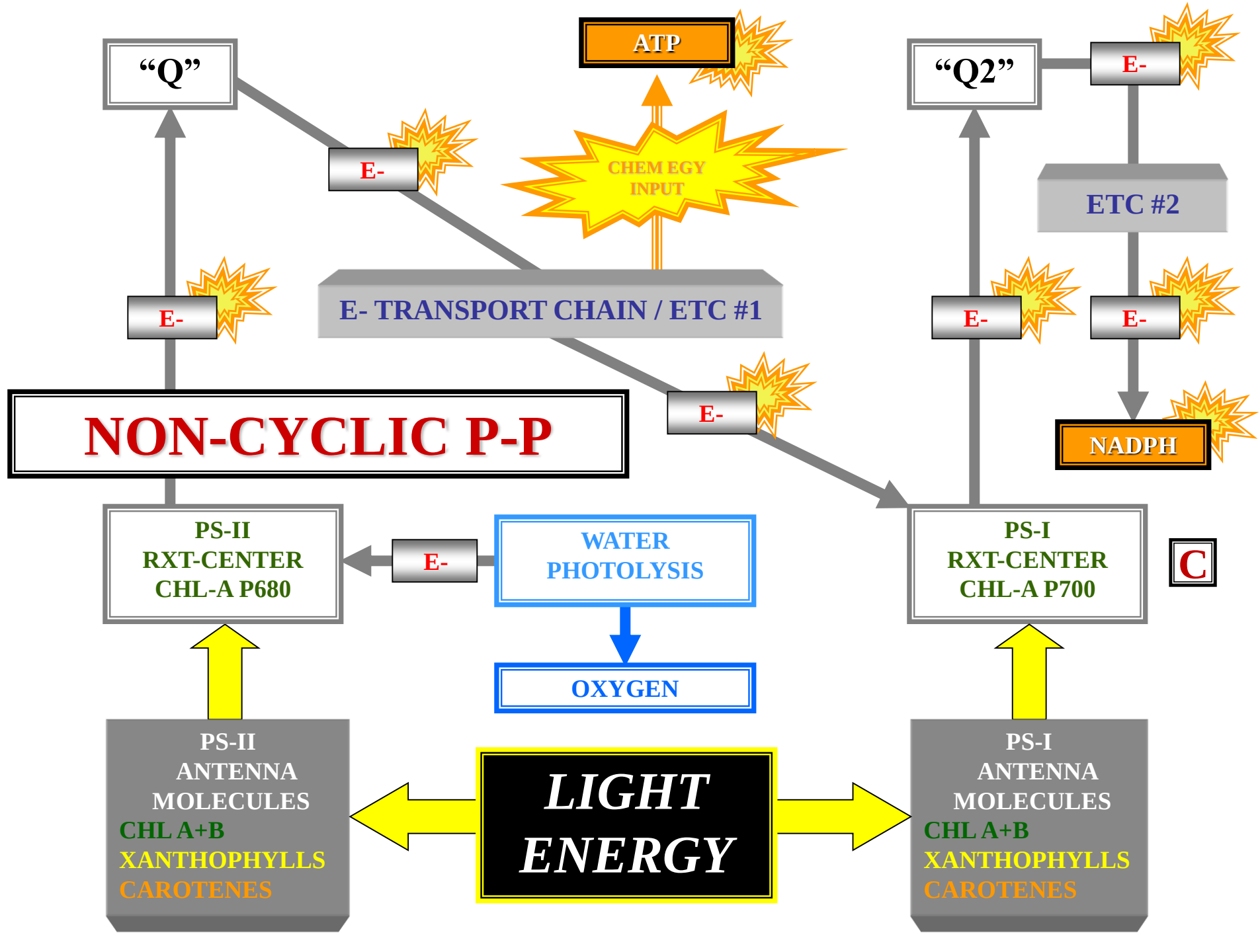
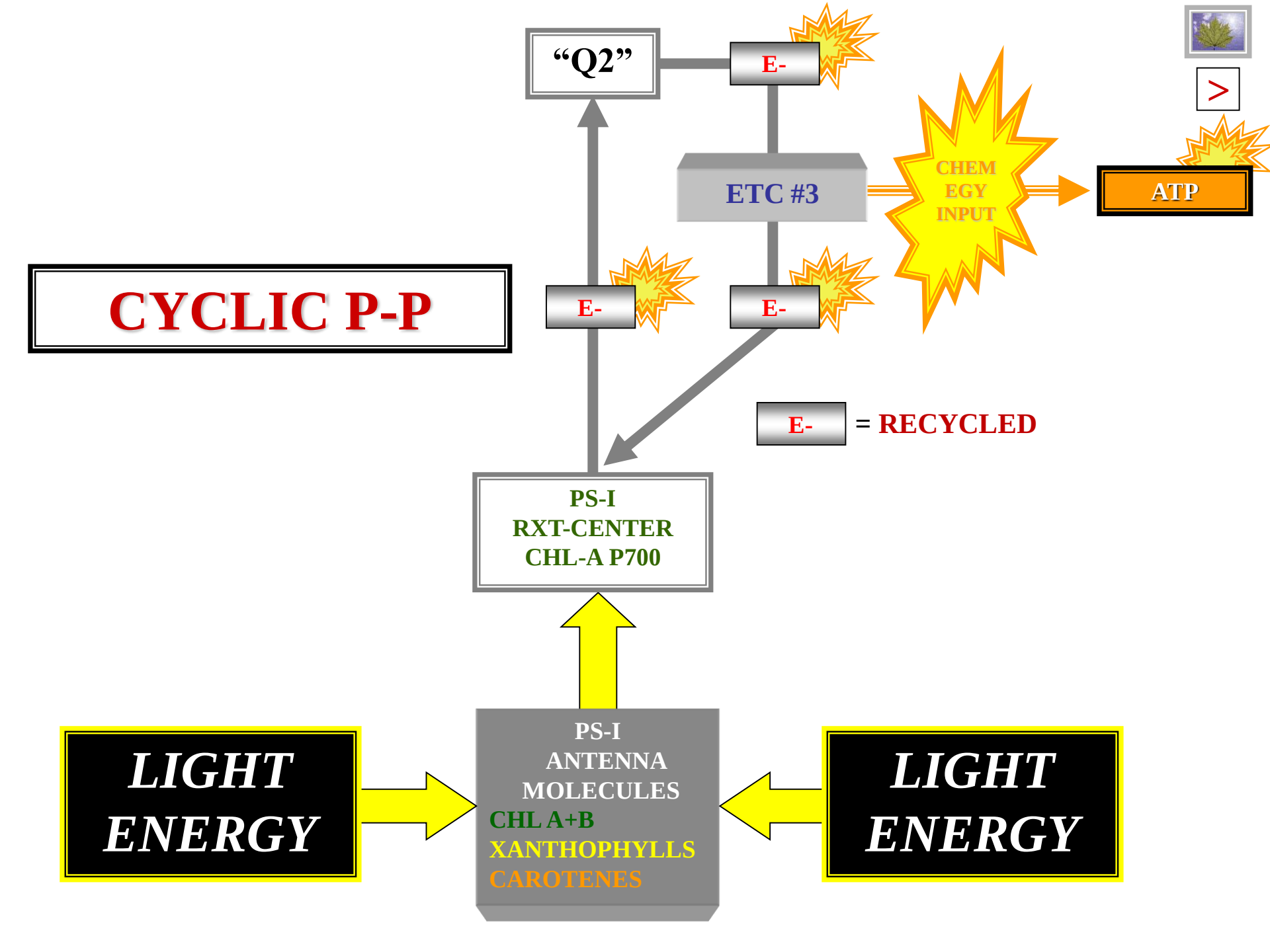
XANTHOPHYLLS
CAROTENES
LIGHT ENERGY
PS-I ANTENNA MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES

A

PLANTS EXPERIENCES PHOTOSYNTHESIS ? DEFICIENCY

PLANTS EXPERIENCES PHOTOSYNTHESIS ATP DEFICIENCY


"Q"
ATP
"Q2"
E-
CHEM EGY INPUT
ETC #2
E- TRANSPORT CHAIN / ETC #1
NON-CYCLIC P-P
NADPH
PS-II RXT-CENTER CHL-A P680
WATER PHOTOLYSIS
PS-I RXT-CENTER CHL-A P700
C
OXYGEN
PS-II ANTENNA MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES
LIGHT ENERGY
PS-I ANTENNA MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES


"Q2"
E-
ETC #3
CHEM EGY INPUT
ATP
>
CYCLIC P-P
E-
E-
E- = RECYCLED
PS-I
RXT-CENTER
CHL-A P700
LIGHT ENERGY
PS-I
ANTENNA
MOLECULES
CHL A+B
XANTHOPHYLLS
CAROTENES
LIGHT ENERGY

PLANTS RELY CYCLIC P-P ELIMINATE ATP DEFICIENCY

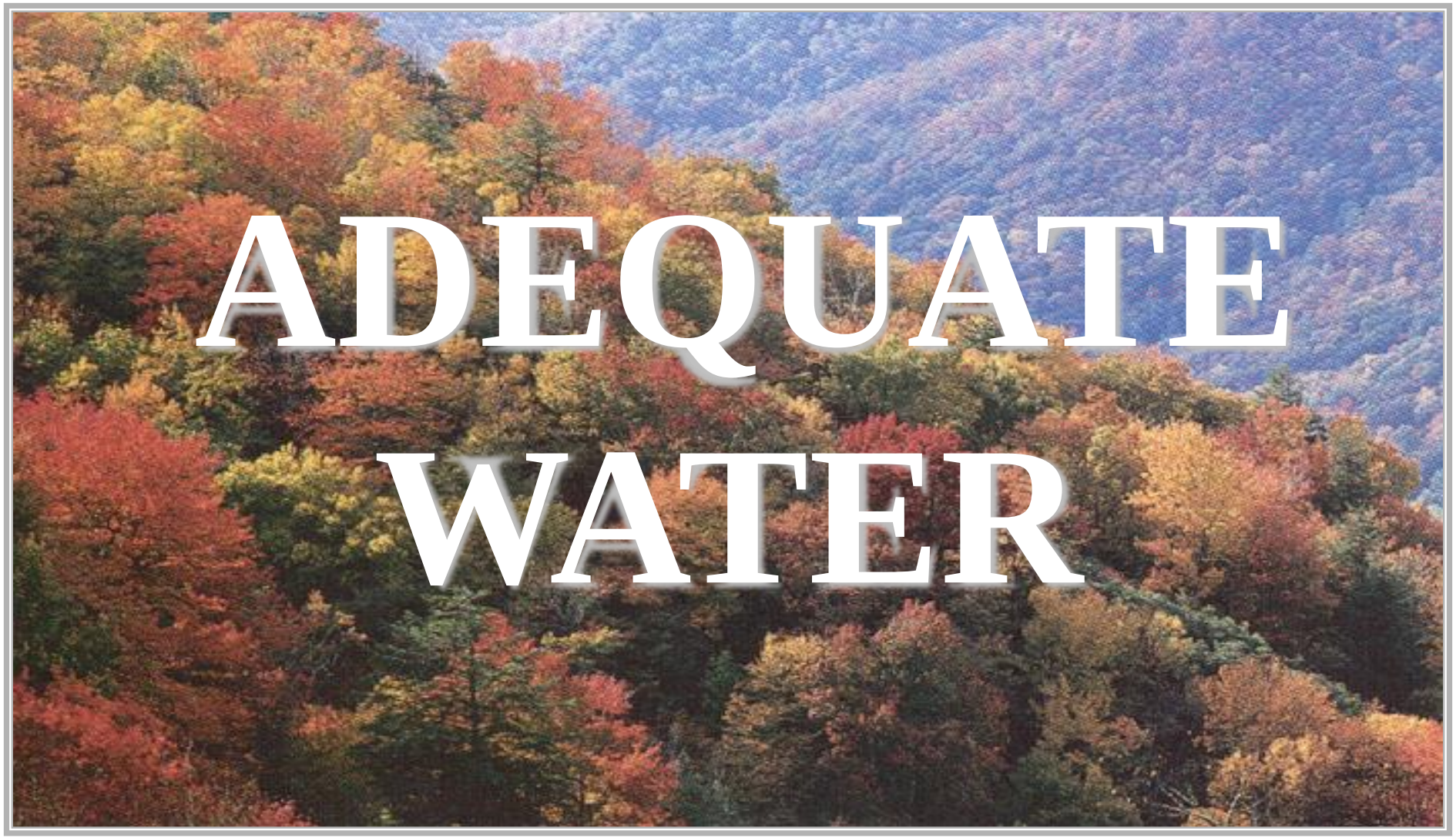
C3 PATHWAY ECOLOGY

C3 ECOLOGY

MESIC HABITATS

C3 ECOLOGY

EG



MESIC HABITATS

C3 ECOLOGY

MESIC HABITATS

C3

CO2
ENTERS
STROMA

↓

CO2 + RIBULOSE BISPHOSPHATE / (RUBP)

RIBULOSE BISPHOSPHATE
CARBOXYLASE
(RUBP-CARBOXYLASE)

↓

UNSTABLE 6C COMPOUND

I

?

ENZYME

C3 CO2 FIXATION ENZYME

C3

CO2
ENTERS
STROMA

↓

CO2 + RIBULOSE BISPHOSPHATE / (RUBP)

RIBULOSE BISPHOSPHATE
CARBOXYLASE
(RUBP-CARBOXYLASE)

↓

UNSTABLE 6C COMPOUND

INEFFICIENT ENZYME

C3 CO2 FIXATION ENZYME

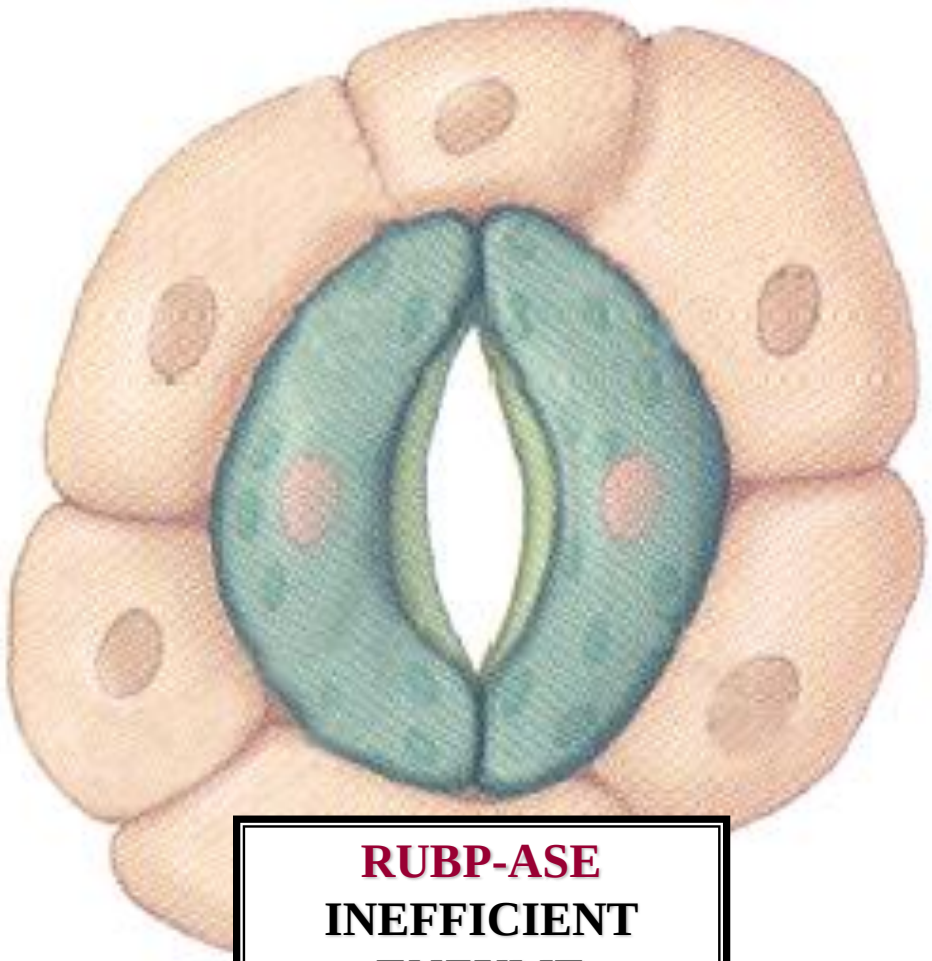
LEAF STOMATE

ATMOSPHERE

ATMOSPHERE

CO2

CO2



CO2

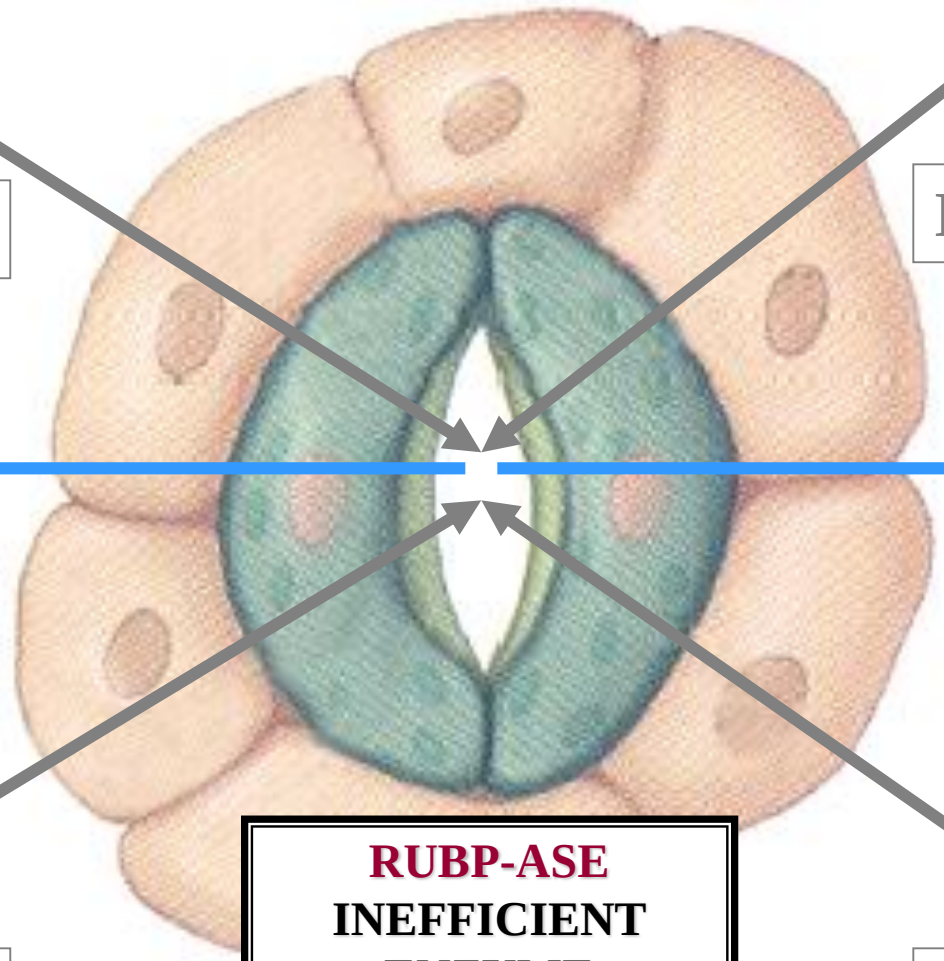
CO2

RUBP-ASE
INEFFICIENT ENZYME

LEAF STOMATE

ATMOSPHERE

ATMOSPHERE



CO2

DIFFUSION

CO2

DIFFUSION

H2O

DIFFUSION

H2O

DIFFUSION

CO2

DIFFUSION

CO2

DIFFUSION

RUBP-ASE
INEFFICIENT
ENZYME

LEAF STOMATE

ATMOSPHERE

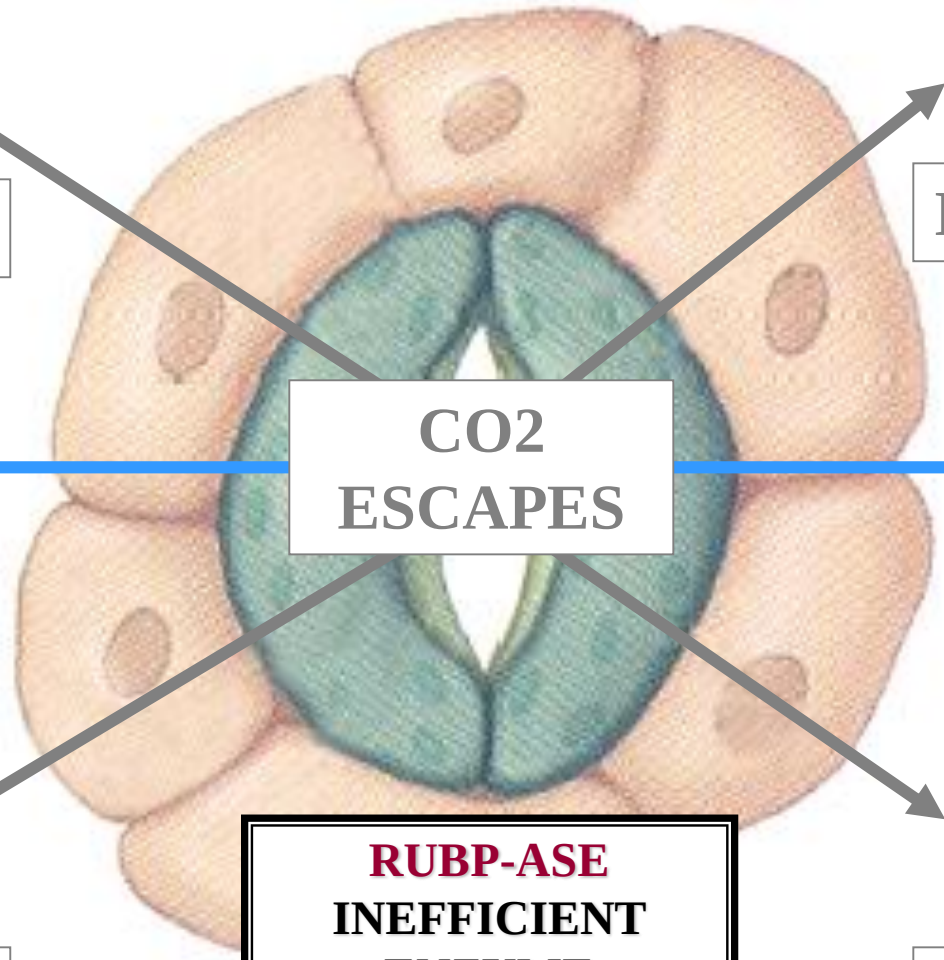
ATMOSPHERE

CO2

DIFFUSION

CO2

DIFFUSION



H2O

DIFFUSION

CO2 ESCAPES

H2O

DIFFUSION

CO2

DIFFUSION

RUBP-ASE
INEFFICIENT
ENZYME

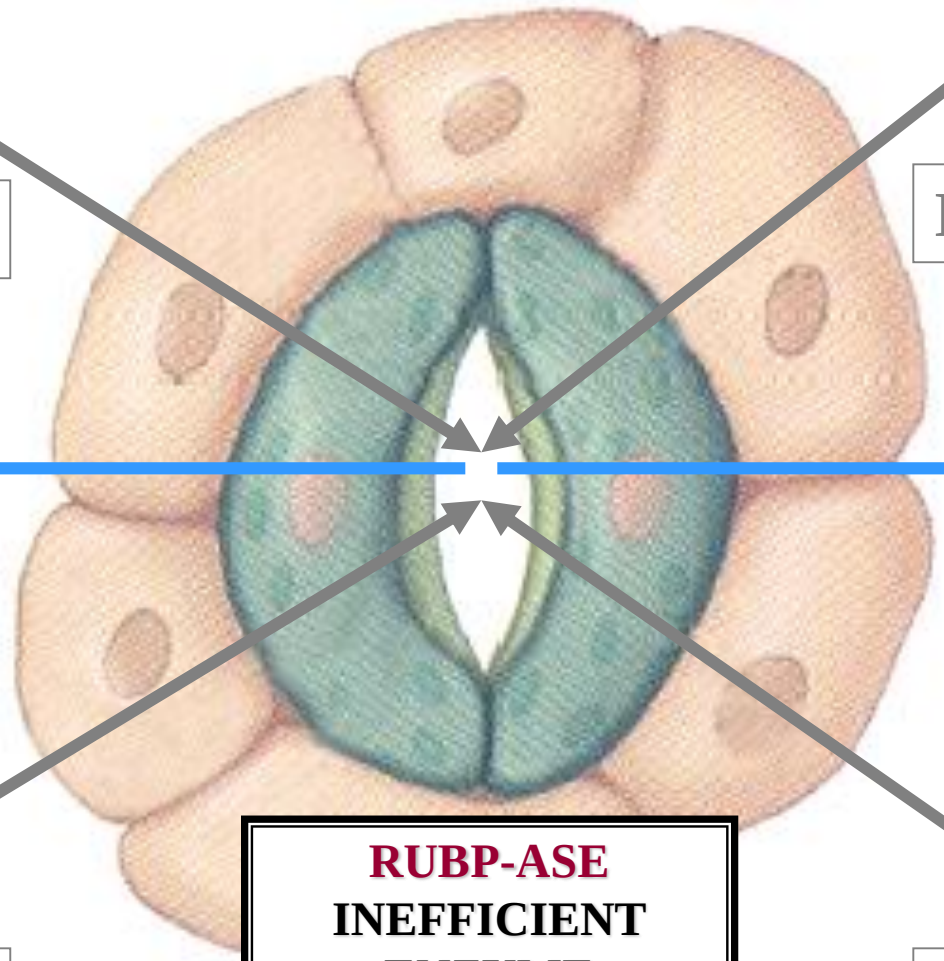
CO2

DIFFUSION

LEAF STOMATE

ATMOSPHERE

ATMOSPHERE



CO2

DIFFUSION

CO2

DIFFUSION

H2O

DIFFUSION

H2O

DIFFUSION

CO2

DIFFUSION

CO2

DIFFUSION

RUBP-ASE
INEFFICIENT
ENZYME

ATMOSPHERE

LEAF STOMATE

ATMOSPHERE

CO2

CO2

OPEN LONG PERIODS

C3

C3

CO2

CO2

RUBP-ASE
INEFFICIENT
ENZYME

LEAF STOMATE

ATMOSPHERE

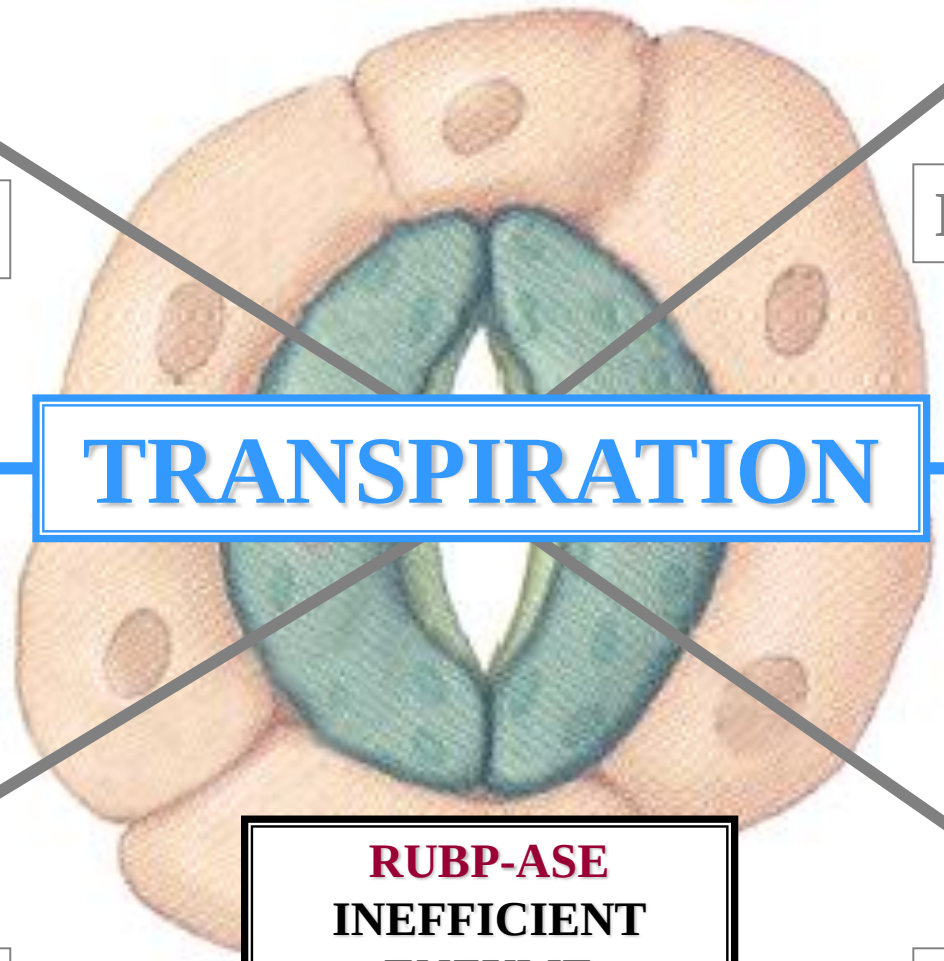
ATMOSPHERE

CO2

DIFFUSION

CO2

DIFFUSION



H2O

TRANSPIRATION

H2O

DIFFUSION

DIFFUSION

CO2

DIFFUSION

CO2

DIFFUSION

RUBP-ASE
INEFFICIENT
ENZYME

ATMOSPHERE

LEAF STOMATE

ATMOSPHERE

CO2

CO2

C3

HIGH

C3

TRANSPIRATION

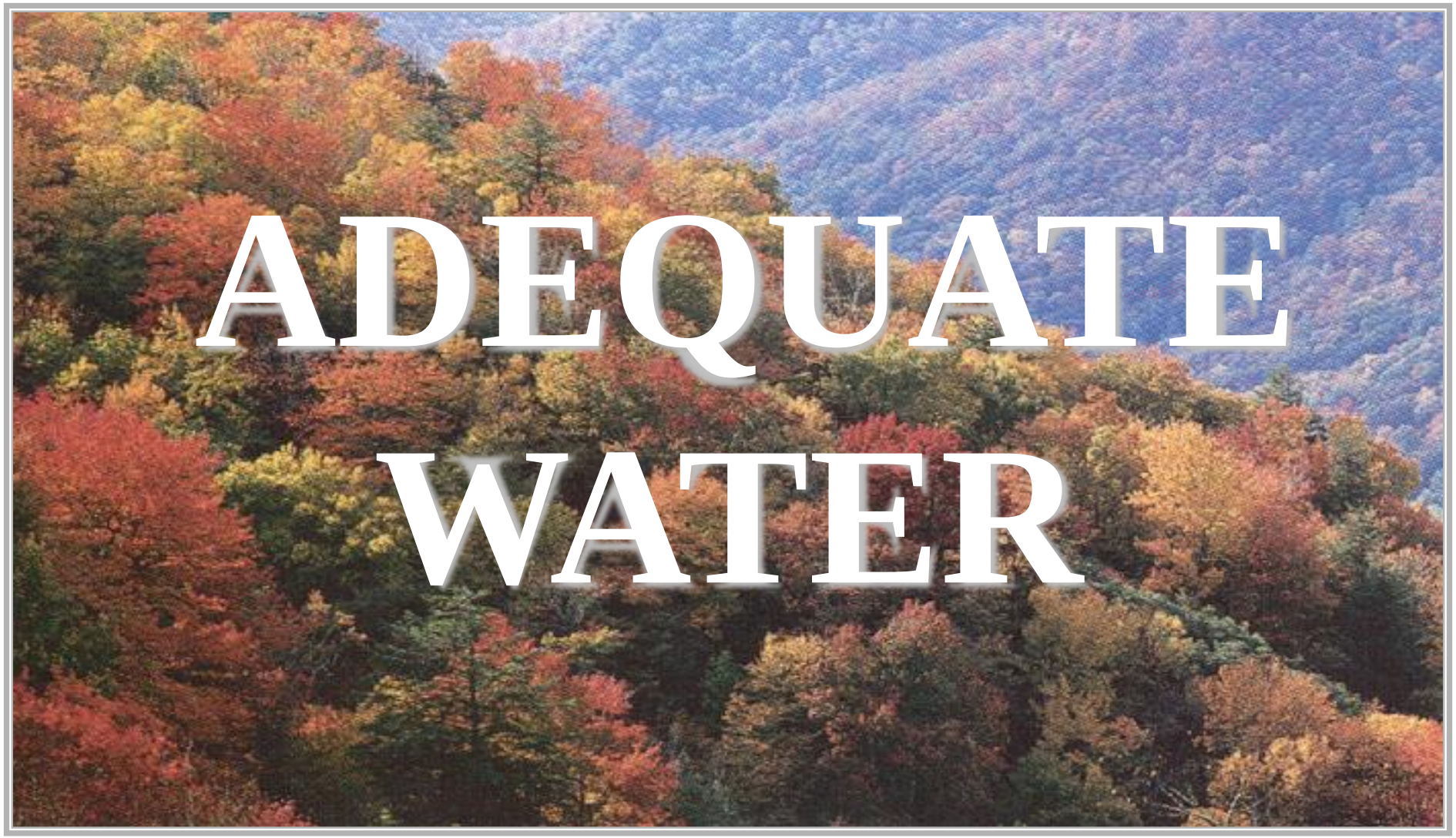
CO2

CO2

RUBP-ASE
INEFFICIENT
ENZYME

C3 ECOLOGY

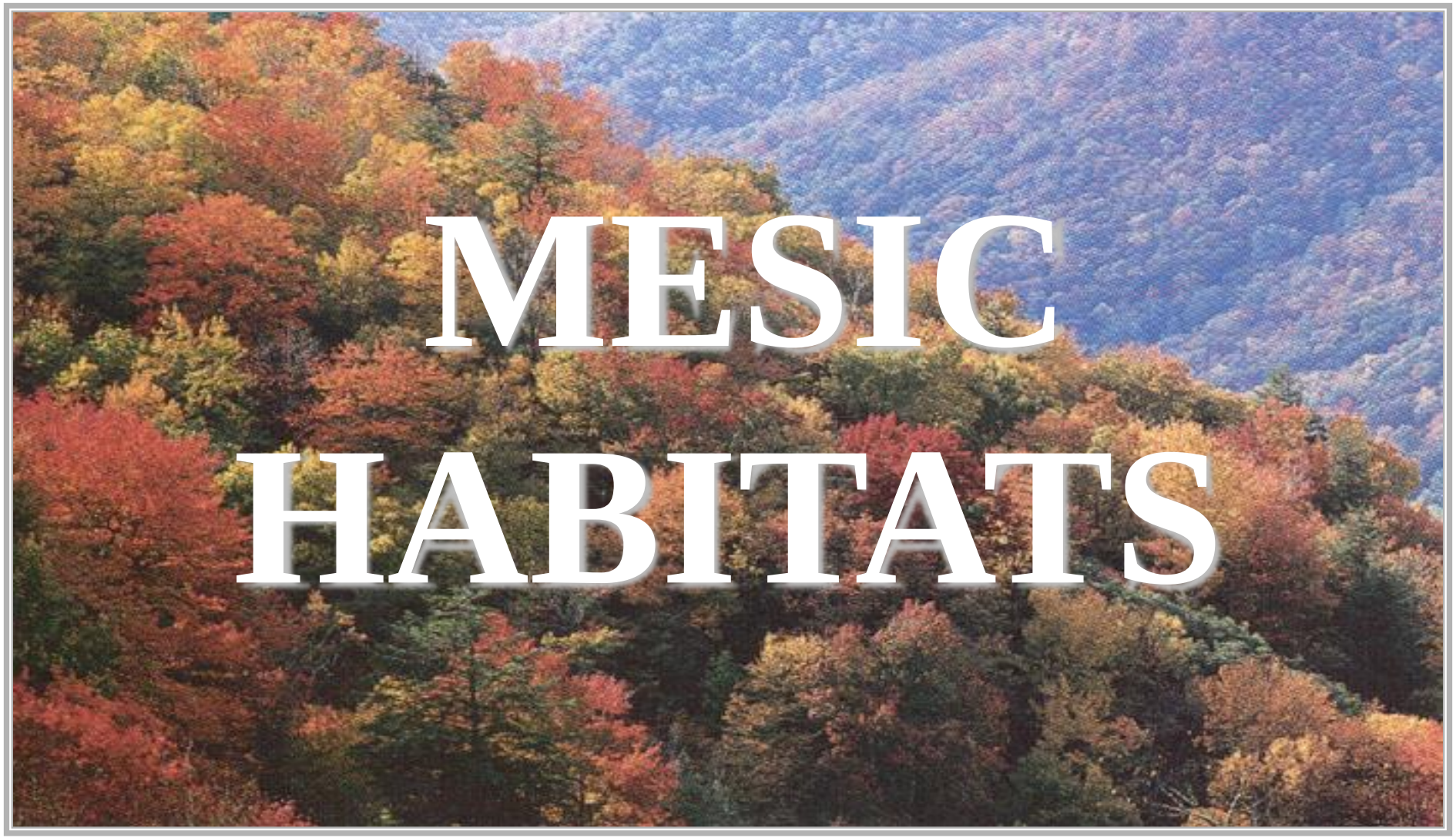
MH



MESIC HABITATS

C3 ECOLOGY

AF



MESIC HABITATS

C3 ECOLOGY

MESIC HABITATS

DARK REACTION

HATCH & SLACK CYCLE

HATCH & SLACK CYCLE

SYNONYMOUS

C4 PATHWAY


HATCH & SLACK
AUSTRALIAN
PLANT
PHYSIOLOGISTS
EL
Asia
Northern Marianas
Philippines
Micronesia
Indonesia
Papua New Guinea
Solomon Islands
Vanuatu
New Caledonia
Fiji Islands
AUSTRALIA
New Zealand

HATCH & SLACK ELICITATED C4 PATHWAY

Asia

Northern Marianas

Philippines

Micronesia

Indonesia

Papua New Guinea

Solomon Islands

Vanuatu

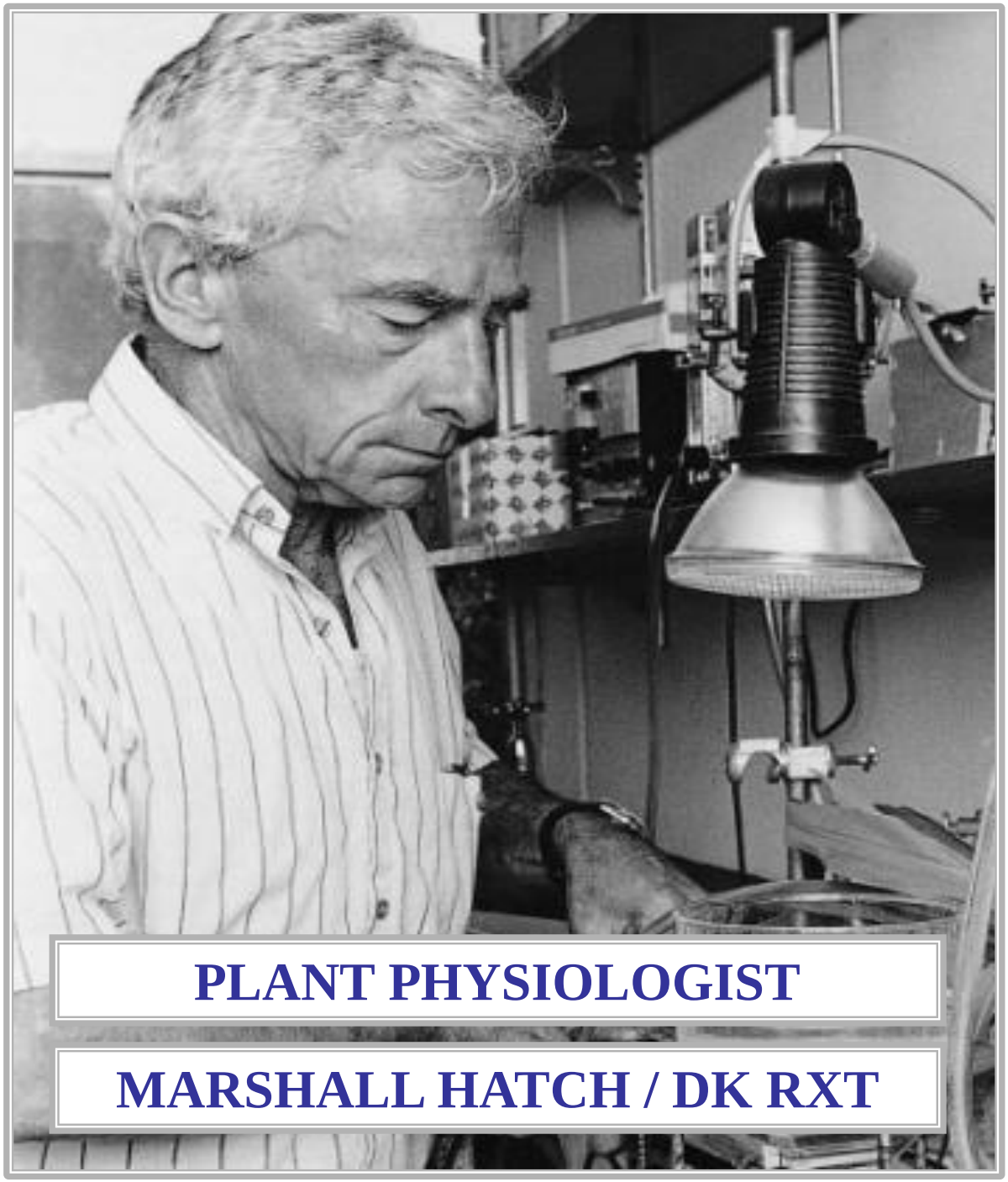
New Caledonia

Fiji Islands

AUSTRALIA

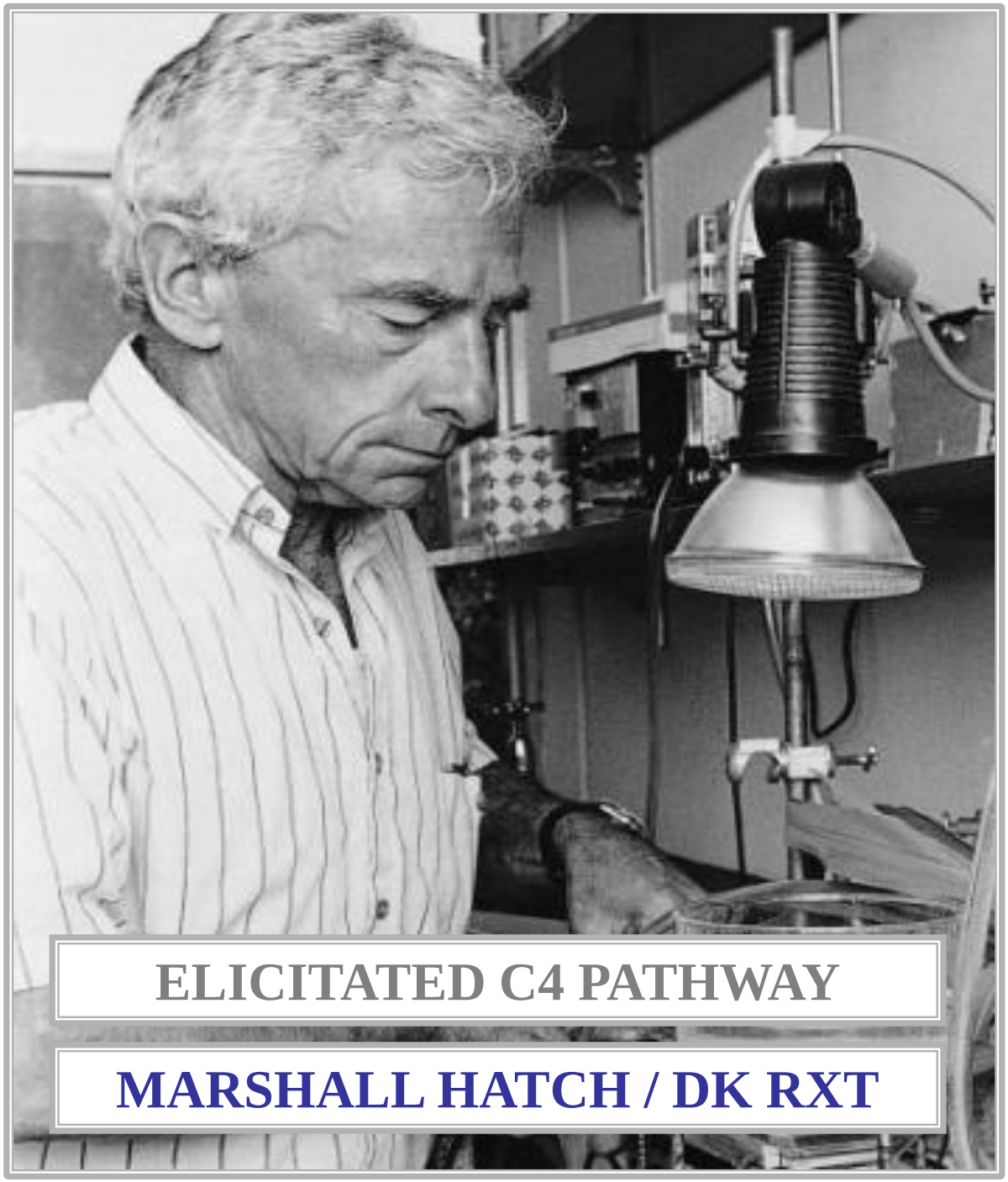
New Zealand

EL



PLANT PHYSIOLOGIST

MARSHALL HATCH / DK RXT



ELICITATED C4 PATHWAY

MARSHALL HATCH / DK RXT

HATCH & SLACK CYCLE

CORN

2 ATP

2 ADP

EGY

PEP-ASE

PEP

FEEDSBACK

PYRUVATE

OXALOACETATE

CO2

MALATE

MESOPHYLL CELL CYTOSOL

MESOPHYLL CELL CHLOROPLAST

GLUCOSE

METABOLISM

C3

RUBP

PGA

RUBP-ASE

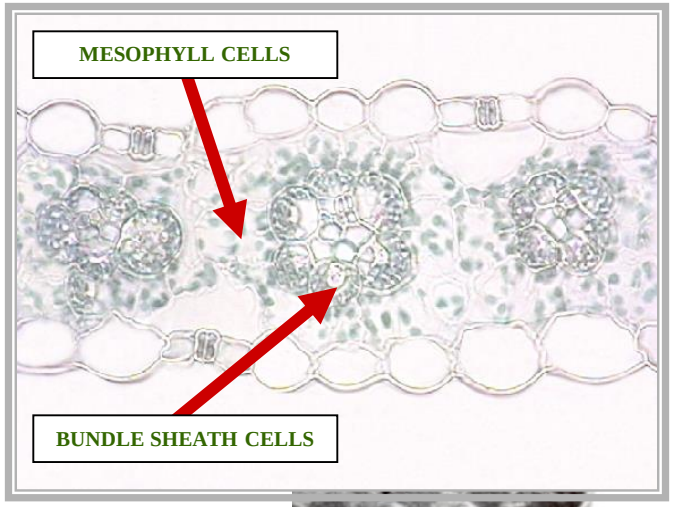
PYRUVATE

CO2

MALATE

DECARBOXYLATED

BUNDLE-SHEATH CELL CHLOROPLAST



C4

C4 PATHWAY ACRONYM

>

C4 ACRONYM

PEP = PHOSPHOENOLPYRUVATE

C4 ACRONYM


C4 PLANT
MODIFIED
C3 PLANT

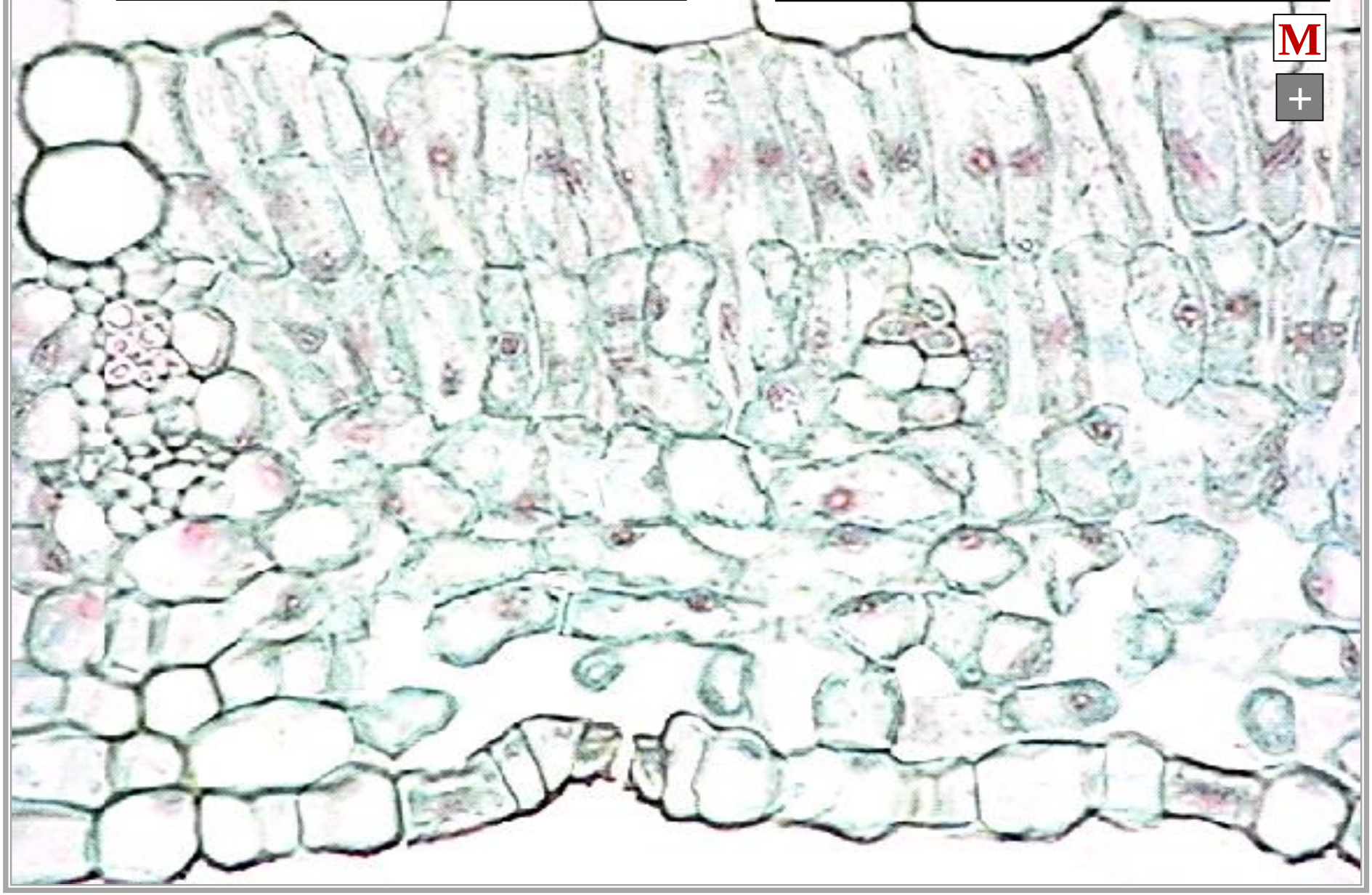
C4
KRANZ
LEAF ANATOMY

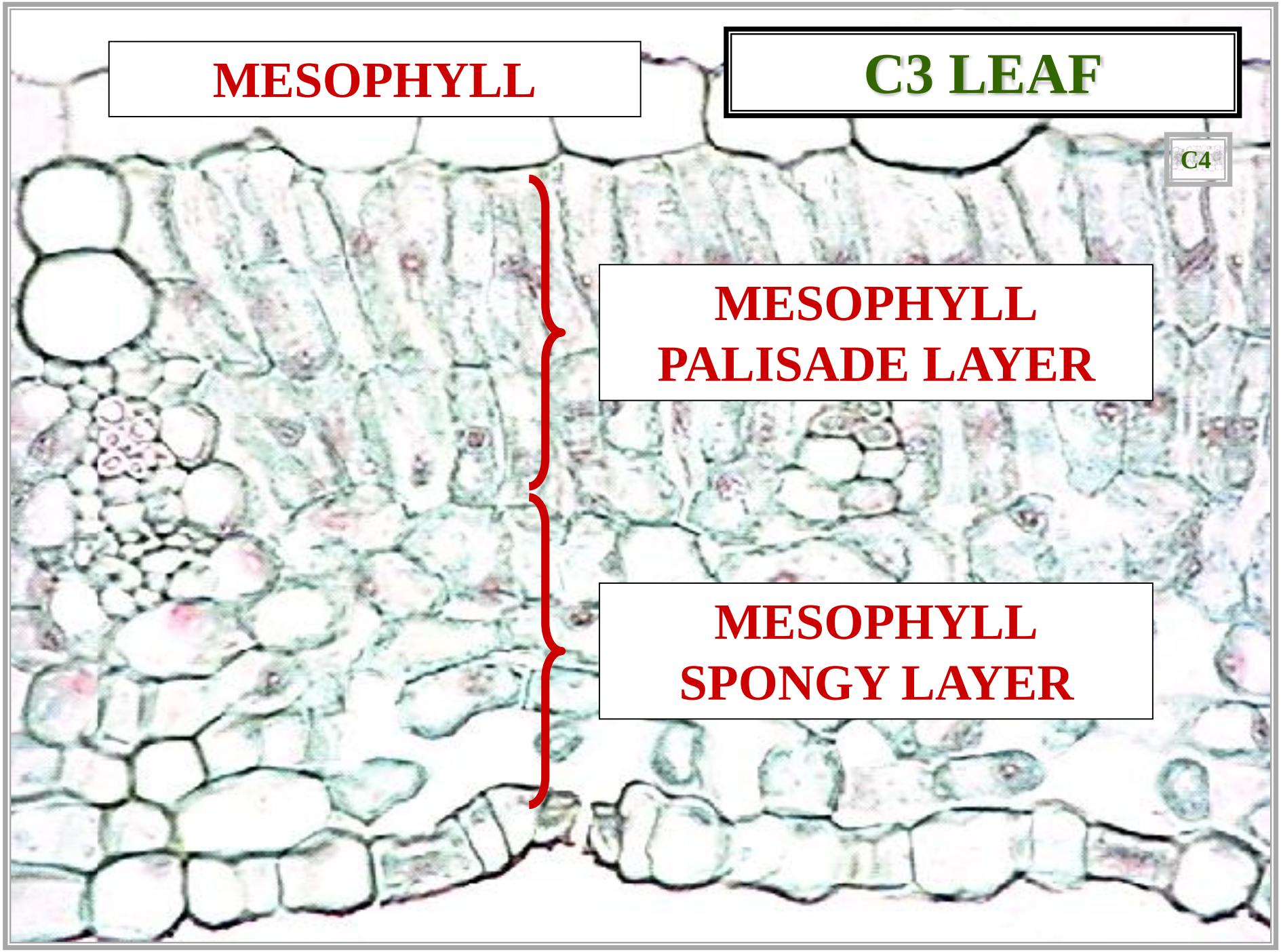
C3

C4 LEAF MESOPHYLL

MESOPHYLL

C3 LEAF




MESOPHYLL
C3 LEAF
C4
MESOPHYLL
PALISADE LAYER
MESOPHYLL
SPONGY LAYER

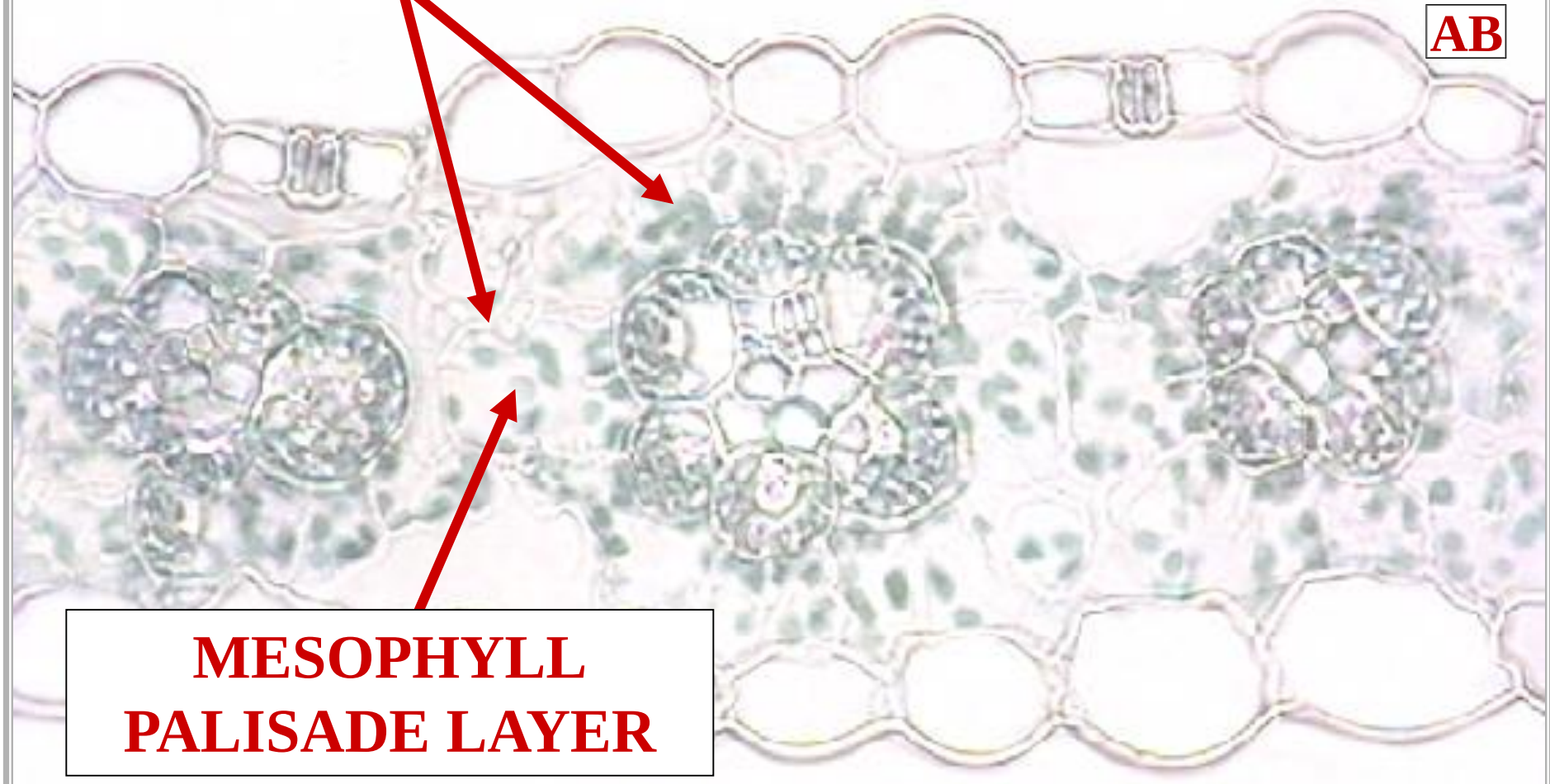
MESOPHYLL

C4 LEAF

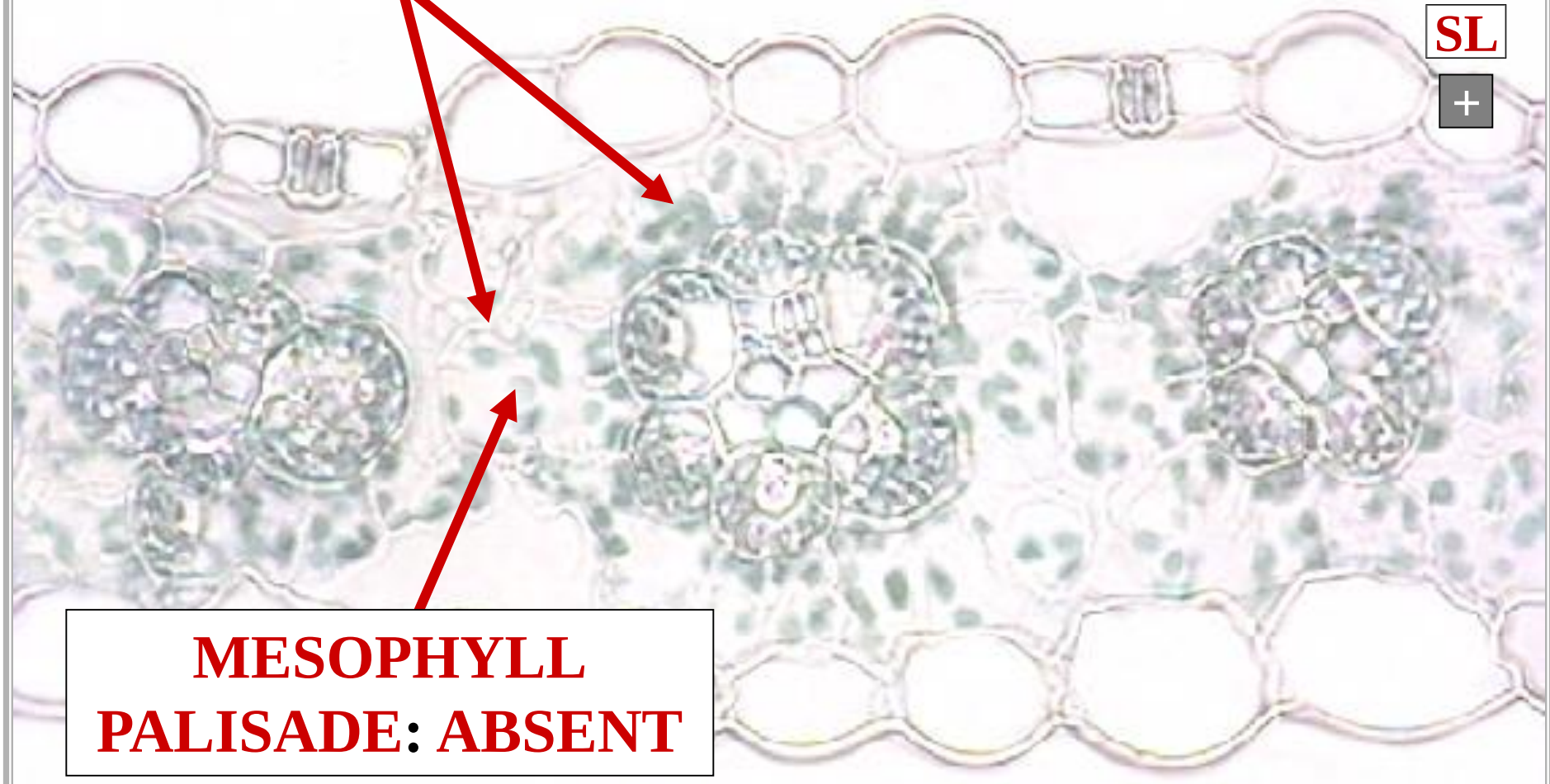
PL

+

KRANZ C4 LEAF ANATOMY



KRANZ C4 LEAF ANATOMY



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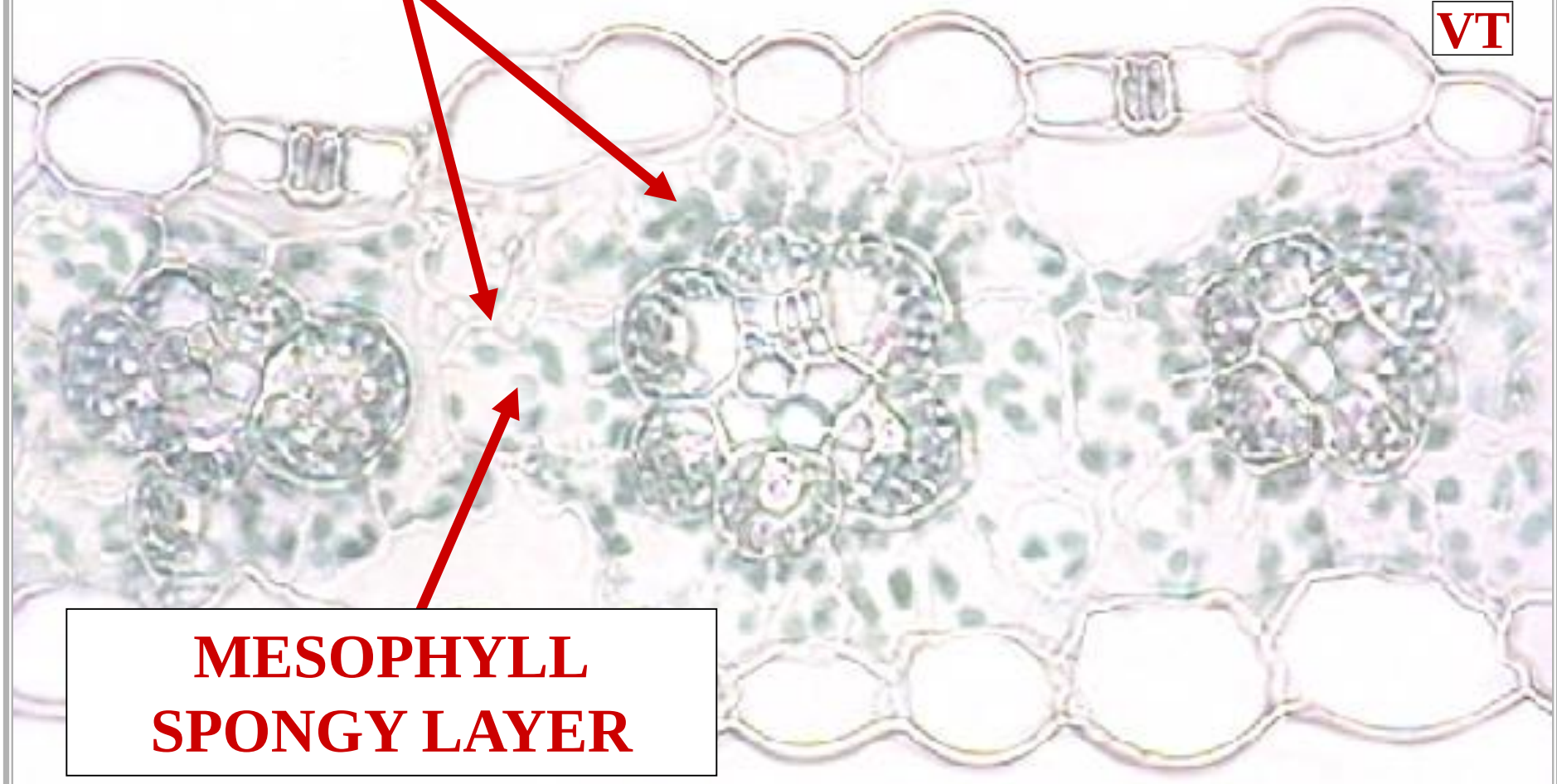
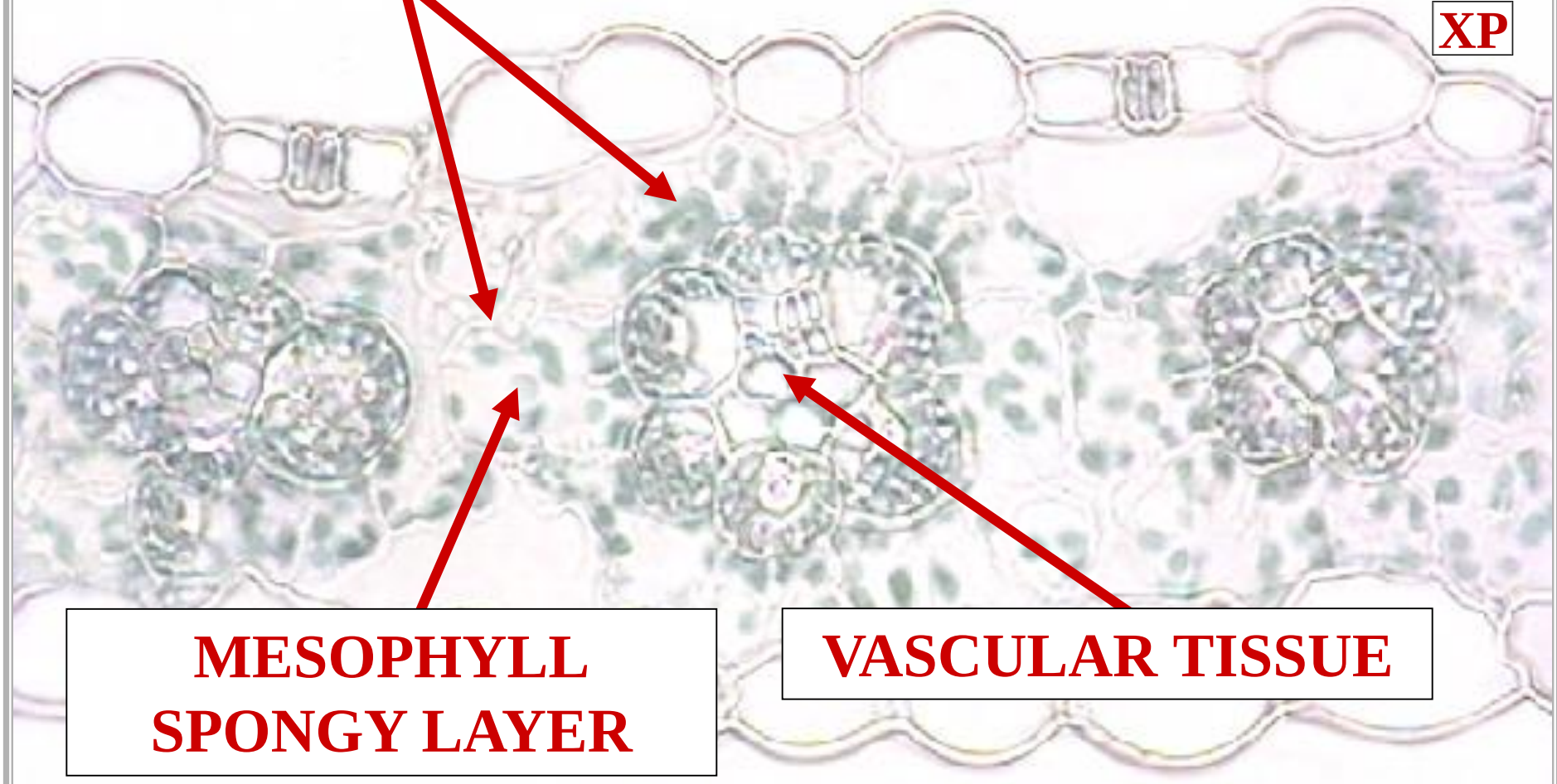
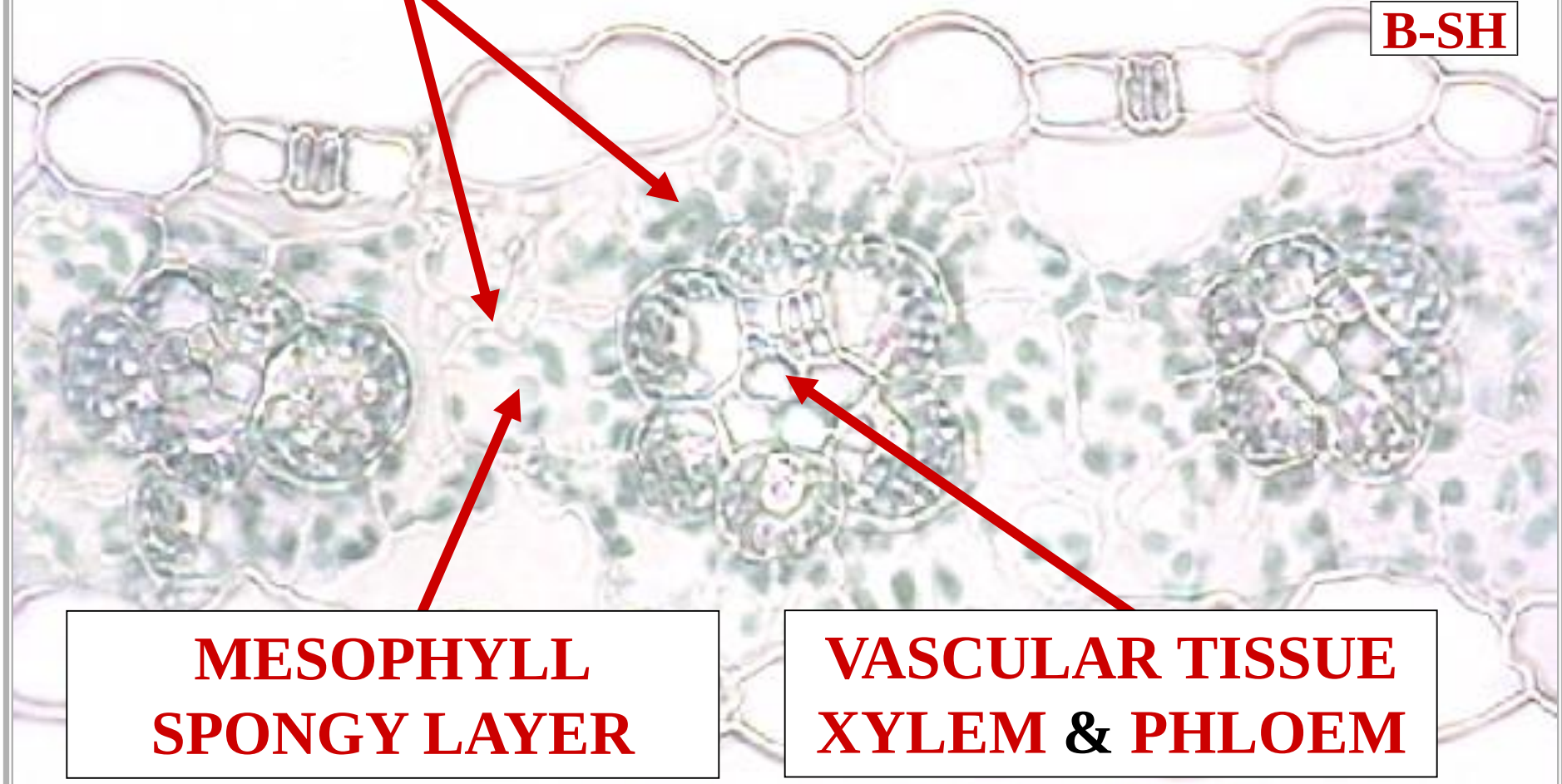


KRANZ C4 LEAF ANATOMY



KRANZ C4 LEAF ANATOMY



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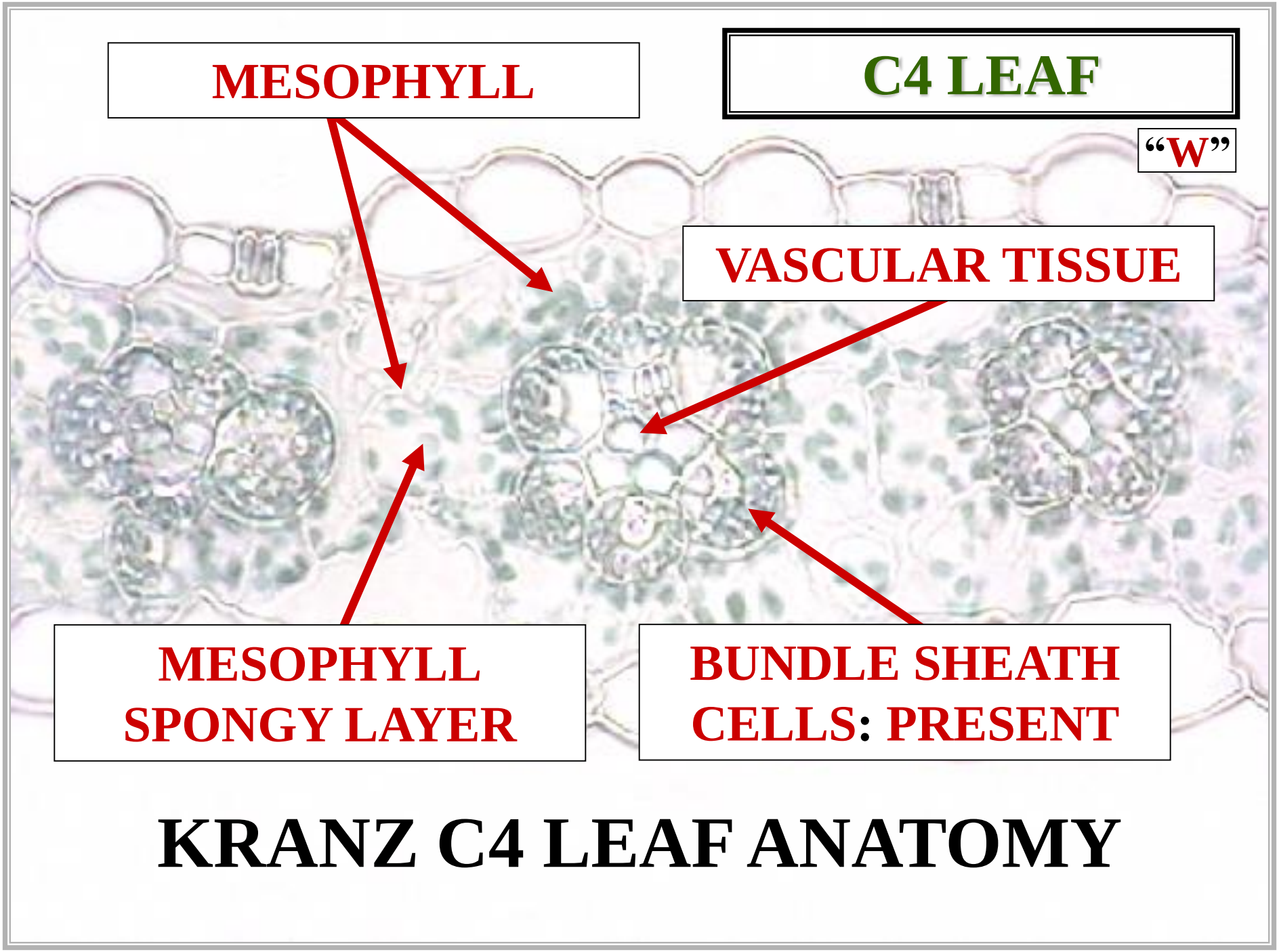
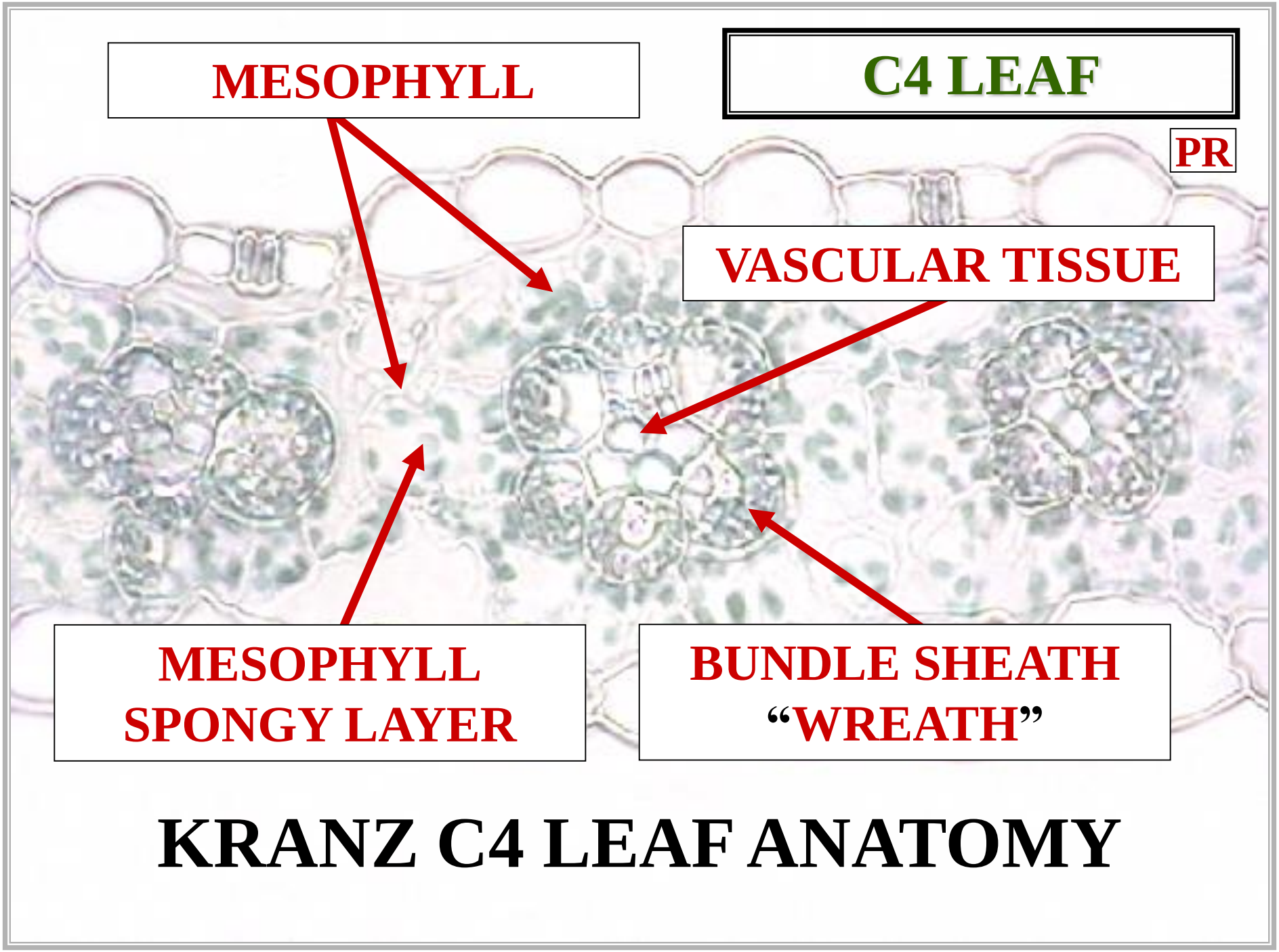
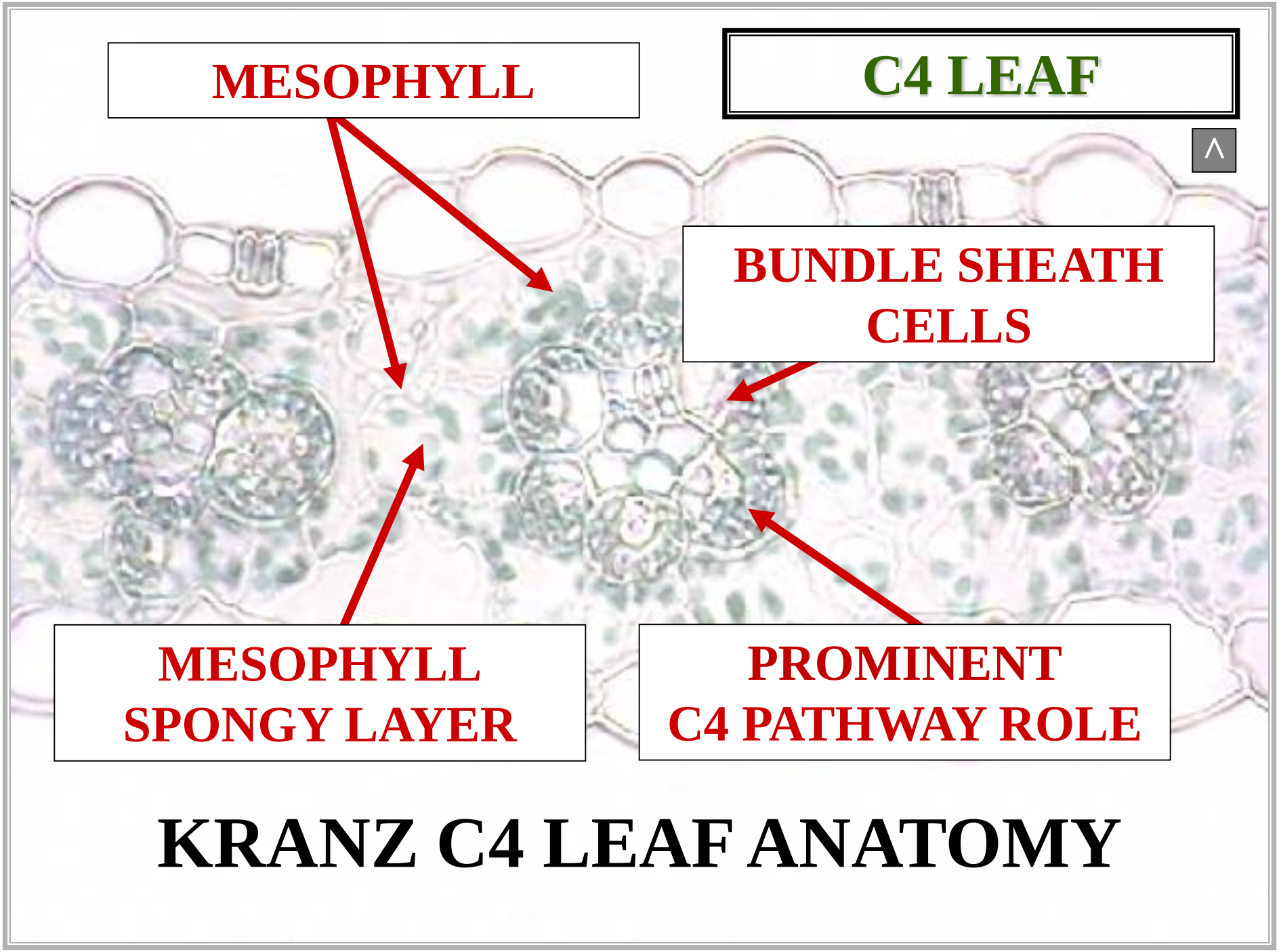


KRANZ C4 LEAF ANATOMY



KRANZ C4 LEAF ANATOMY



KRANZ C4 LEAF ANATOMY

C4 PATHWAY SPECIFICS

C4 PATHWAY CORN PLANT

C4

CORN

LEAF
STOMATE

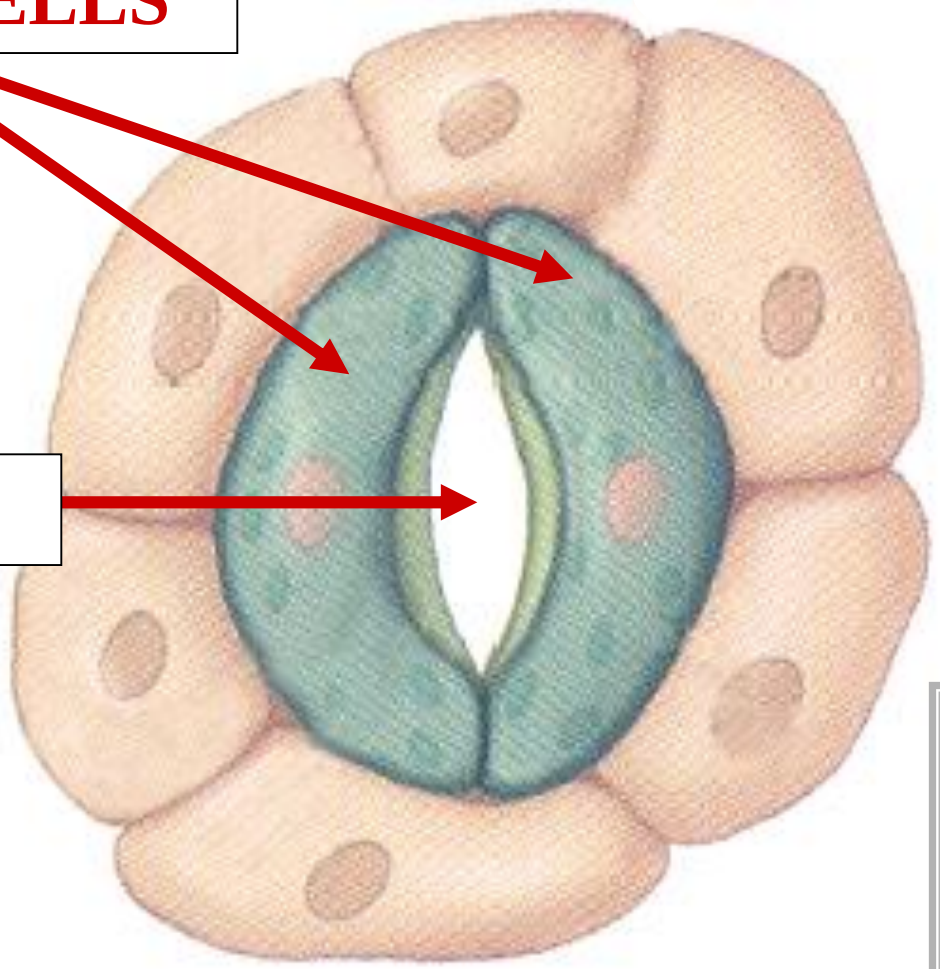
LEAF
STOMATE

?

C

GUARD CELLS

STOMA



LEAF
STOMATE

C

ATMOSPHERE

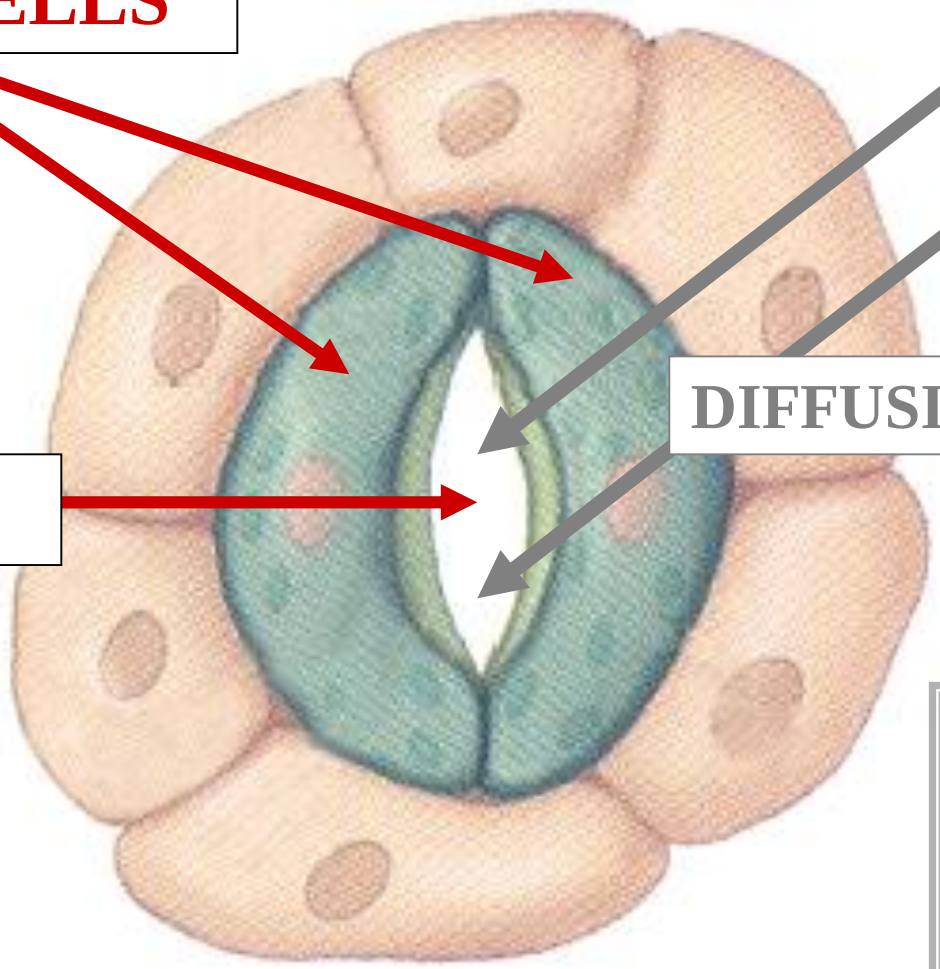
GUARD CELLS

?

?

DIFFUSION

STOMA



LEAF
STOMATE

ATMOSPHERE

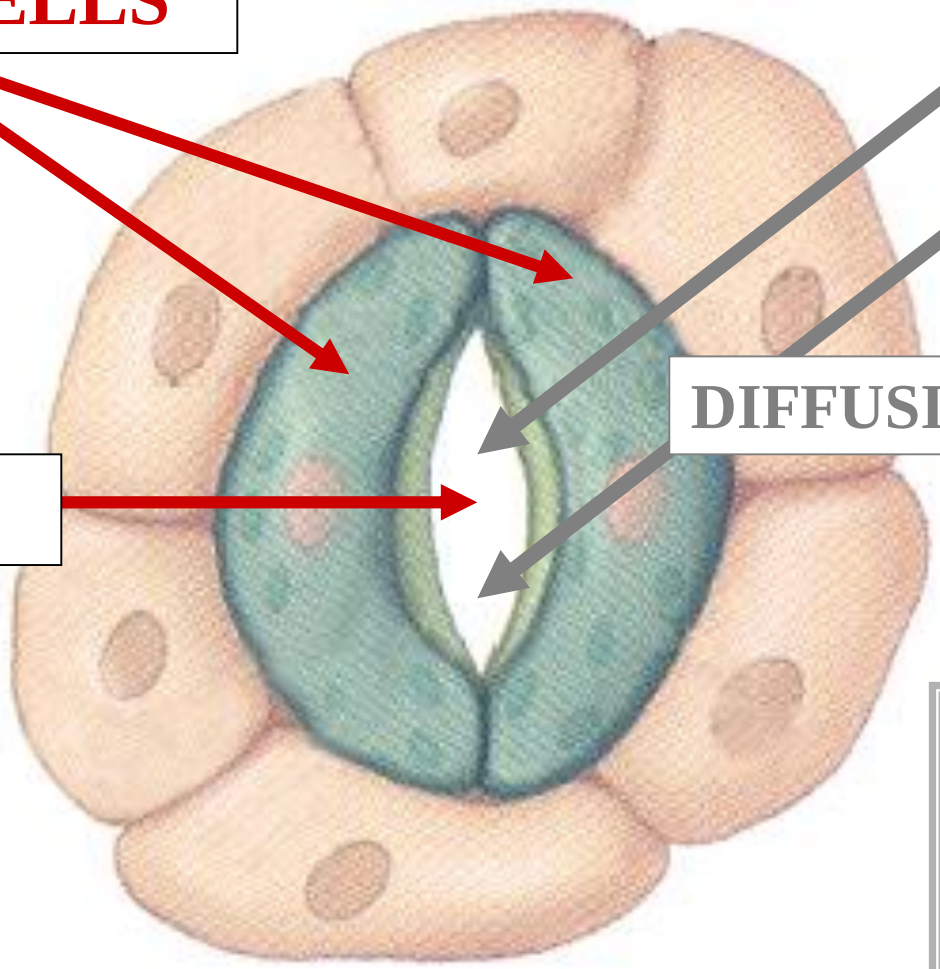
GUARD CELLS

CO2

CO2

DIFFUSION

STOMA



C4 PATHWAY CO2 DIFFUSION

D

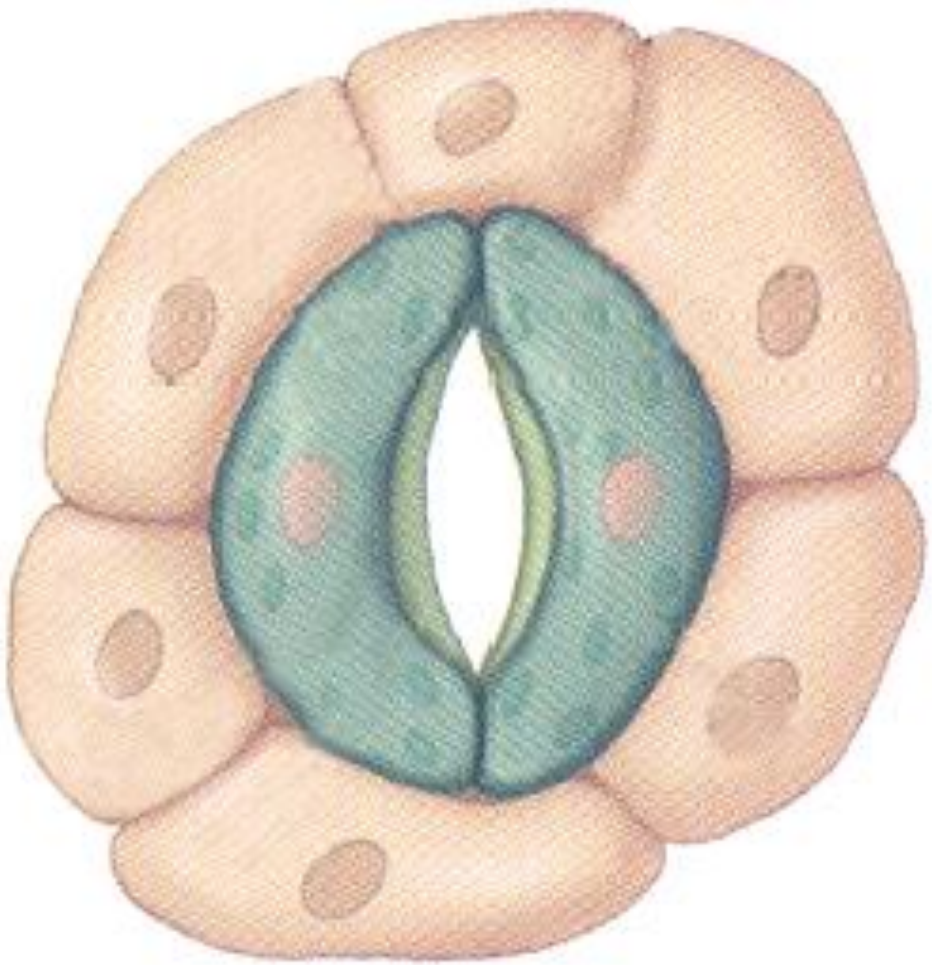
LEAF STOMATE

ATMOSPHERE

ATMOSPHERE

CO2

CO2



CO2

CO2

LEAF STOMATE

ATMOSPHERE

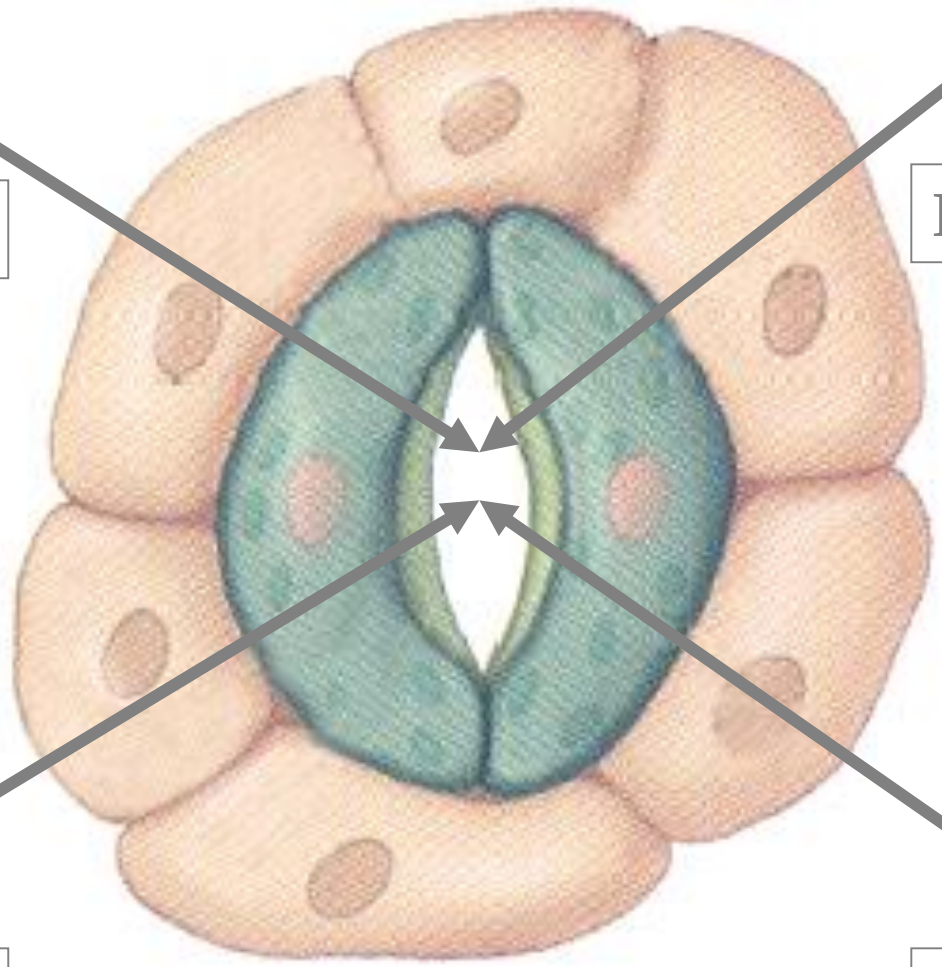
ATMOSPHERE

CO2

DIFFUSION

CO2

DIFFUSION



CO2

DIFFUSION

CO2

DIFFUSION