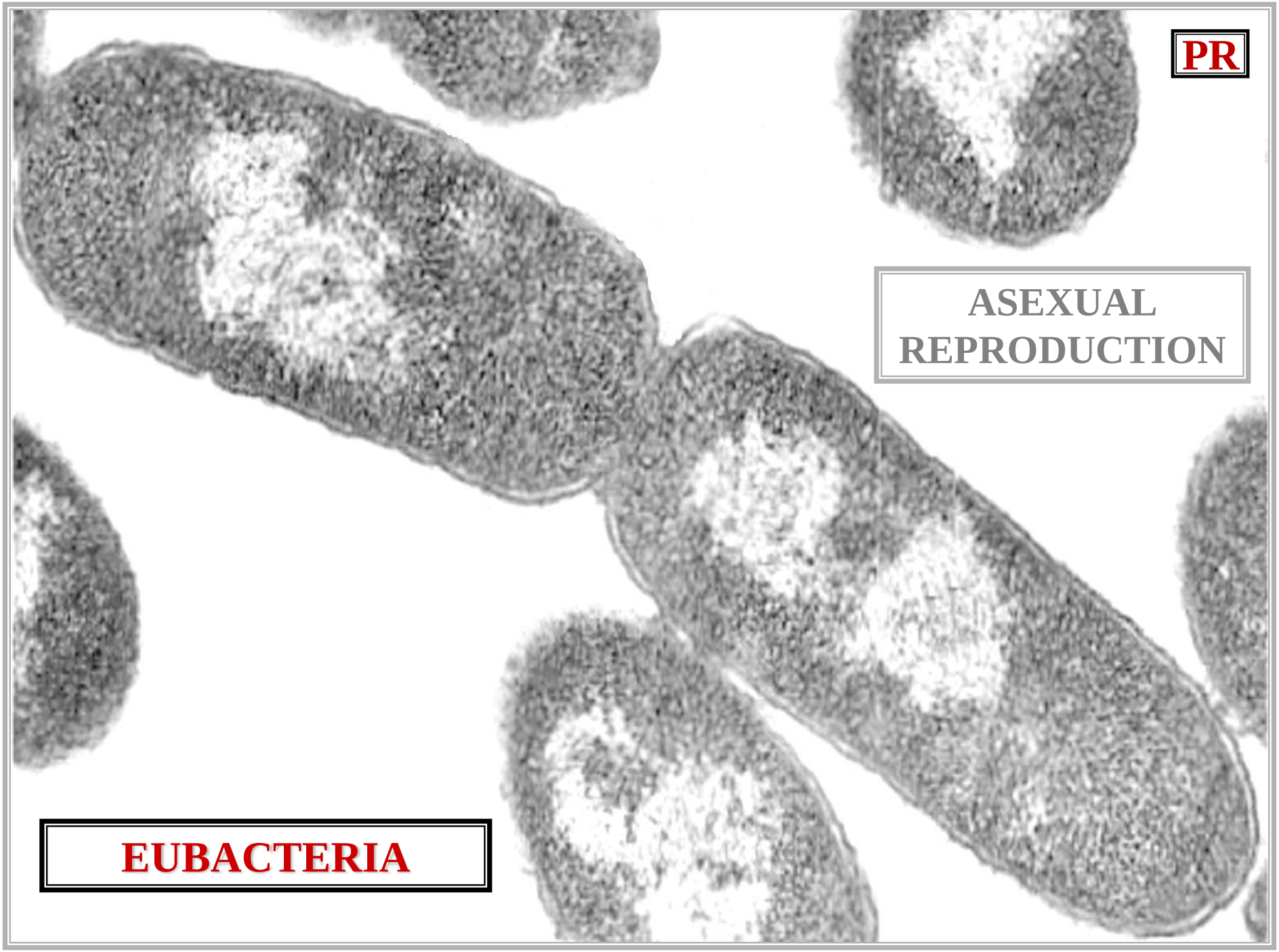
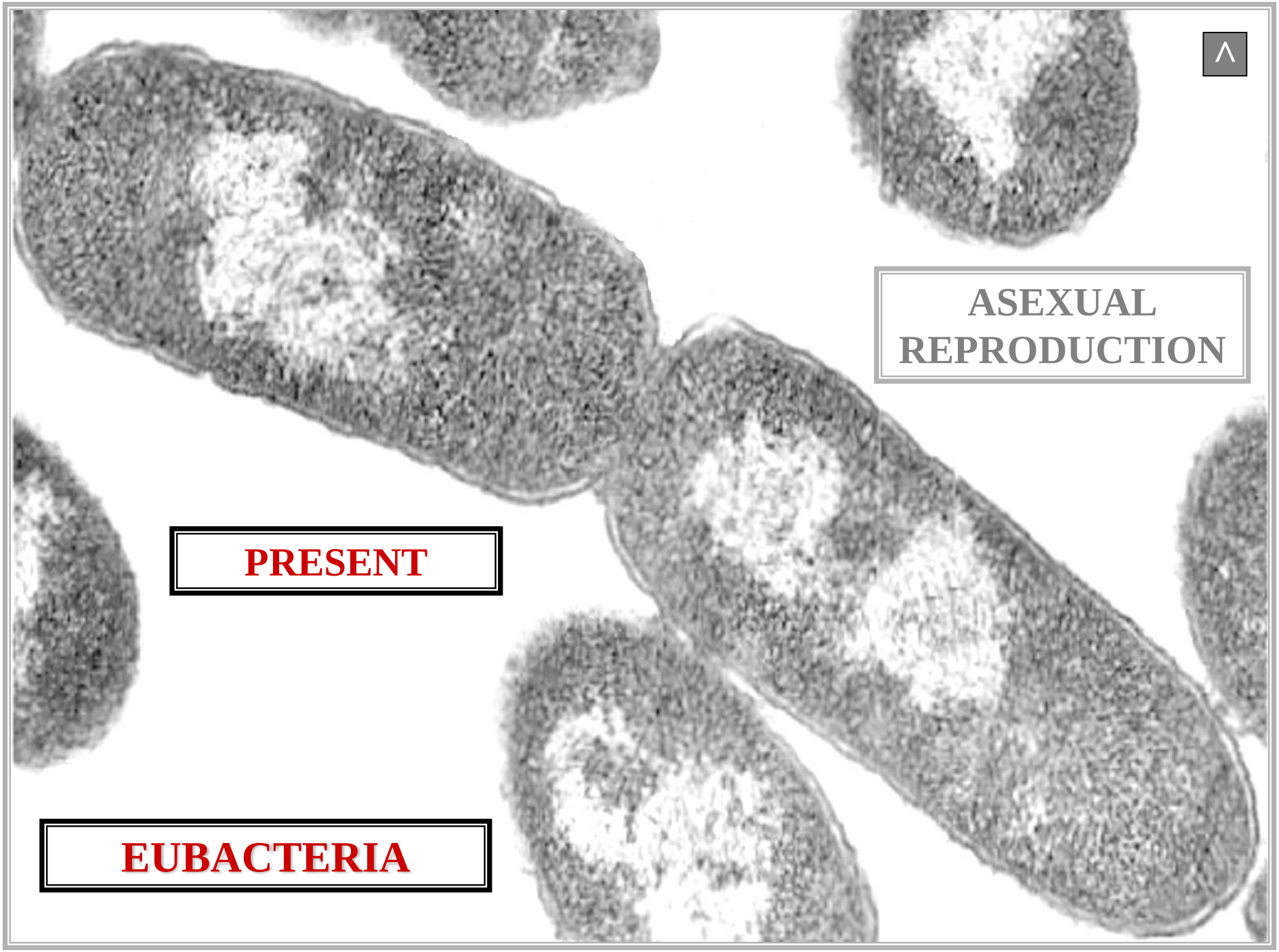


PR

ASEXUAL REPRODUCTION

EUBACTERIA


ASEXUAL
REPRODUCTION
PRESENT
EUBACTERIA

B

BINARY FISSION

BINARY FISSION

BINARY FISSION

CYTOSOL DIVISION

BINARY FISSION

AP

BINARY FISSION

CYTOSOL DIVISION

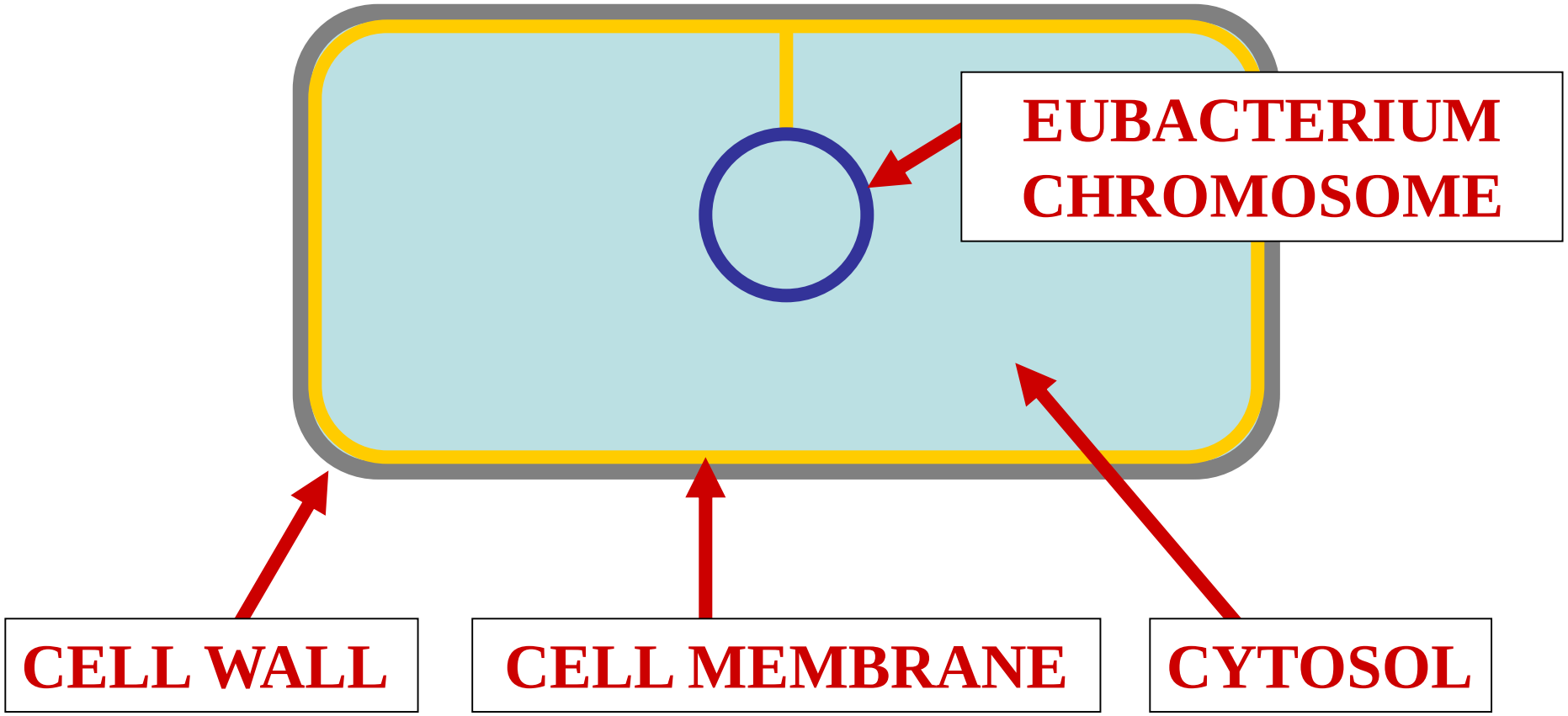
WITHOUT NUCLEAR DIVISION

BINARY FISSION

BINARY FISSION APPLIED

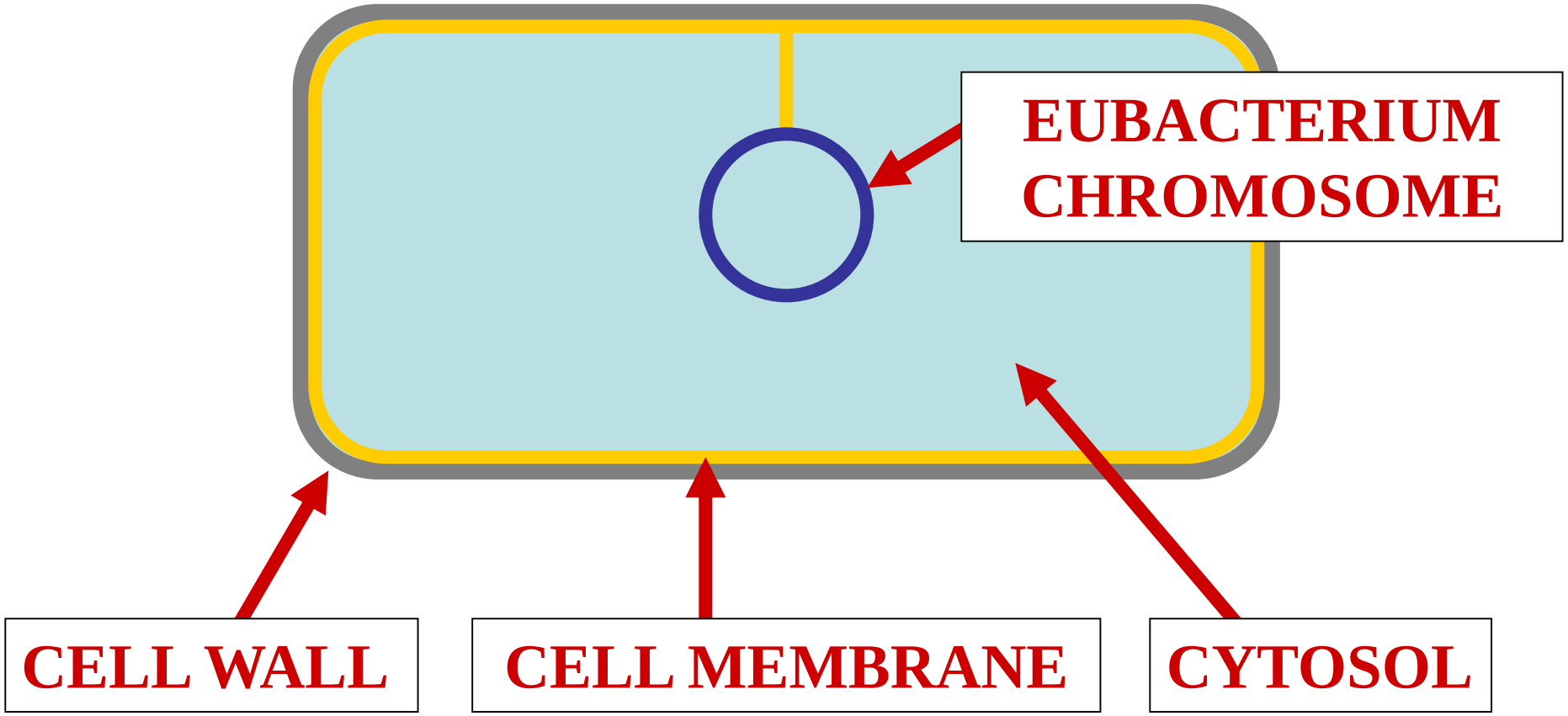
BF

EUBACTERIUM MOTHER CELL

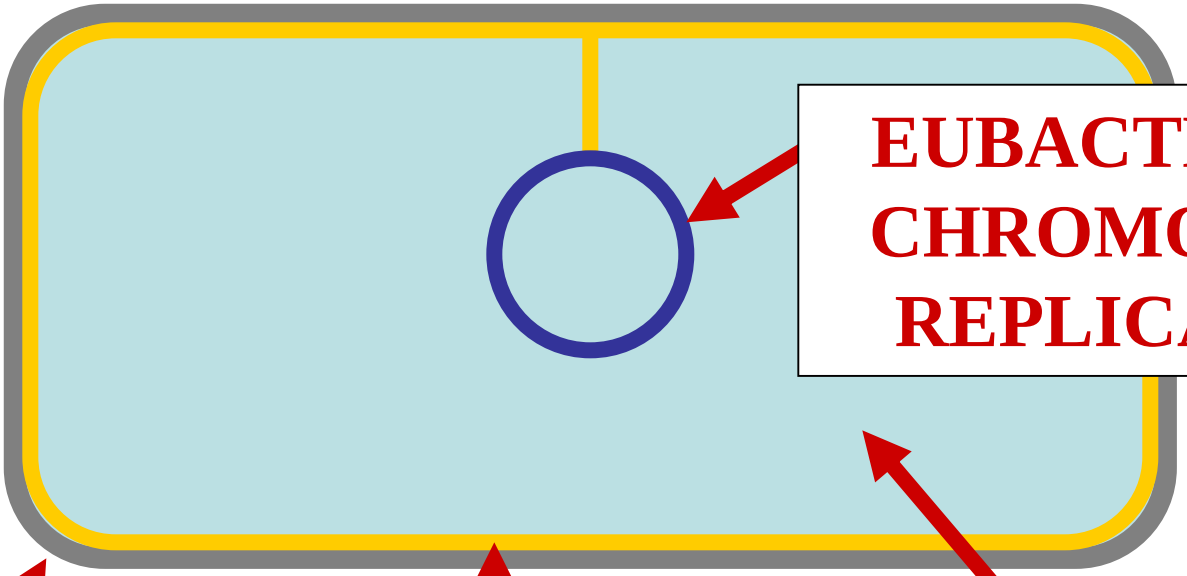


R

BINARY FISSION
MOTHER CELL



BINARY FISSION
MOTHER CELL



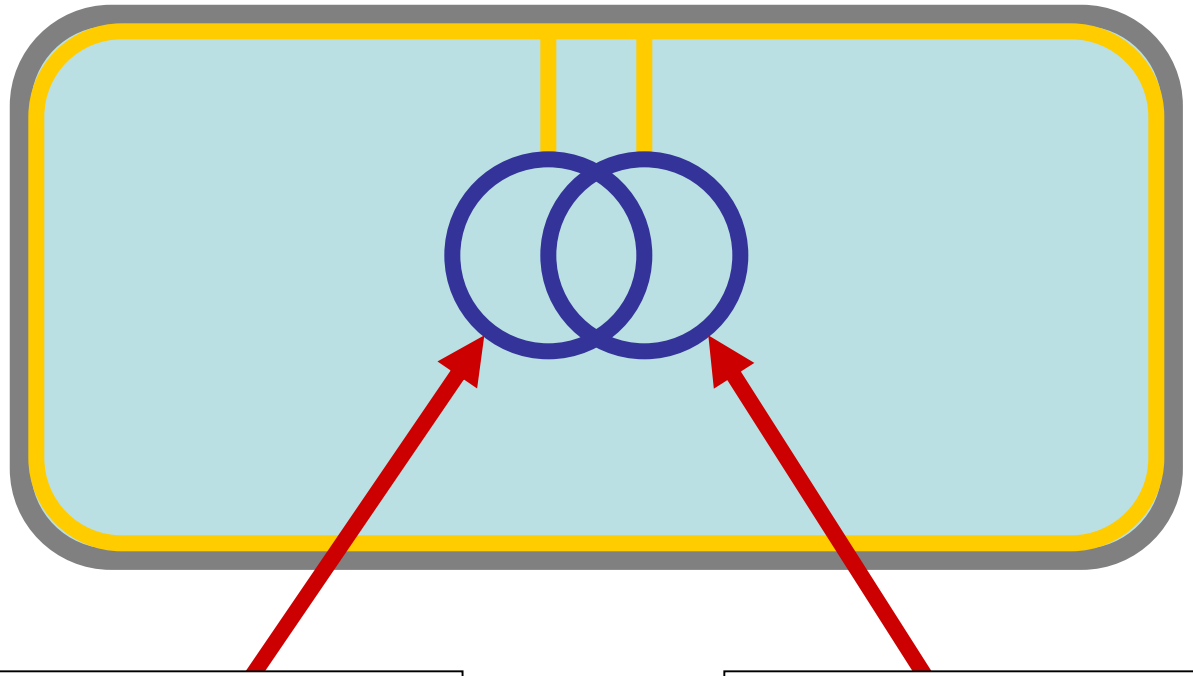
EUBACTERIUM CHROMOSOME REPLICATION

CELL WALL

CELL MEMBRANE

CYTOSOL

BINARY FISSION
MOTHER CELL

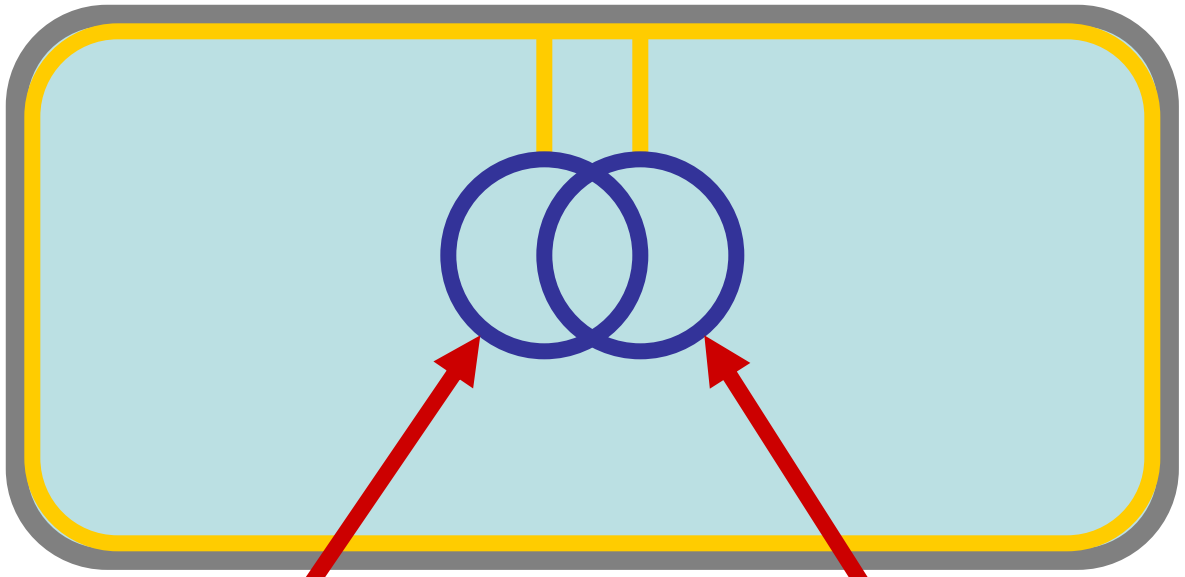


REPLICATED EUBACTERIUM CHROMOSOME

REPLICATED EUBACTERIUM CHROMOSOME

A

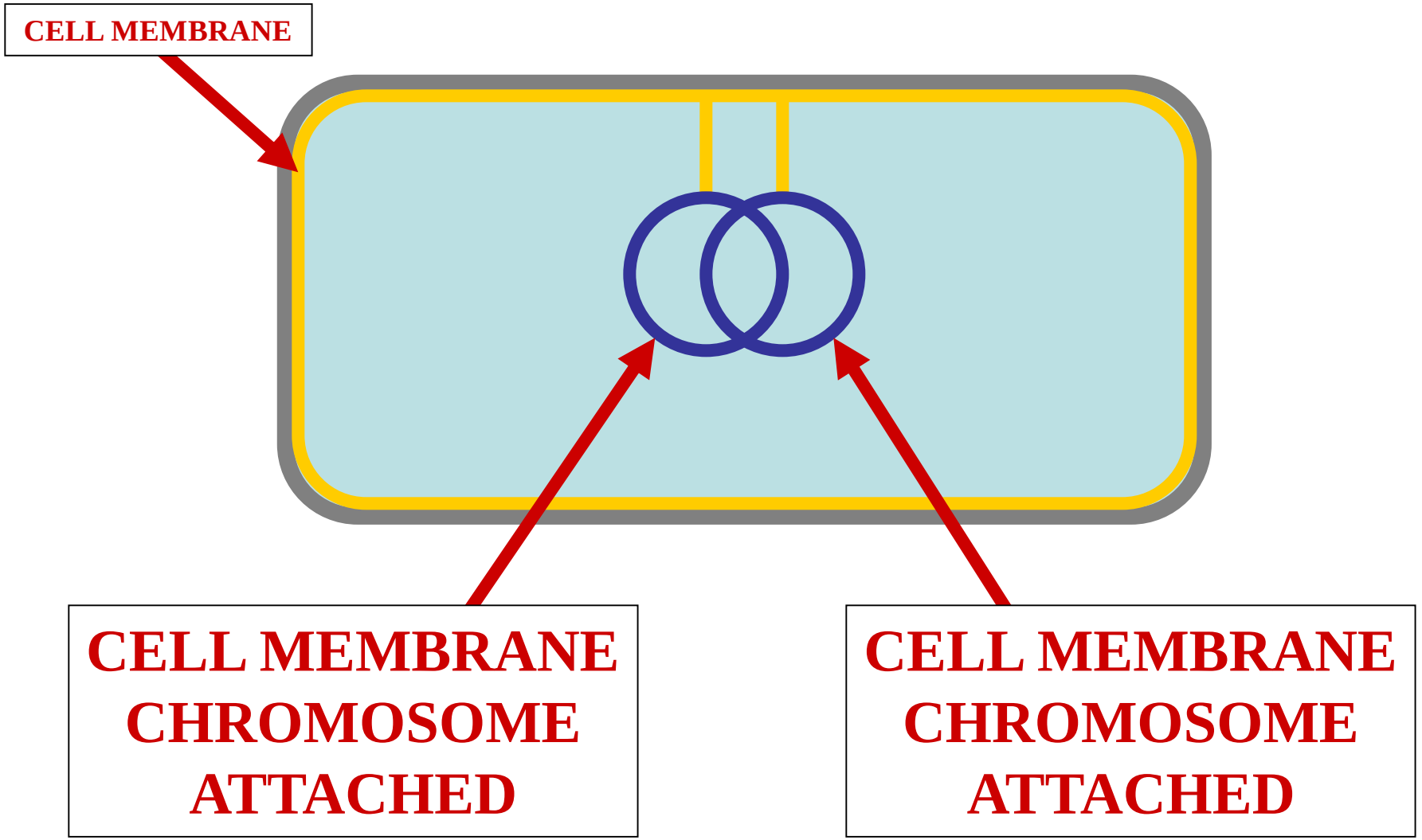
BINARY FISSION
MOTHER CELL



DNA CONTENT DOUBLED

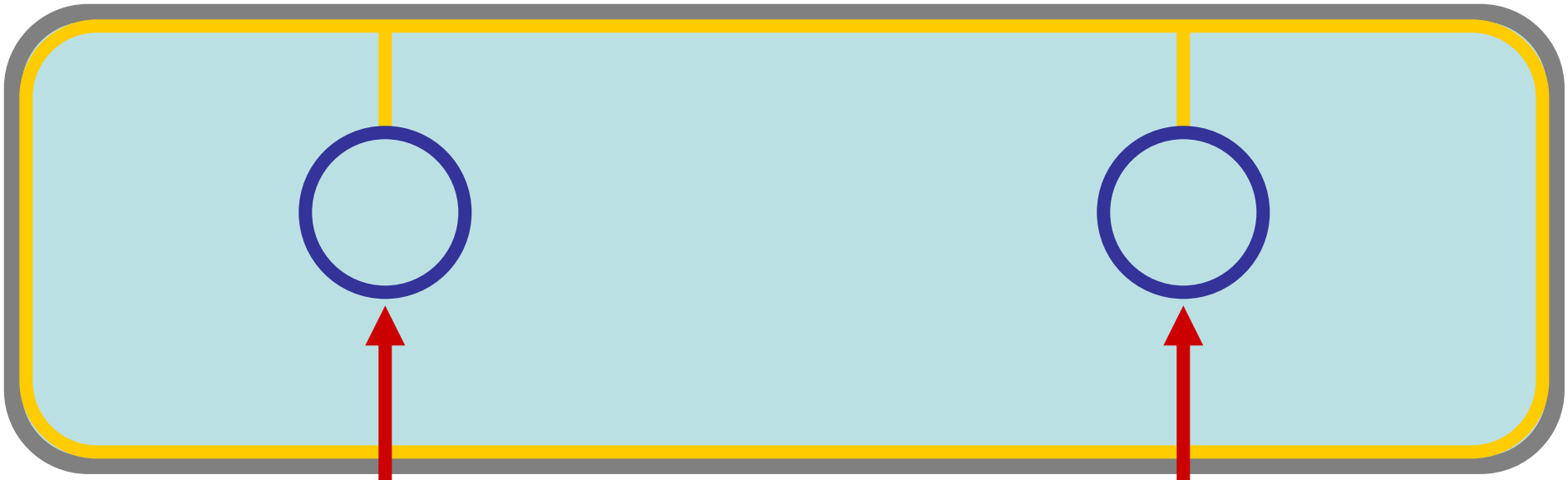
DNA CONTENT DOUBLED

BINARY FISSION
MOTHER CELL



S

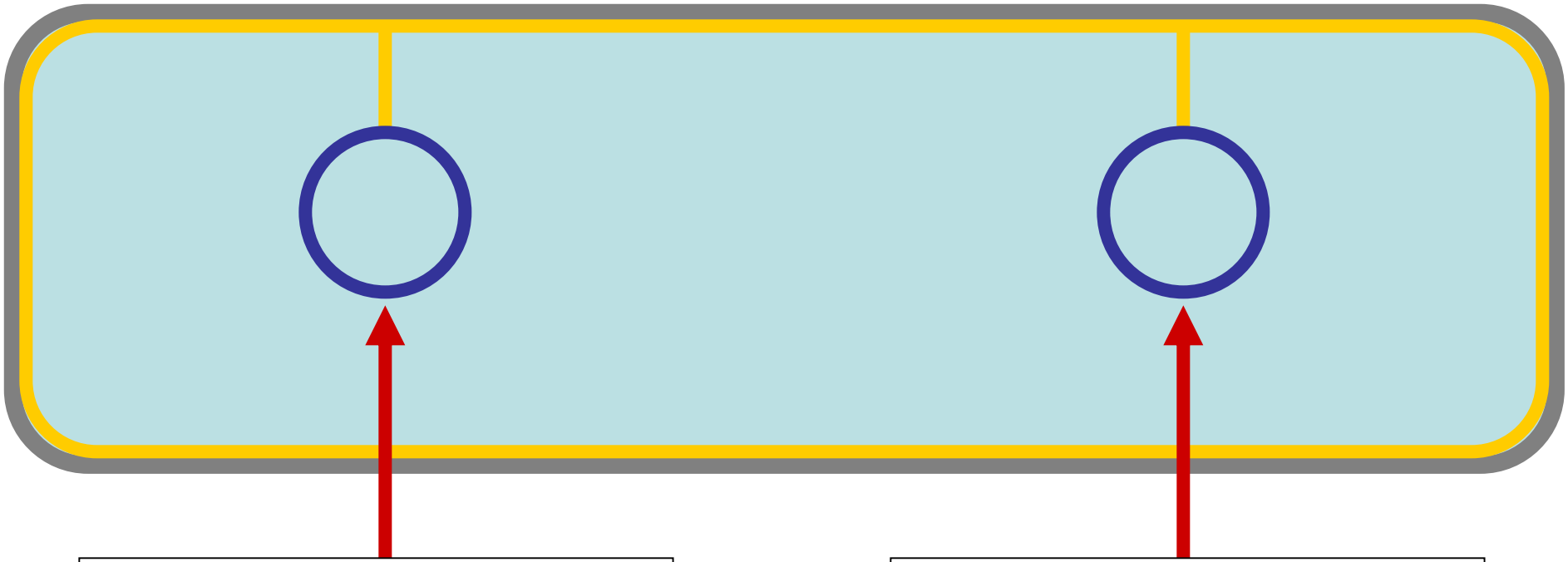
BINARY FISSION
MOTHER CELL



CELL
GROWTH
CELL MEMBRANE
GROWTH

CELL
GROWTH
CELL MEMBRANE
GROWTH

BINARY FISSION
MOTHER CELL

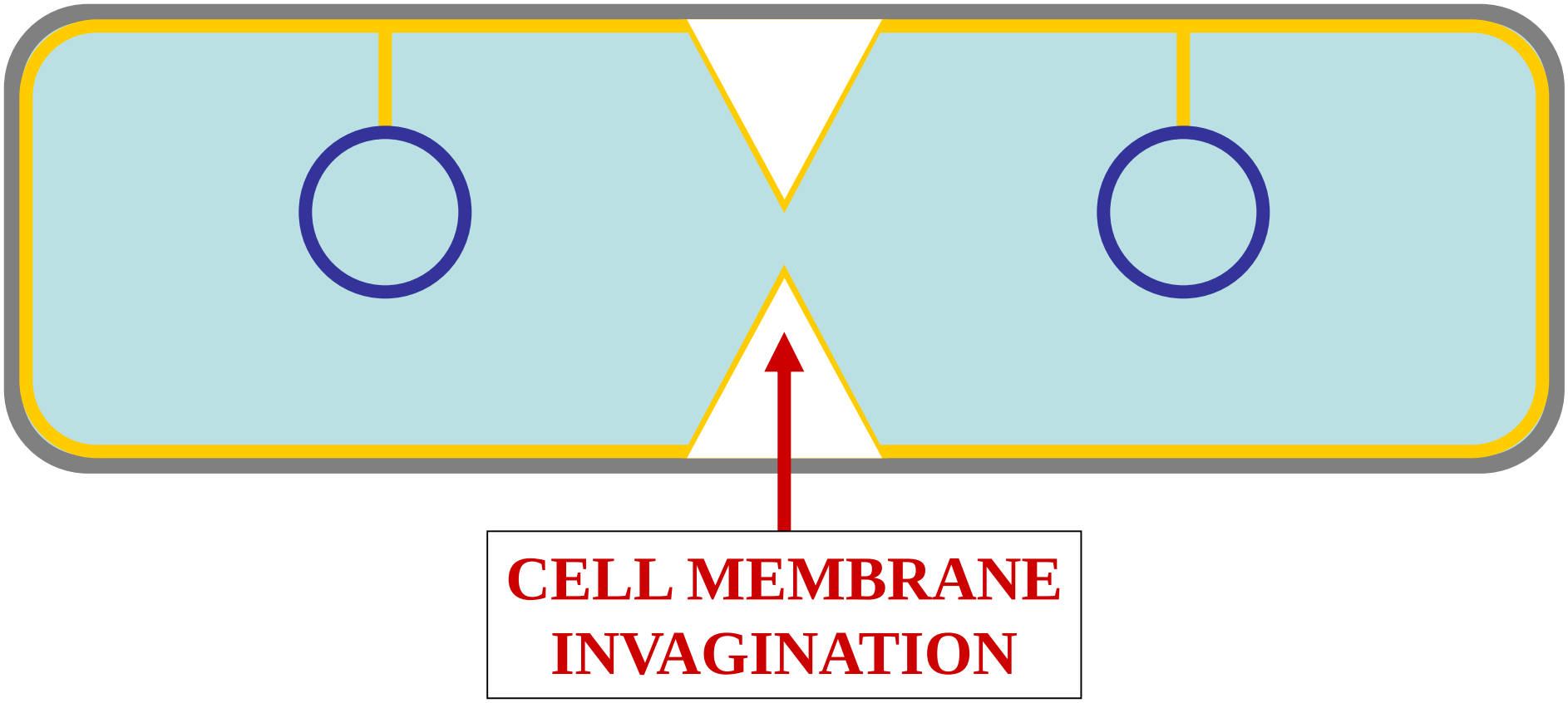


REPLICATED CHROMOSOME SEPARATE

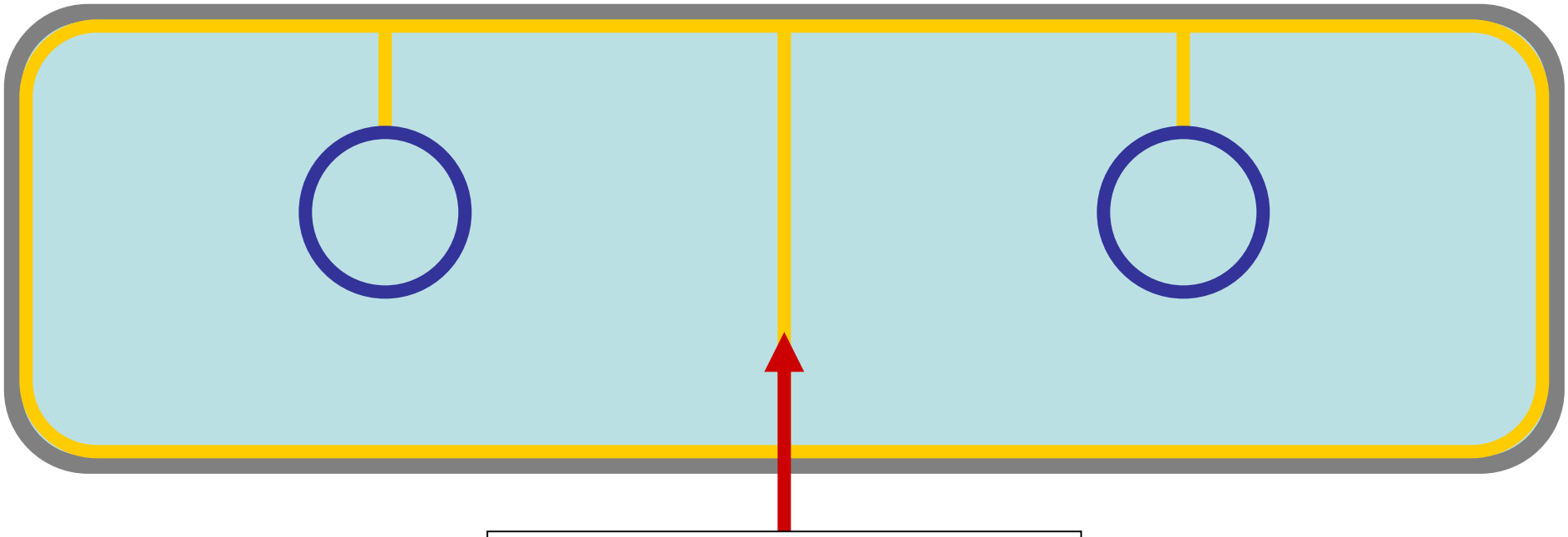
REPLICATED CHROMOSOMES SEPARATE

I

BINARY FISSION
MOTHER CELL

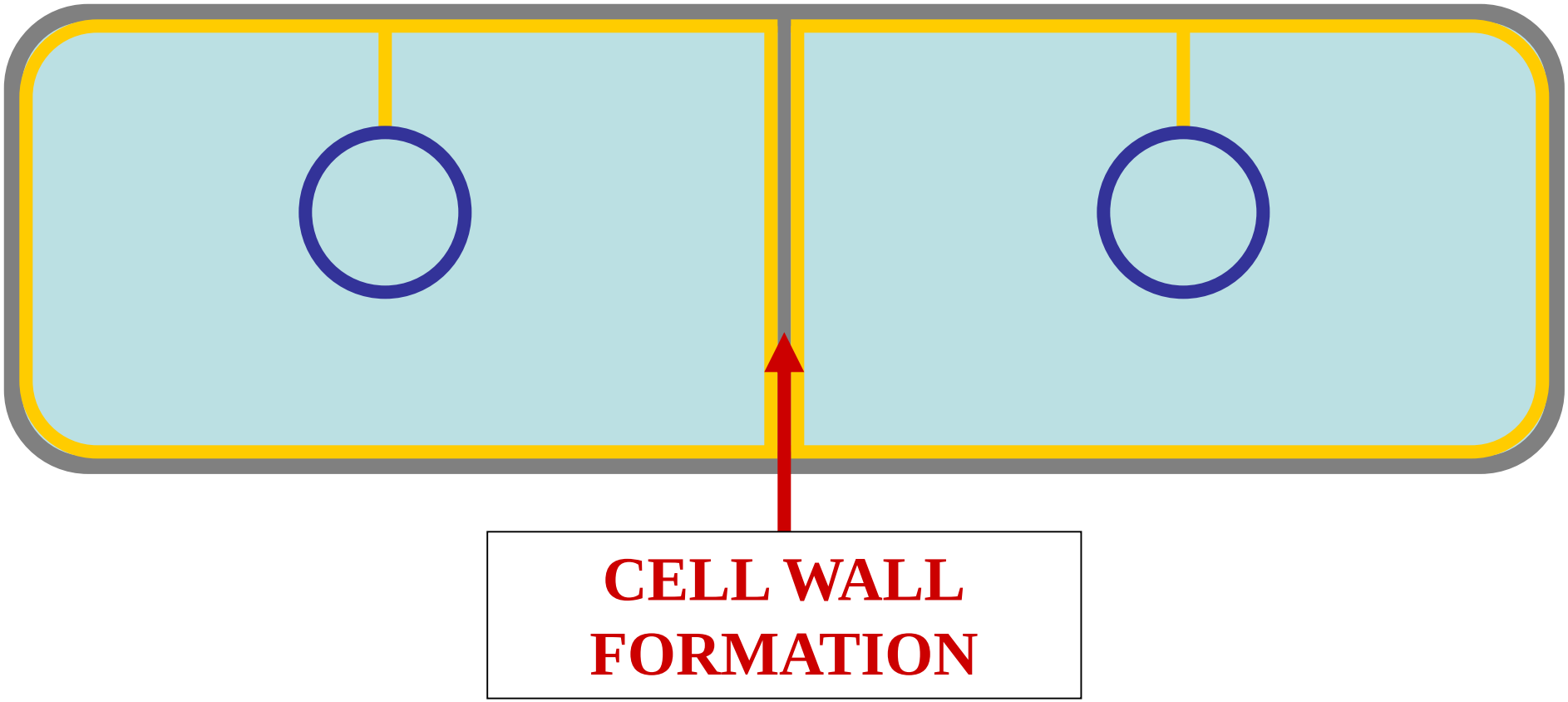


BINARY FISSION
MOTHER CELL

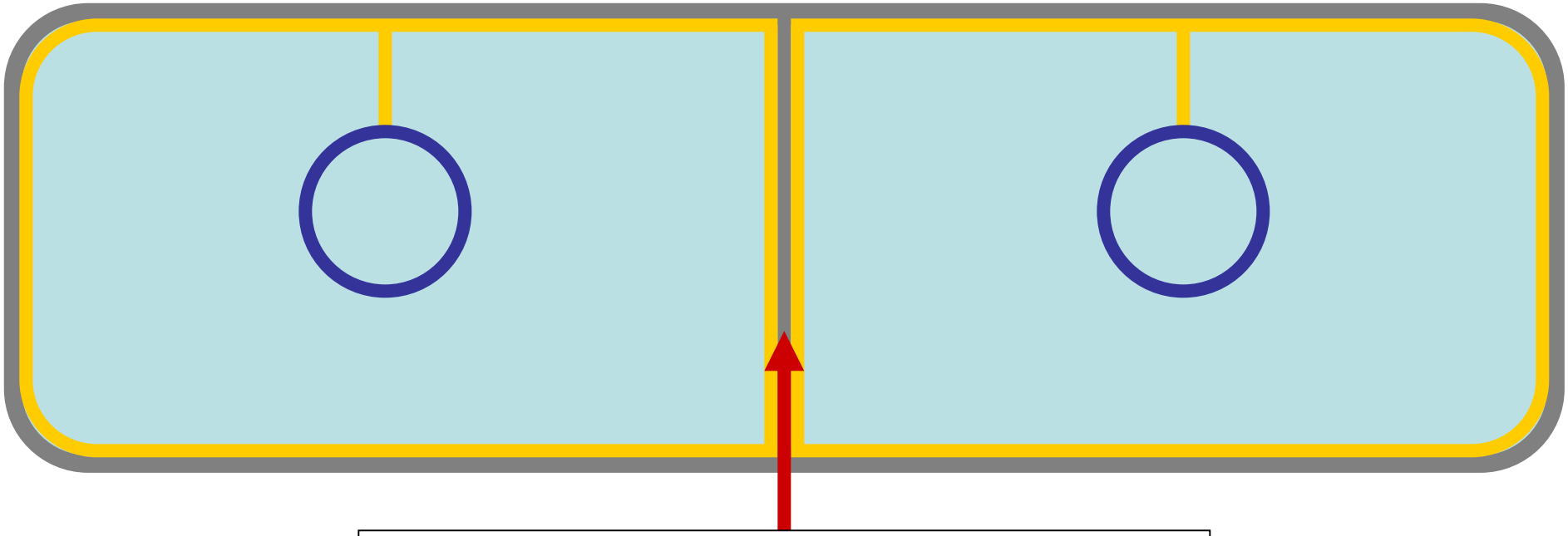


CELL MEMBRANE ISOLATES CHROMOSOMES

BINARY FISSION
MOTHER CELL



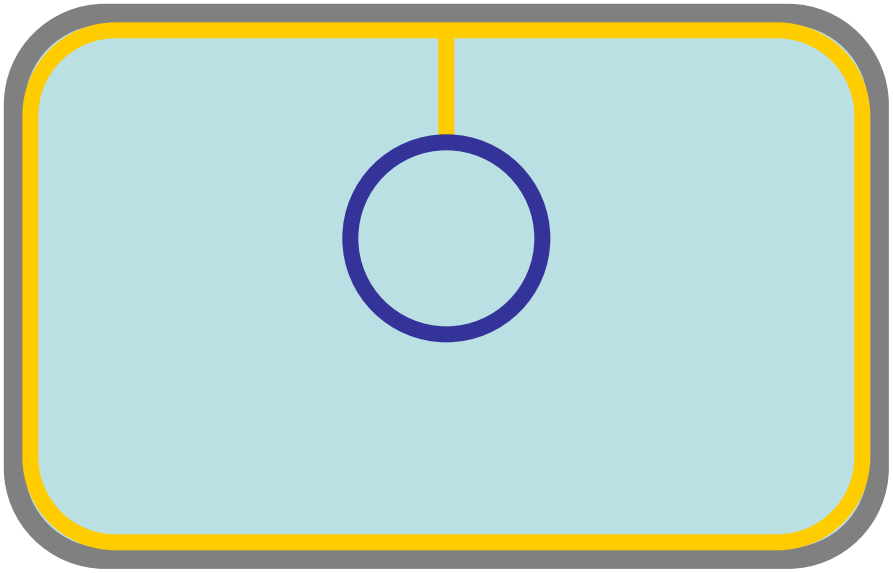
BINARY FISSION
MOTHER CELL

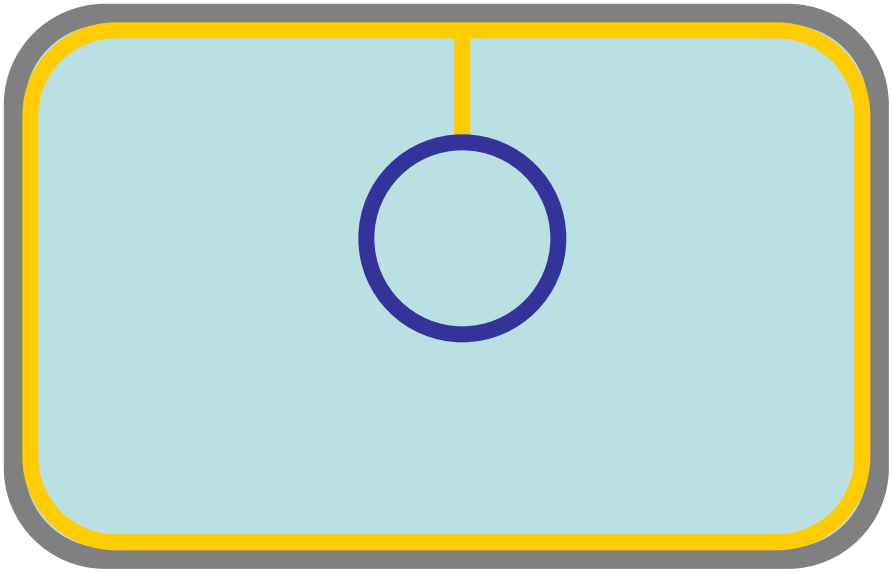


CELL WALL
PARTITIONS
MOTHER CELL CYTOSOL

D

BINARY FISSION
MOTHER CELL

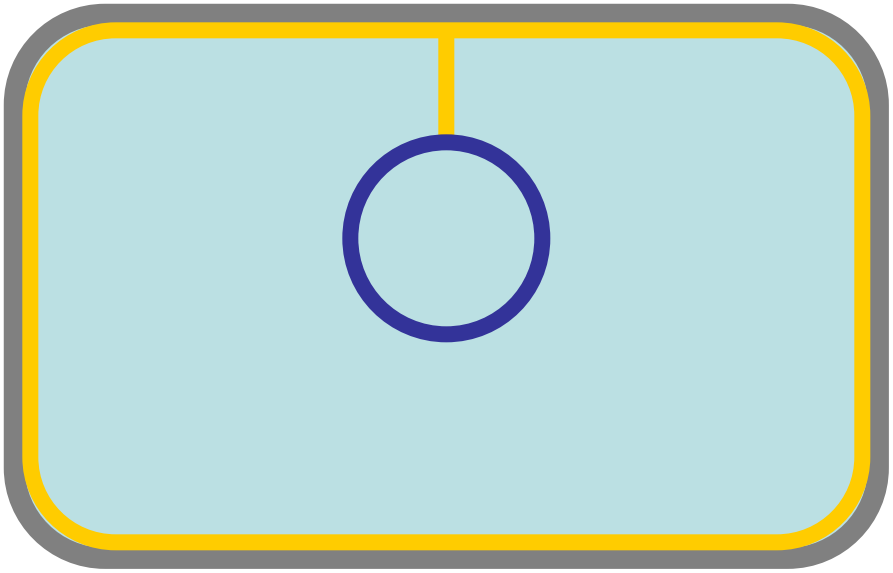


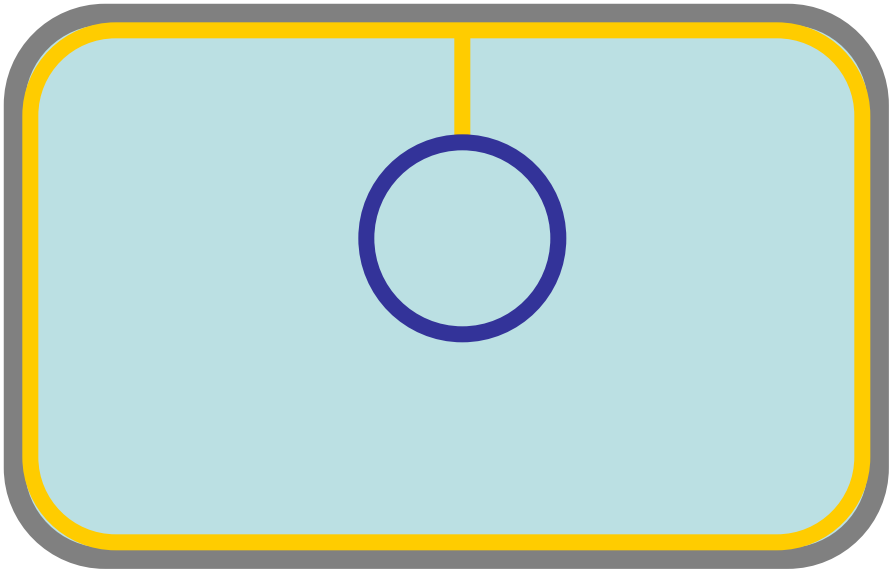


EUBACTERIUM CELL

EUBACTERIUM CELL

BINARY FISSION
MOTHER CELL

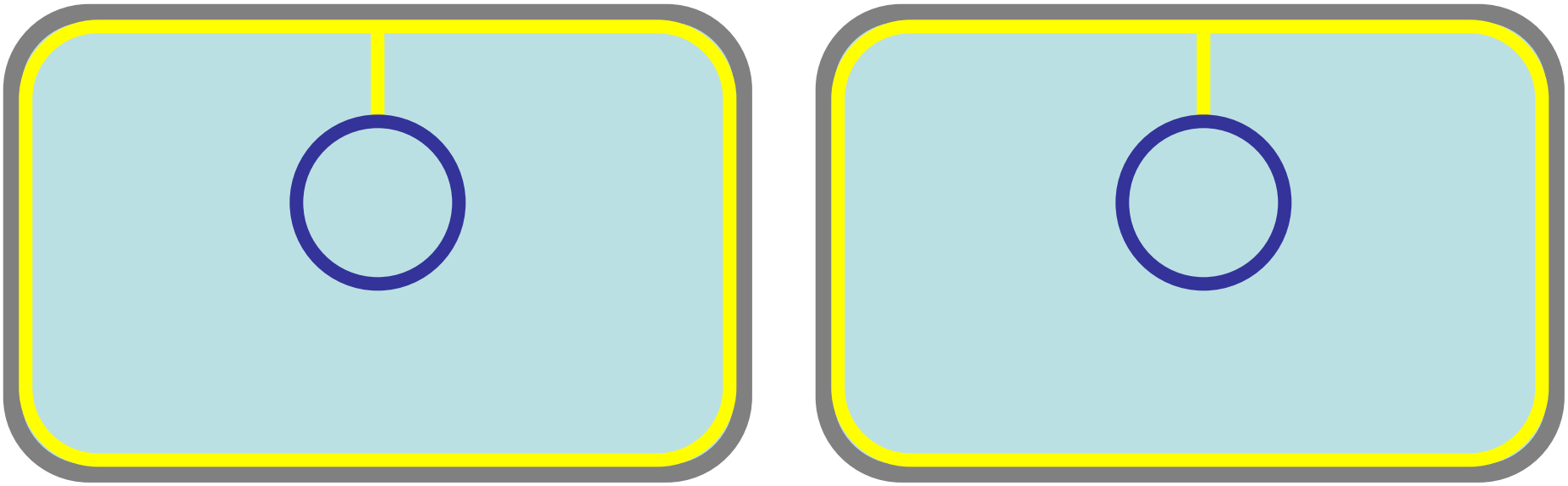




DAUGHTER CELL

DAUGHTER CELL

DAUGHTER CELLS



GENETICALLY IDENTICAL

FRAGMENTATION

FRAGMENTATION

AP

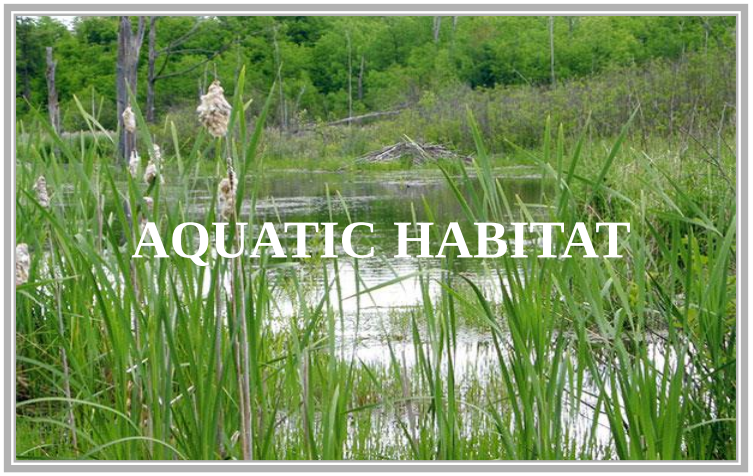
FRAGMENTATION

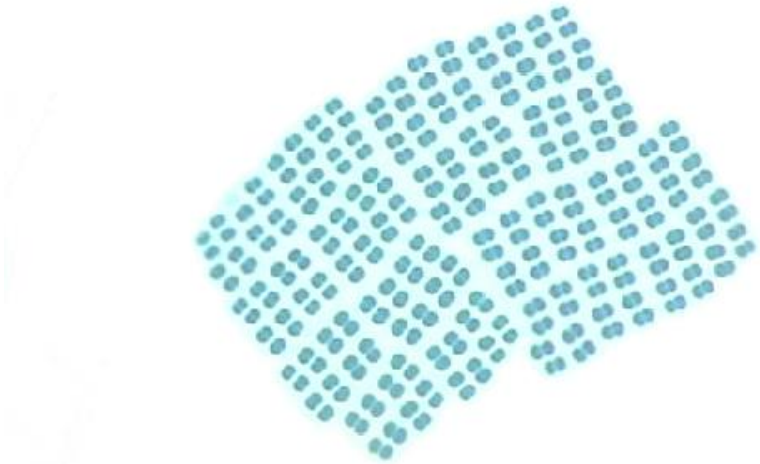
COLONY OR FILAMENT BREAK-UP

FRAGMENTATION

FRAGMENTATION APPLIED

COLONY



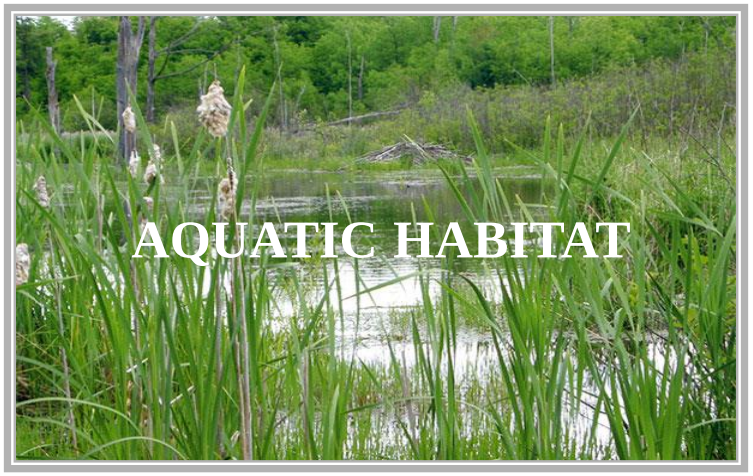


+

F

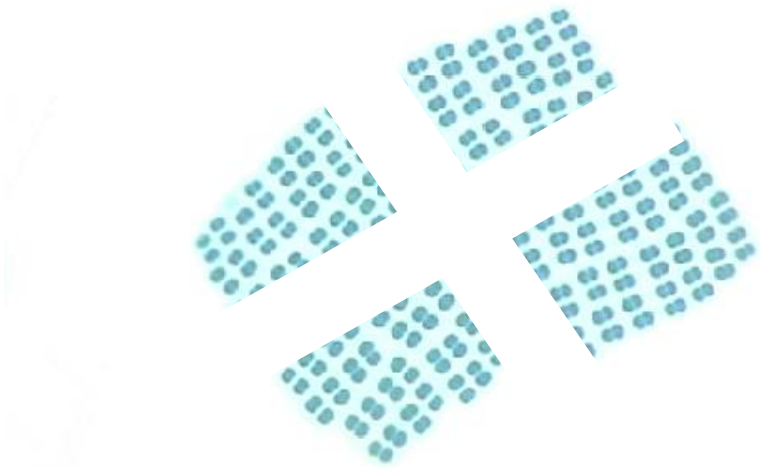
FILAMENT

COLONY



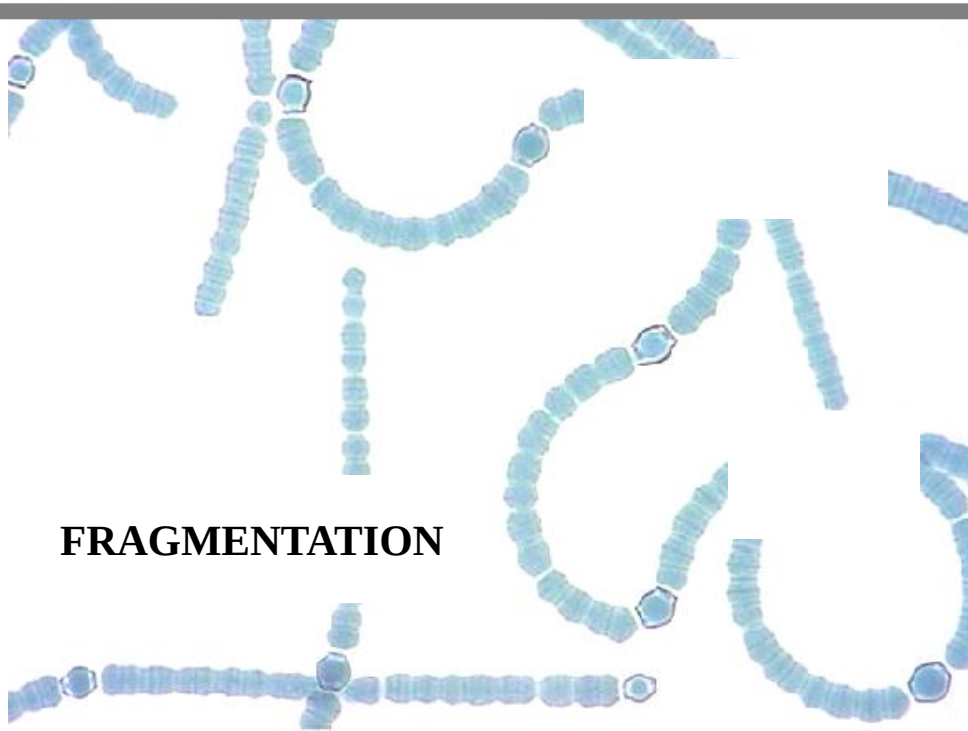
A

+



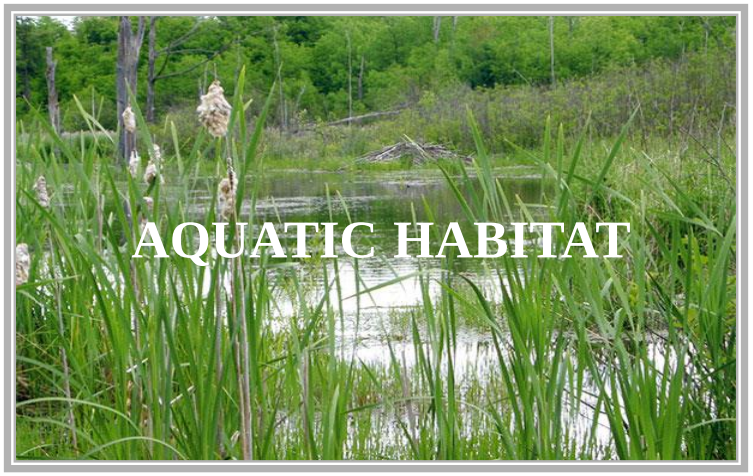
FRAGMENTATION

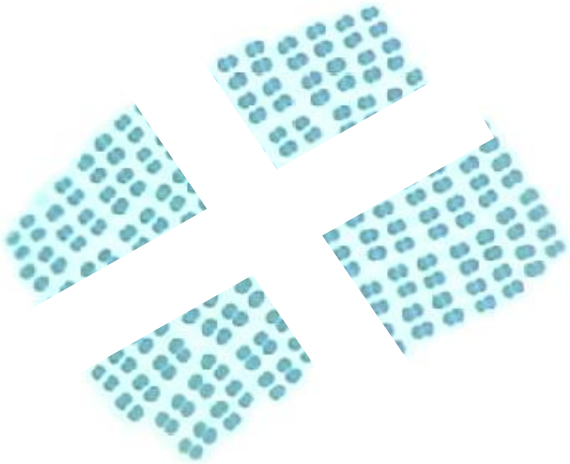
FILAMENT



FRAGMENTATION

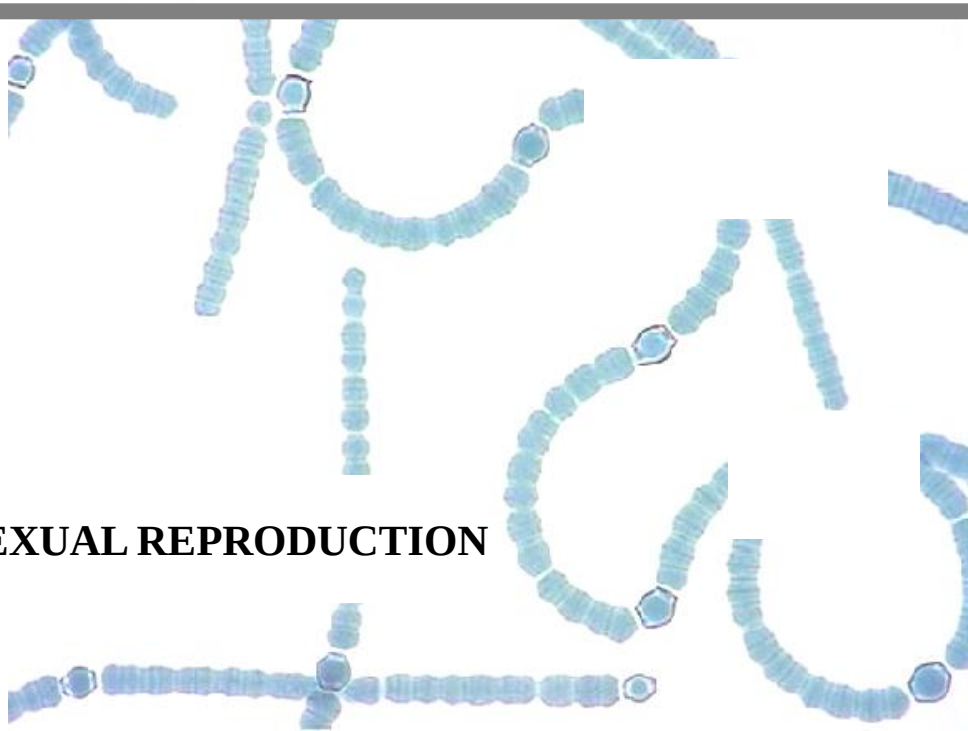
COLONY





ASEXUAL REPRODUCTION

FILAMENT



ASEXUAL REPRODUCTION

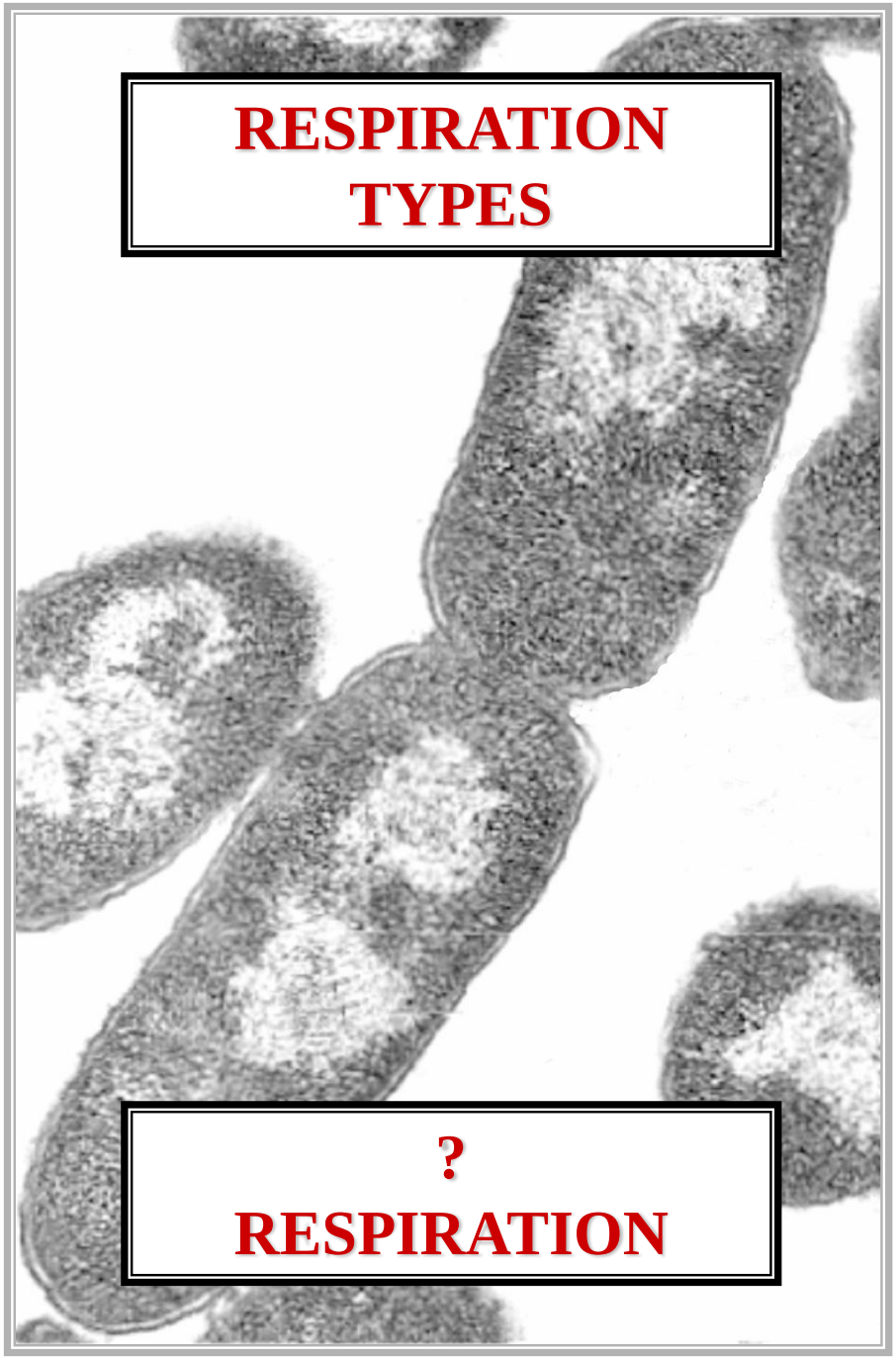
EUBACTERIA METABOLISM

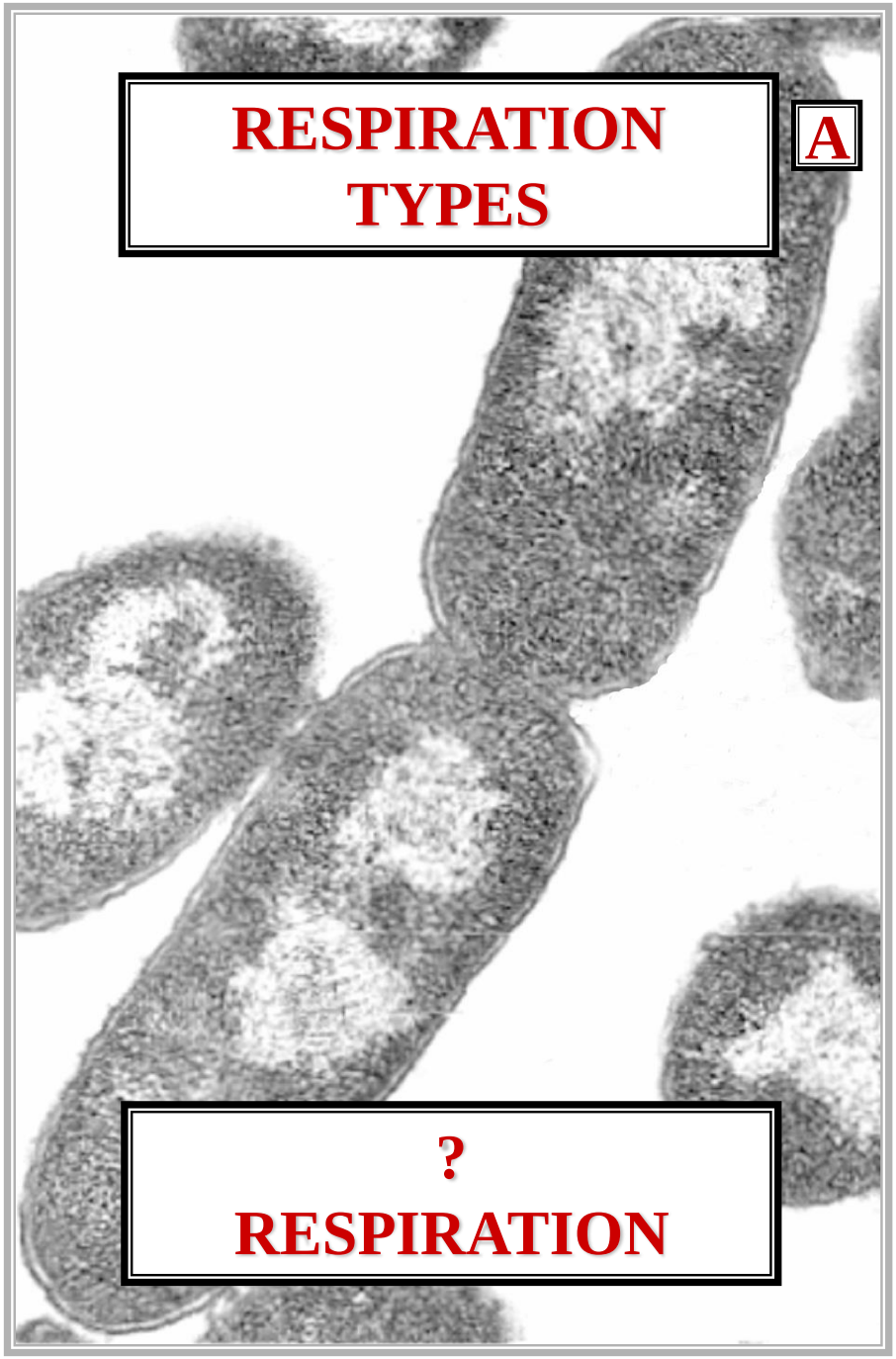

?
EUBACTERIA
METABOLISM
HIGHLY DIVERSE
RESPIRATION
&
NUTRITION

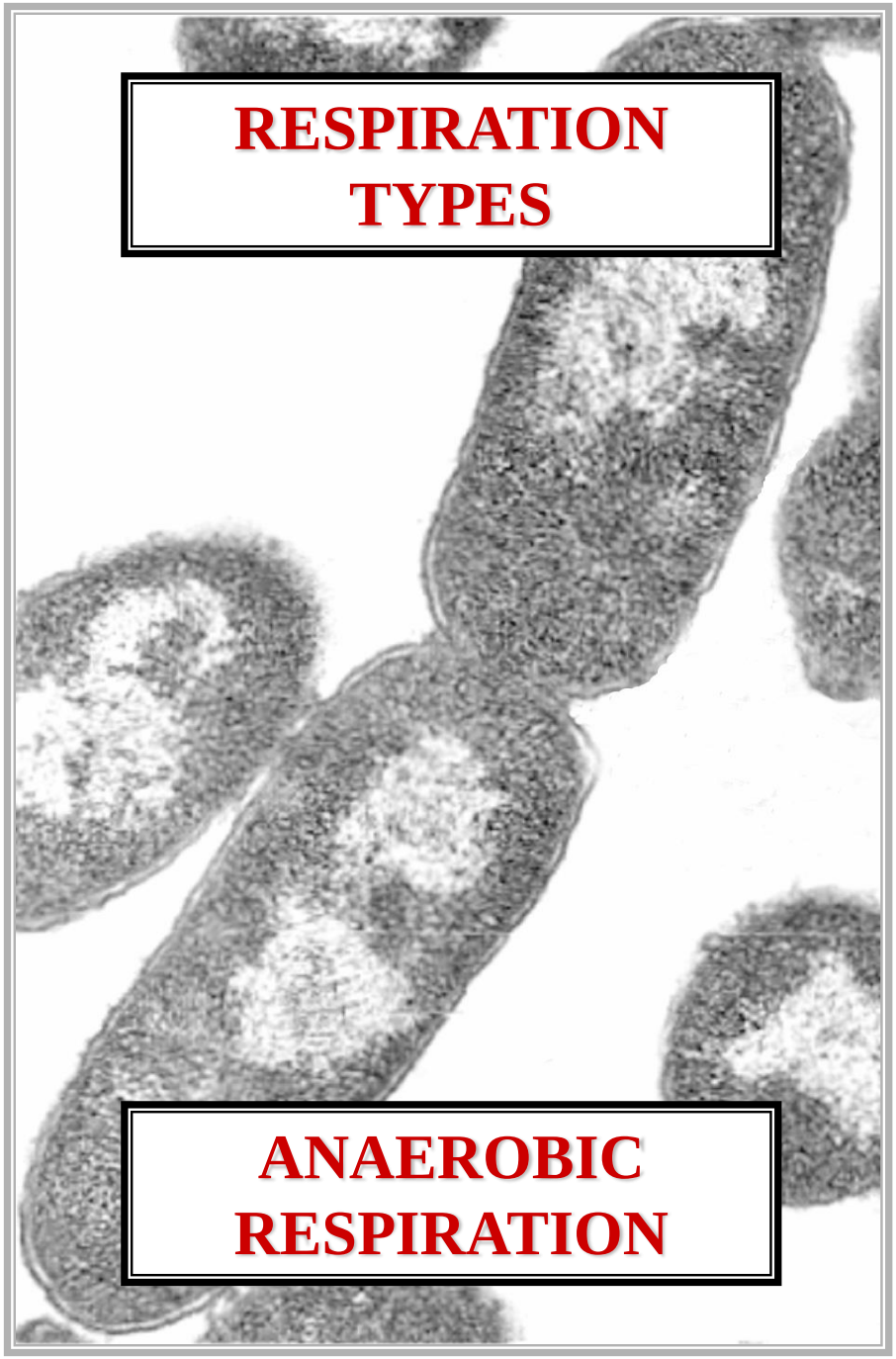
QUESTION

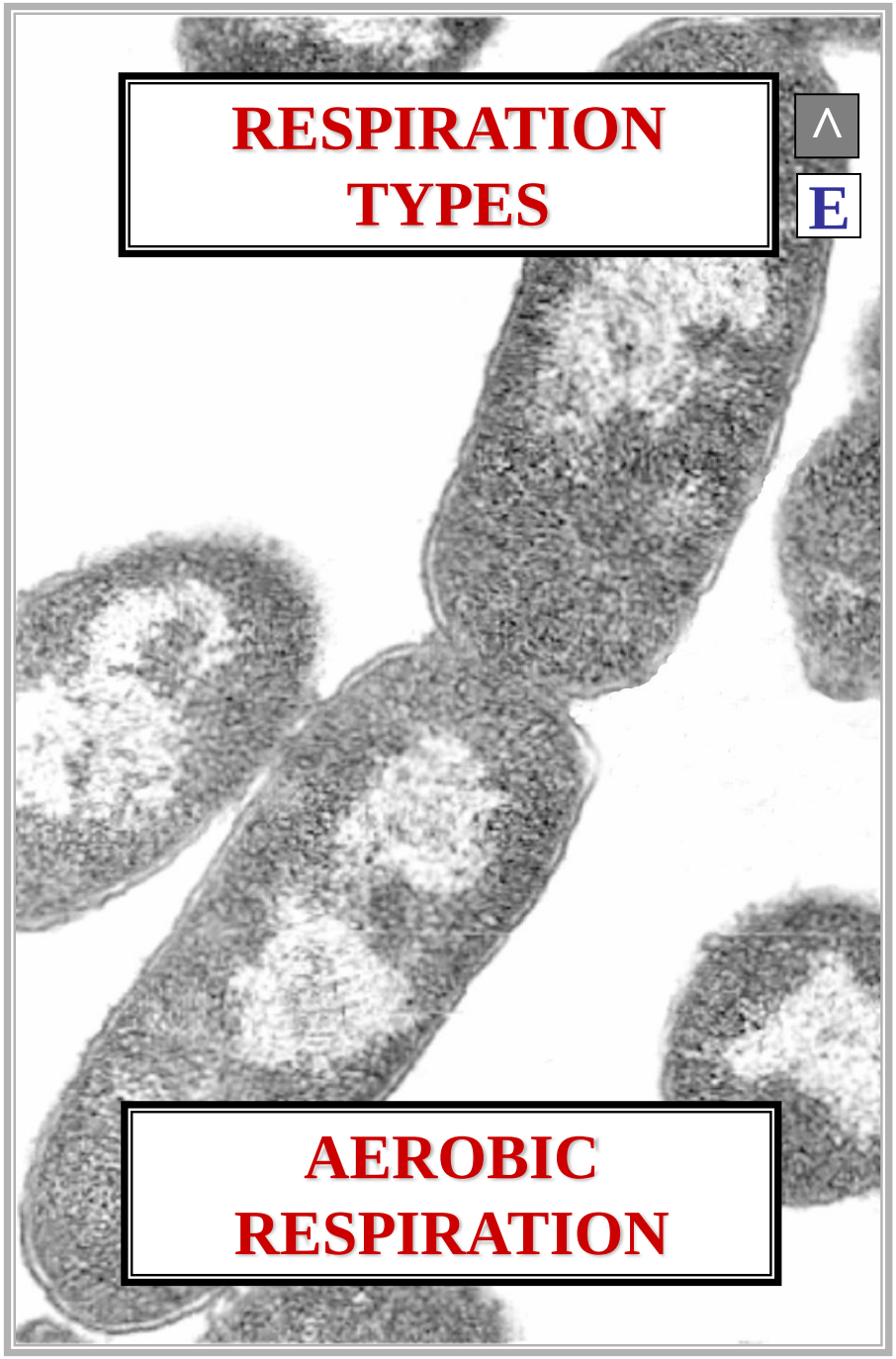
WHAT ARE THE RESPIRATION TYPES?

QUESTION


RESPIRATION
TYPES
?
RESPIRATION


RESPIRATION
TYPES
A
?
RESPIRATION


RESPIRATION TYPES
ANAEROBIC RESPIRATION


RESPIRATION TYPES
^
E
AEROBIC RESPIRATION

EUBACTERIA RESPIRATION MODES

EUBACTERIA
RESPIRATION
MODES

OBLIGATE ANAEROBES

EUBACTERIA
RESPIRATION
MODES

EUBACTERIA
RESPIRATION
MODES

OBLIGATE ANAEROBES
FACULTATIVE ANAEROBES

EUBACTERIA
RESPIRATION
MODES

EUBACTERIA
RESPIRATION
MODES

O

OBLIGATE ANAEROBE

FACULTATIVE ANAEROBES

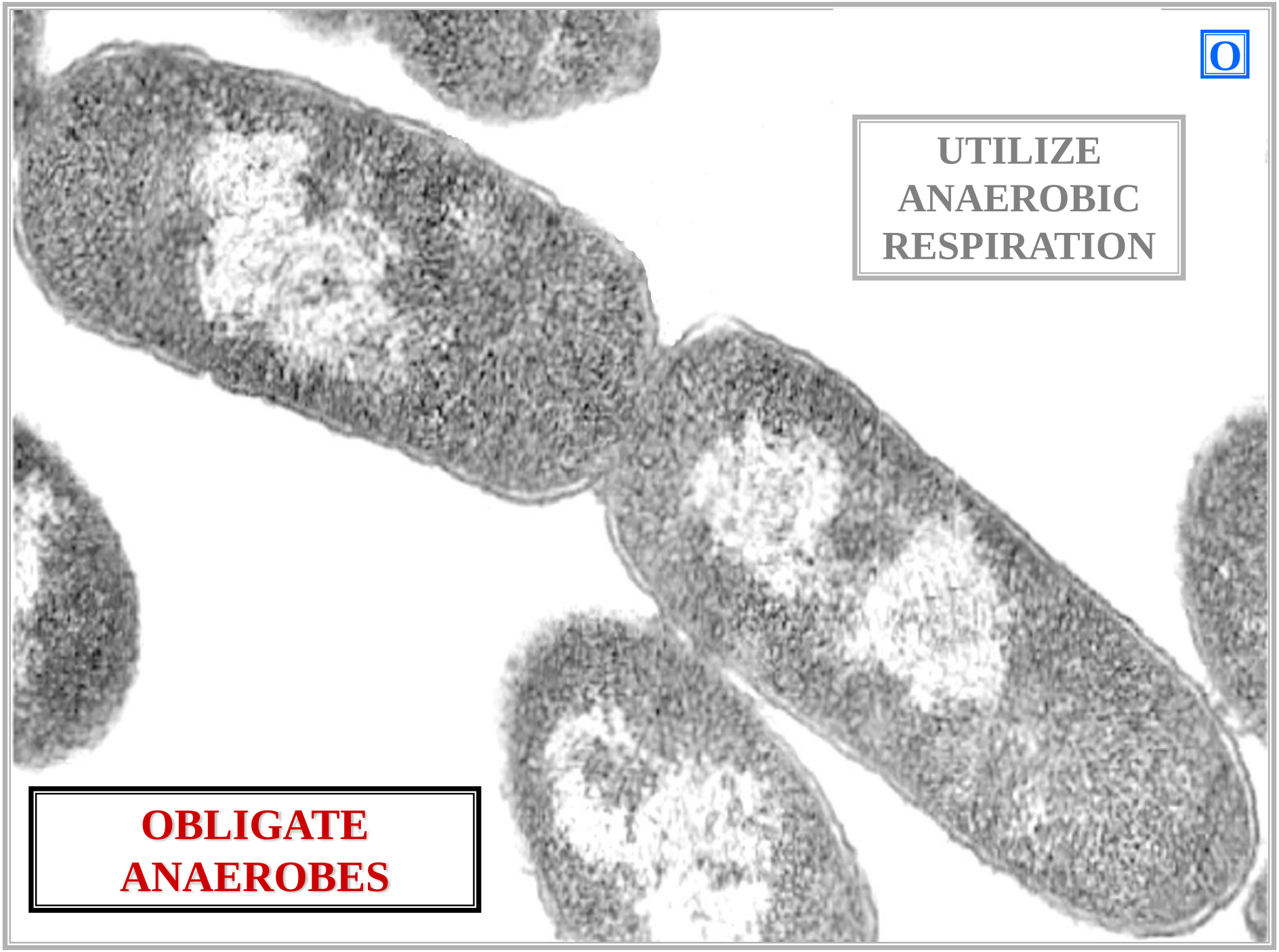
OBLIGATE AEROBES

EUBACTERIA
RESPIRATION
MODES

OBLIGATE ANAEROBES

A

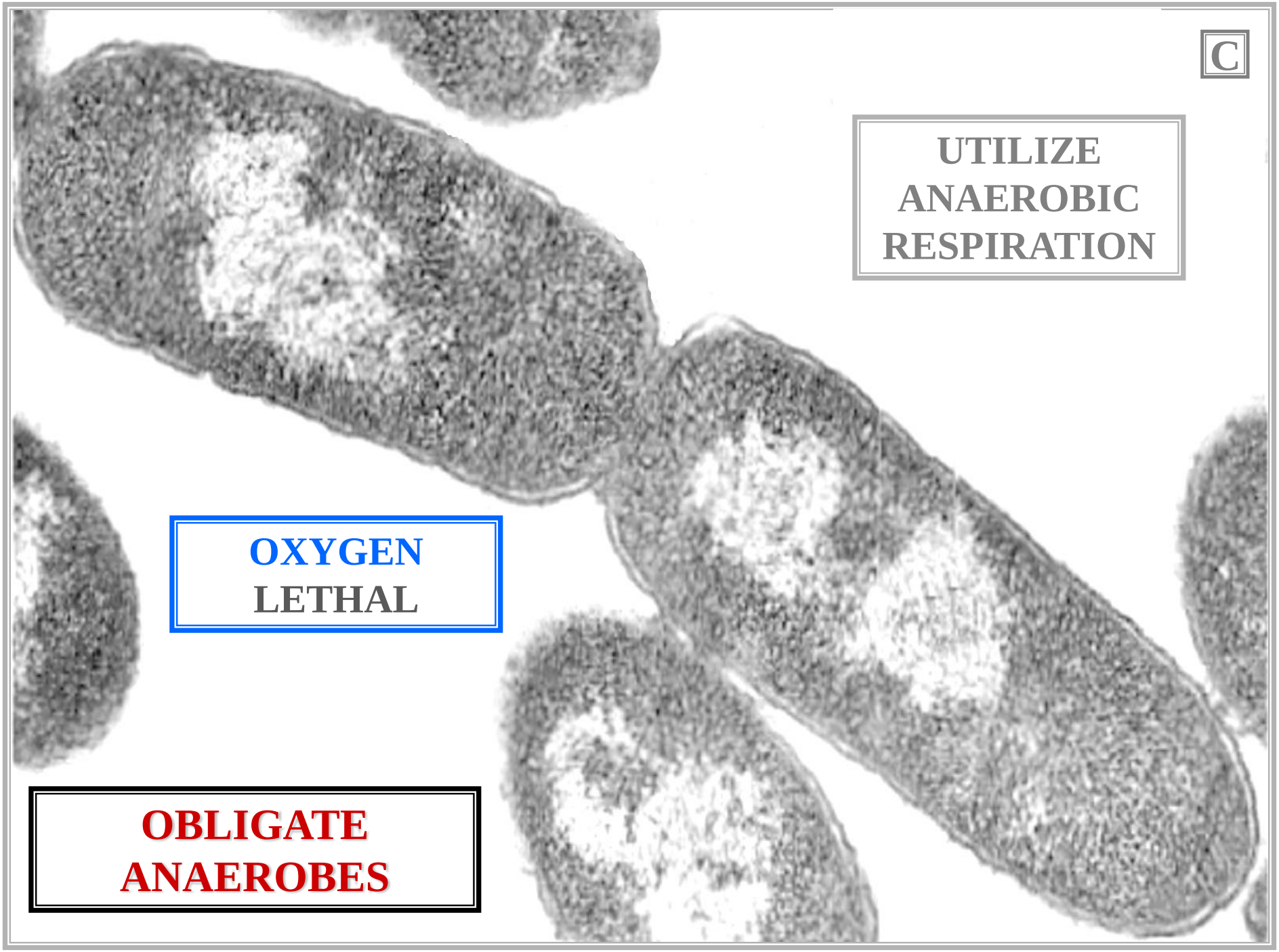
OBLIGATE ANAEROBES

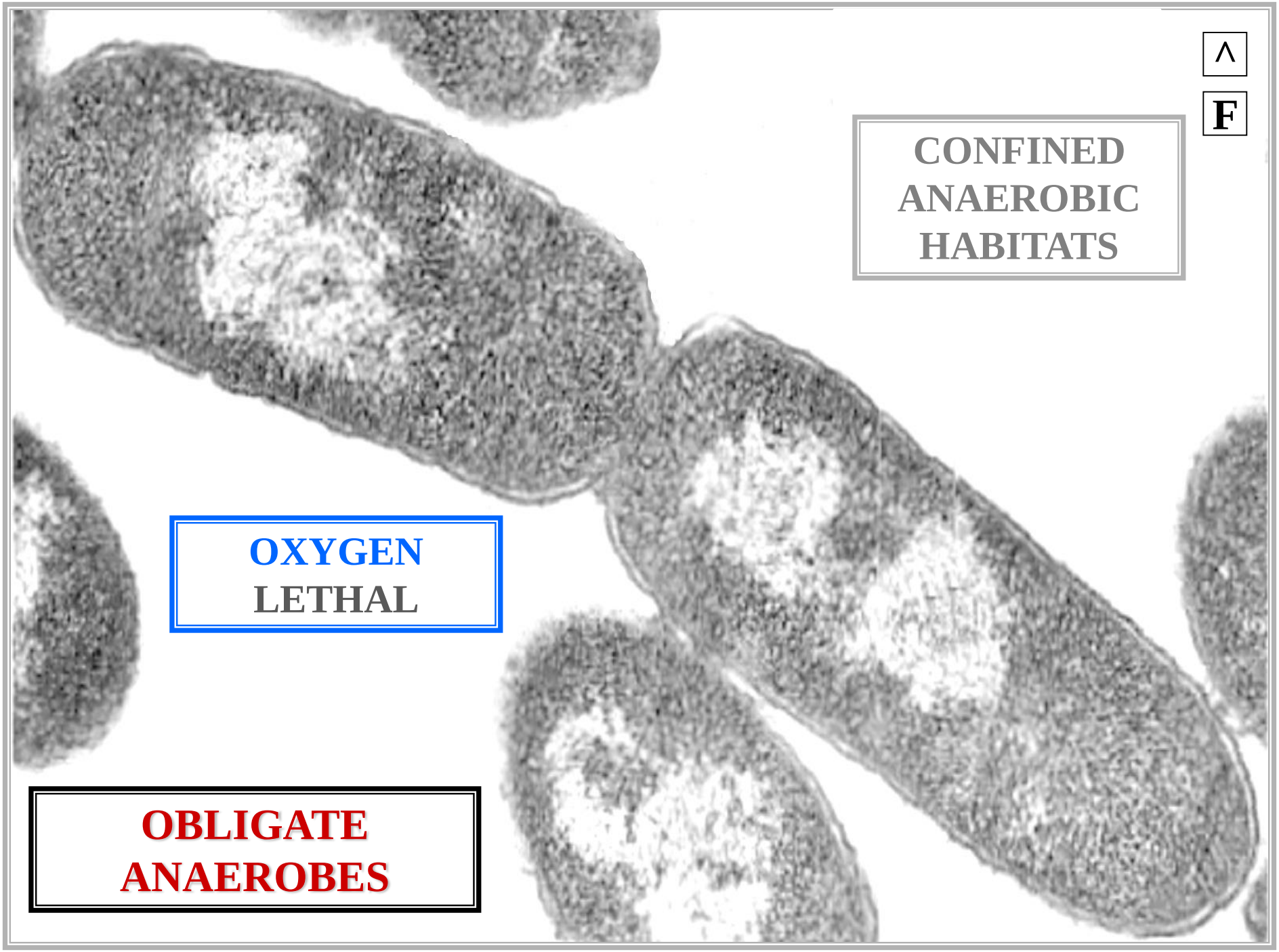


O

UTILIZE ANAEROBIC RESPIRATION

OBLIGATE ANAEROBES

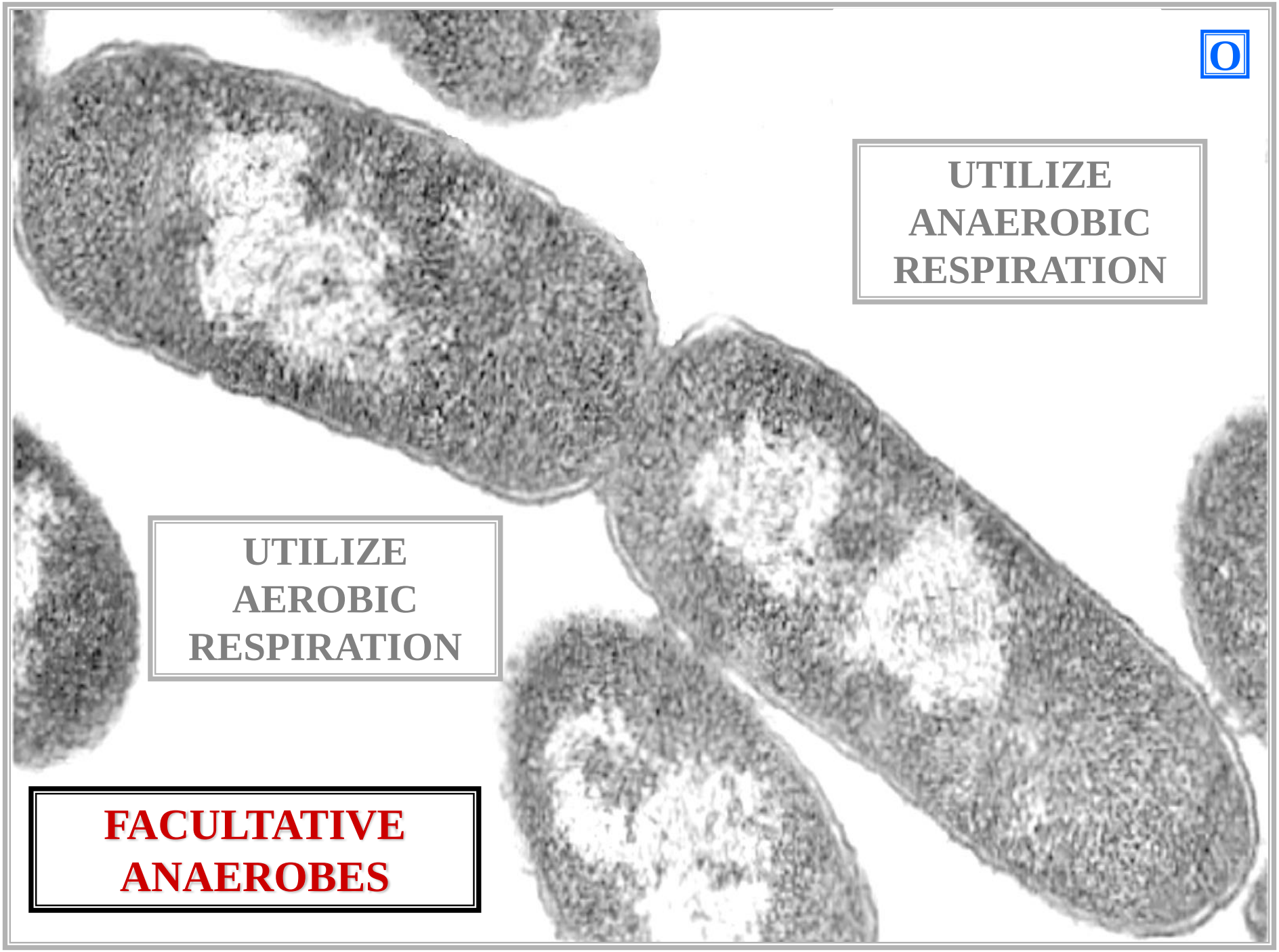

C
UTILIZE
ANAEROBIC
RESPIRATION
OXYGEN
LETHAL
OBLIGATE
ANAEROBES

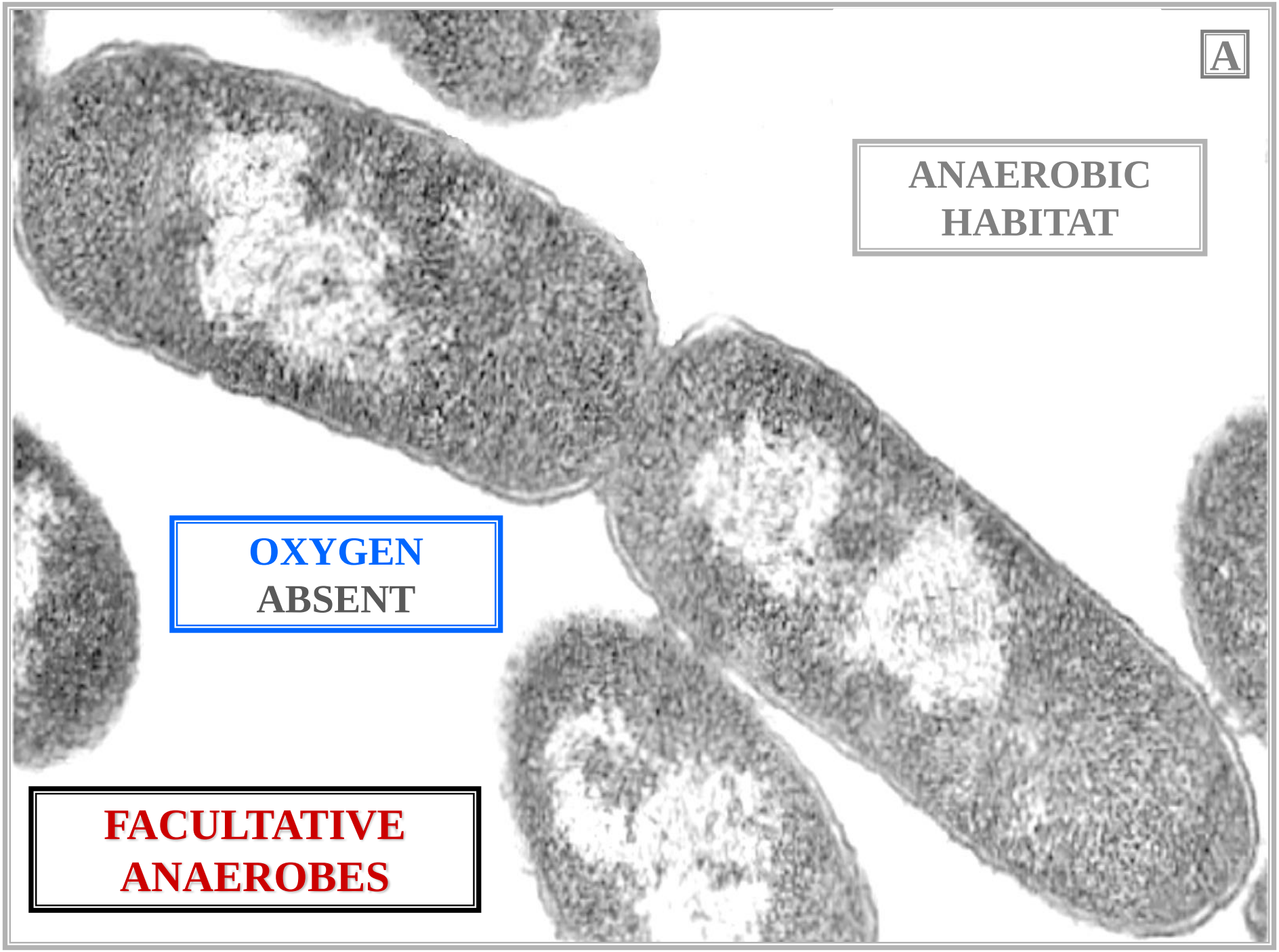

^
F
CONFINED
ANAEROBIC
HABITATS
OXYGEN
LETHAL
OBLIGATE
ANAEROBES

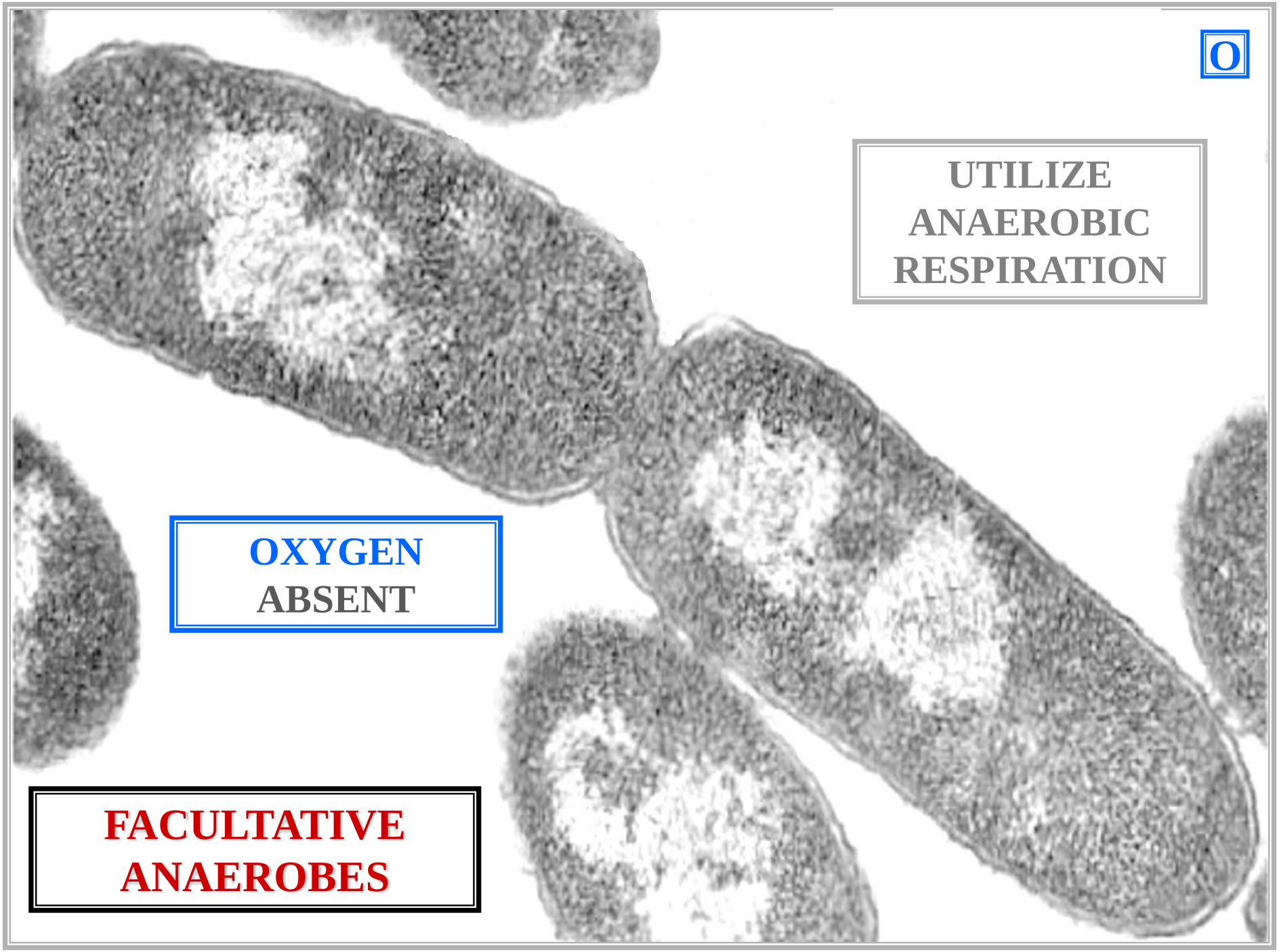
FACULTATIVE ANAEROBES

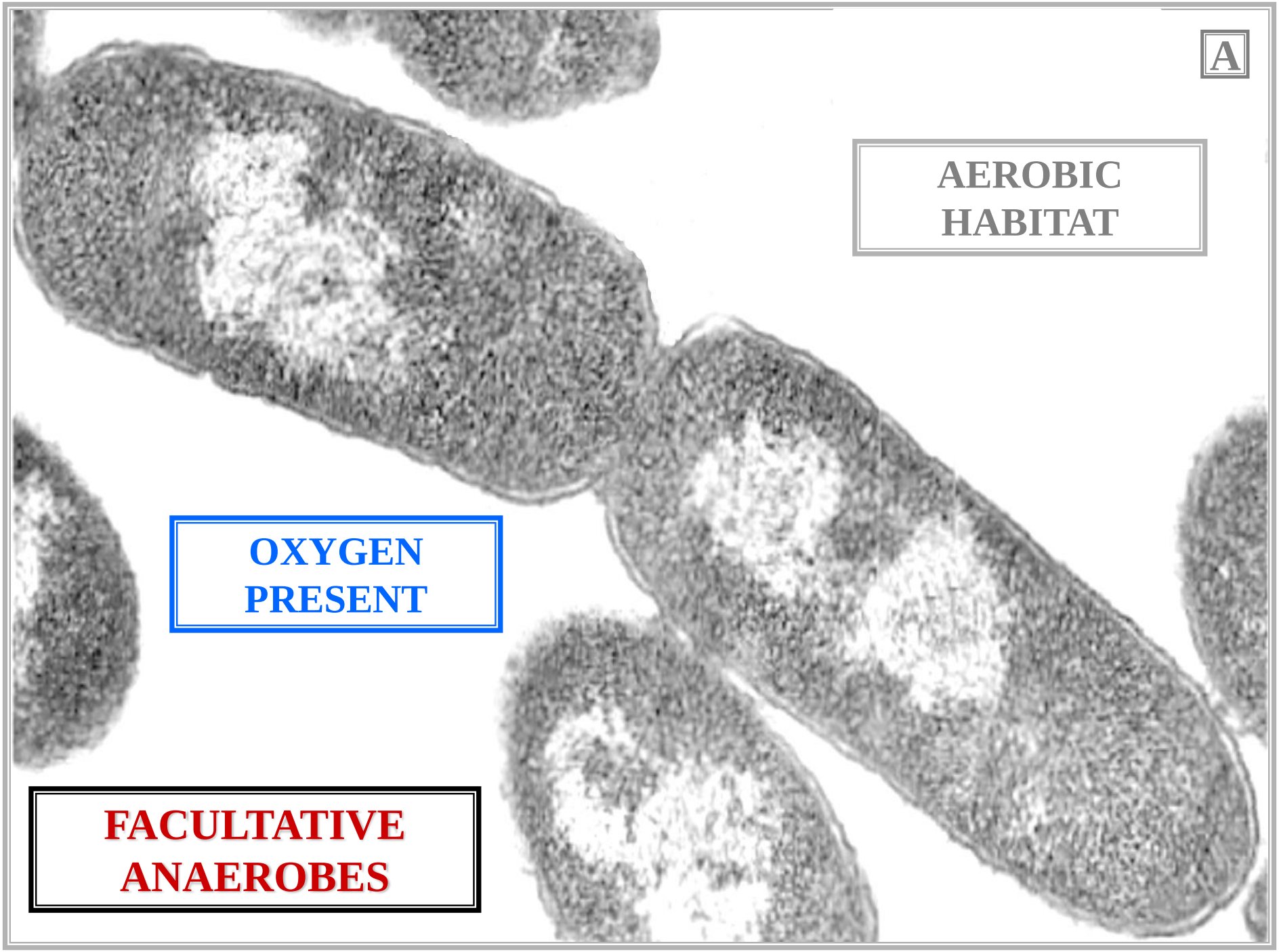
AA

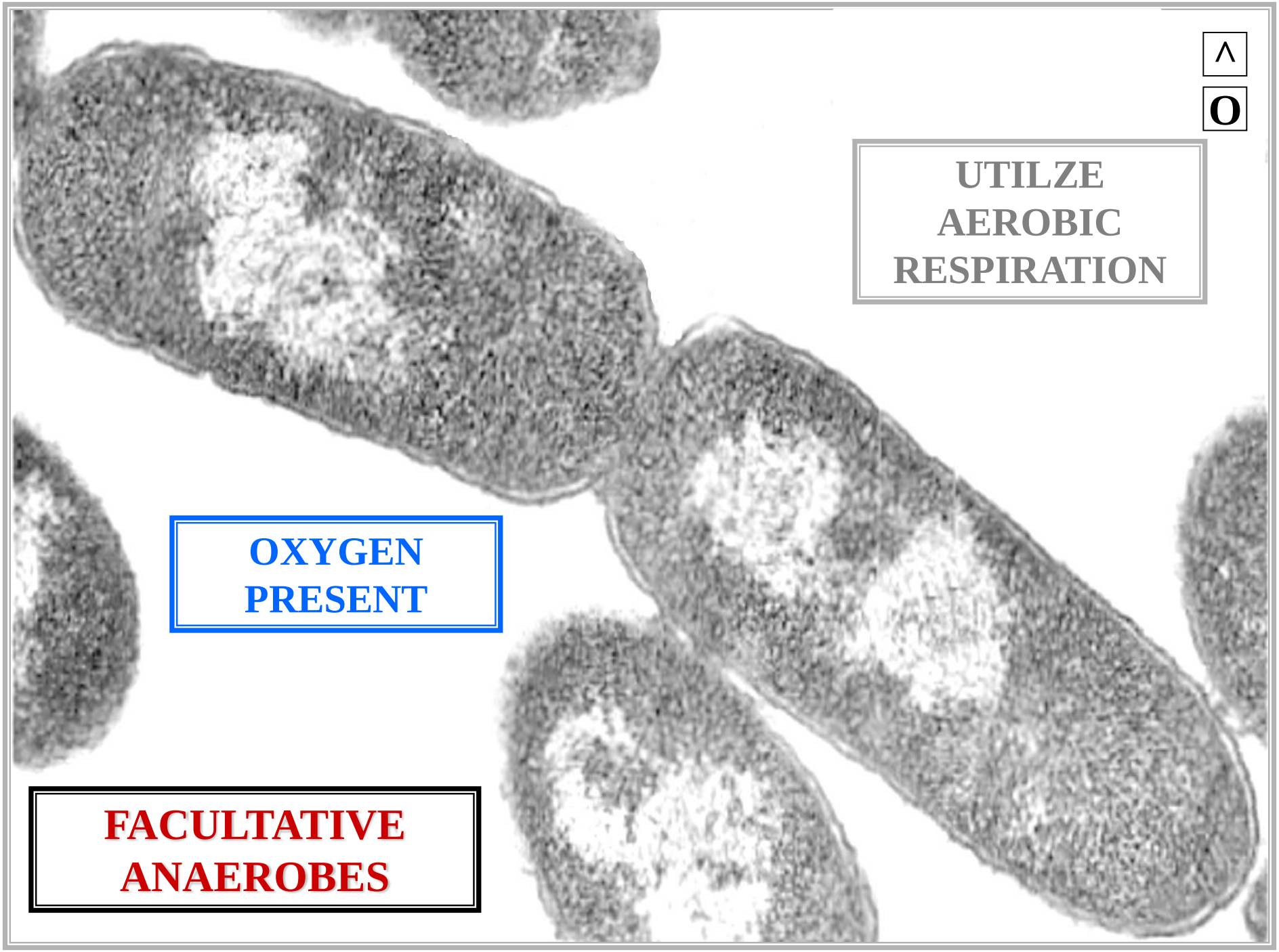
FACULTATIVE ANAEROBES


O
UTILIZE
ANAEROBIC
RESPIRATION
UTILIZE
AEROBIC
RESPIRATION
FACULTATIVE
ANAEROBES


A
ANAEROBIC HABITAT
OXYGEN ABSENT
FACULTATIVE ANAEROBES


O
UTILIZE
ANAEROBIC
RESPIRATION
OXYGEN
ABSENT
FACULTATIVE
ANAEROBES


A
AEROBIC
HABITAT
OXYGEN
PRESENT
FACULTATIVE
ANAEROBES


^
O
UTILZE
AEROBIC
RESPIRATION
OXYGEN
PRESENT
FACULTATIVE
ANAEROBES

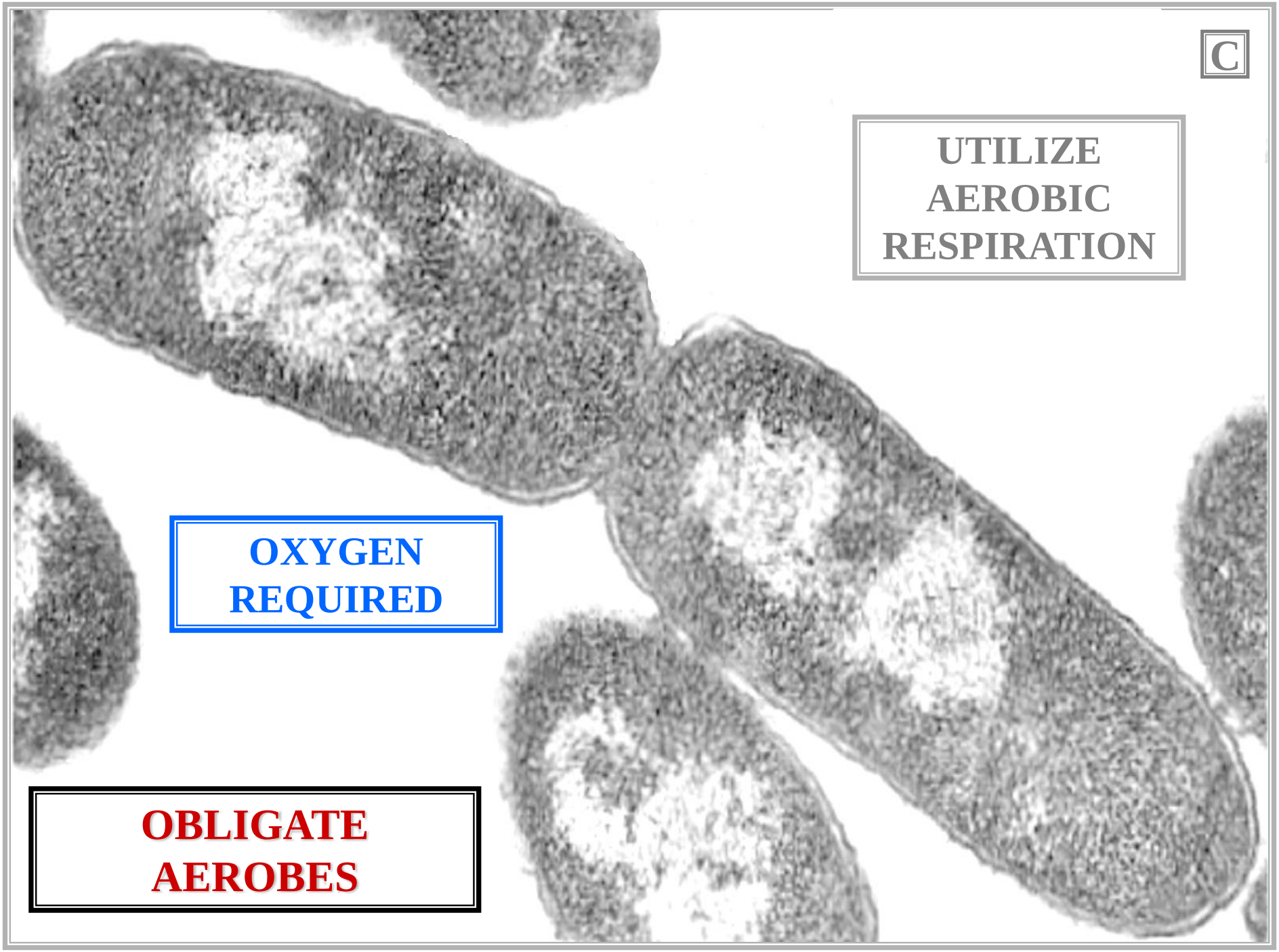
OBLIGATE AEROBES

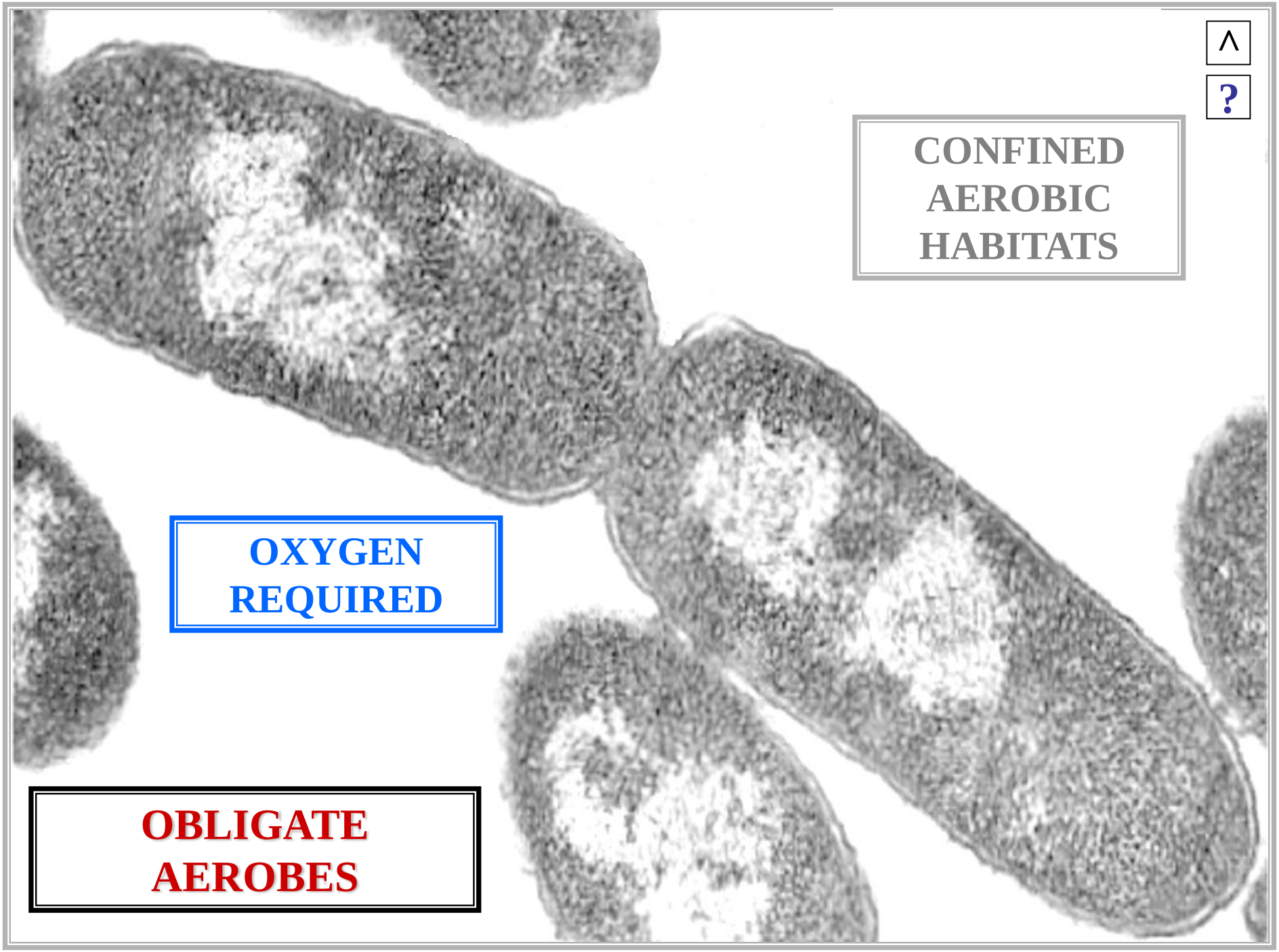
OBLIGATE AEROBES

O

UTILIZE AEROBIC RESPIRATION

OBLIGATE AEROBES


C
UTILIZE AEROBIC RESPIRATION
OXYGEN REQUIRED
OBLIGATE AEROBES



CONFINED AEROBIC HABITATS

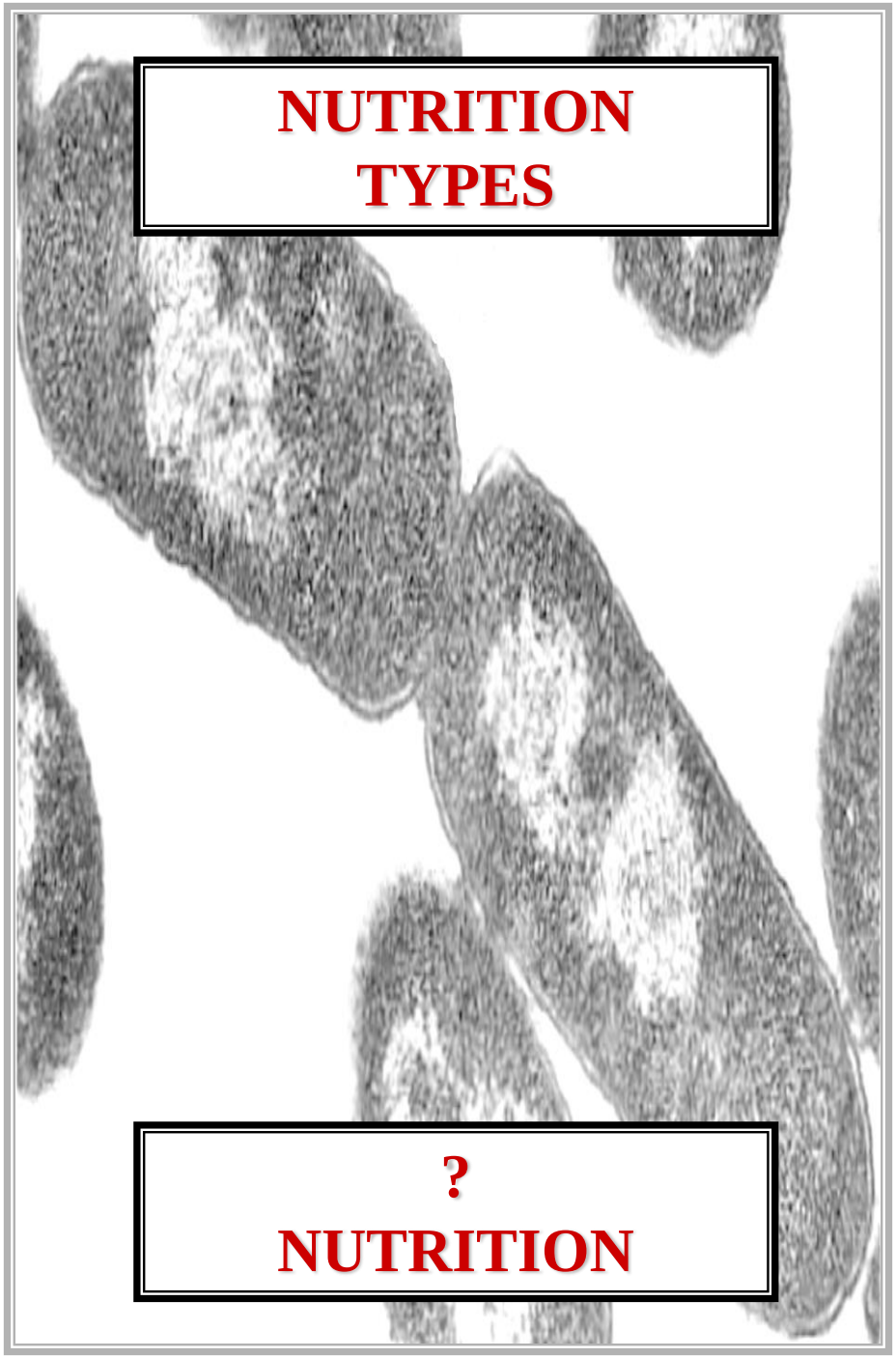
OXYGEN REQUIRED

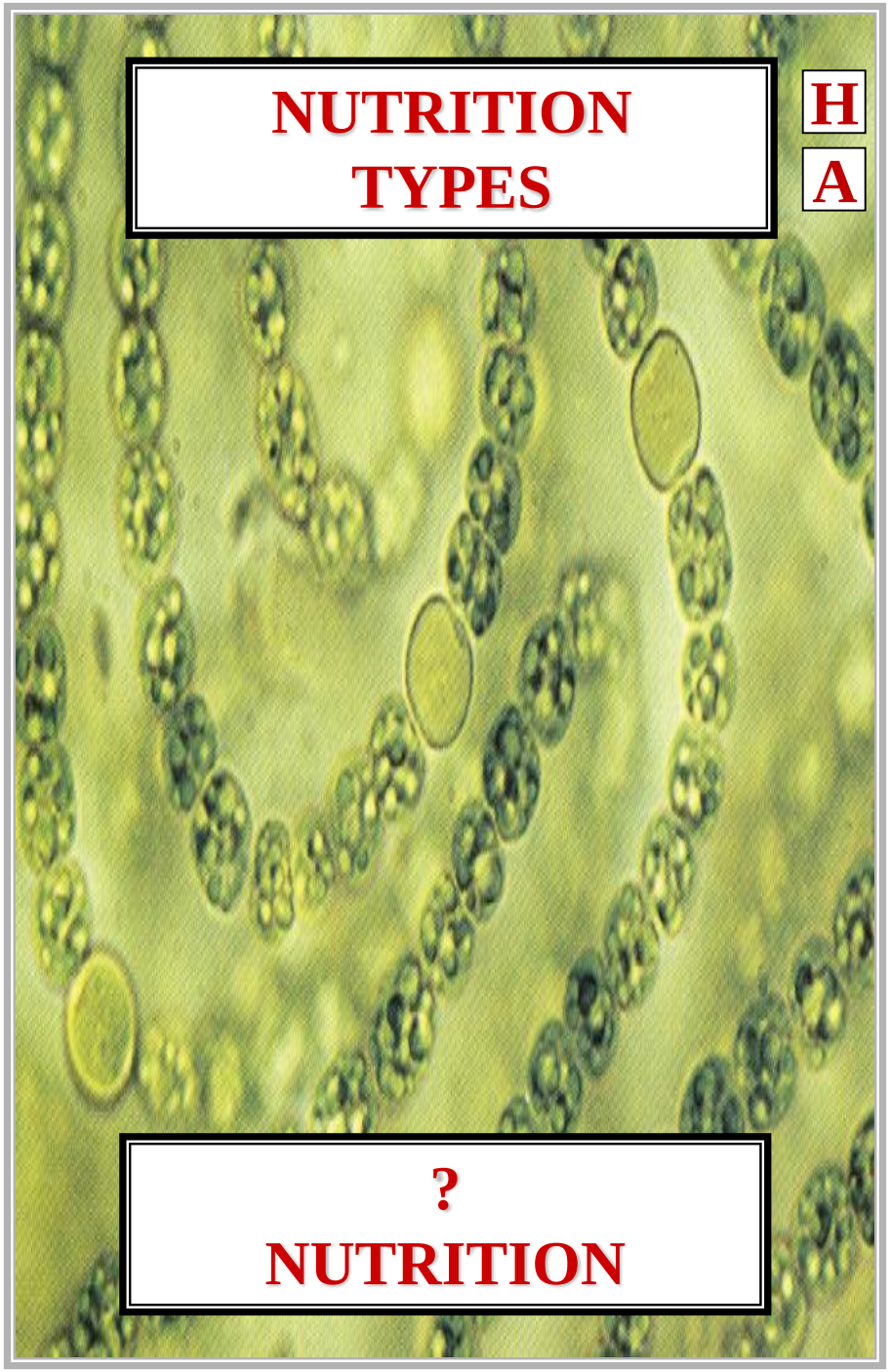
OBLIGATE AEROBES

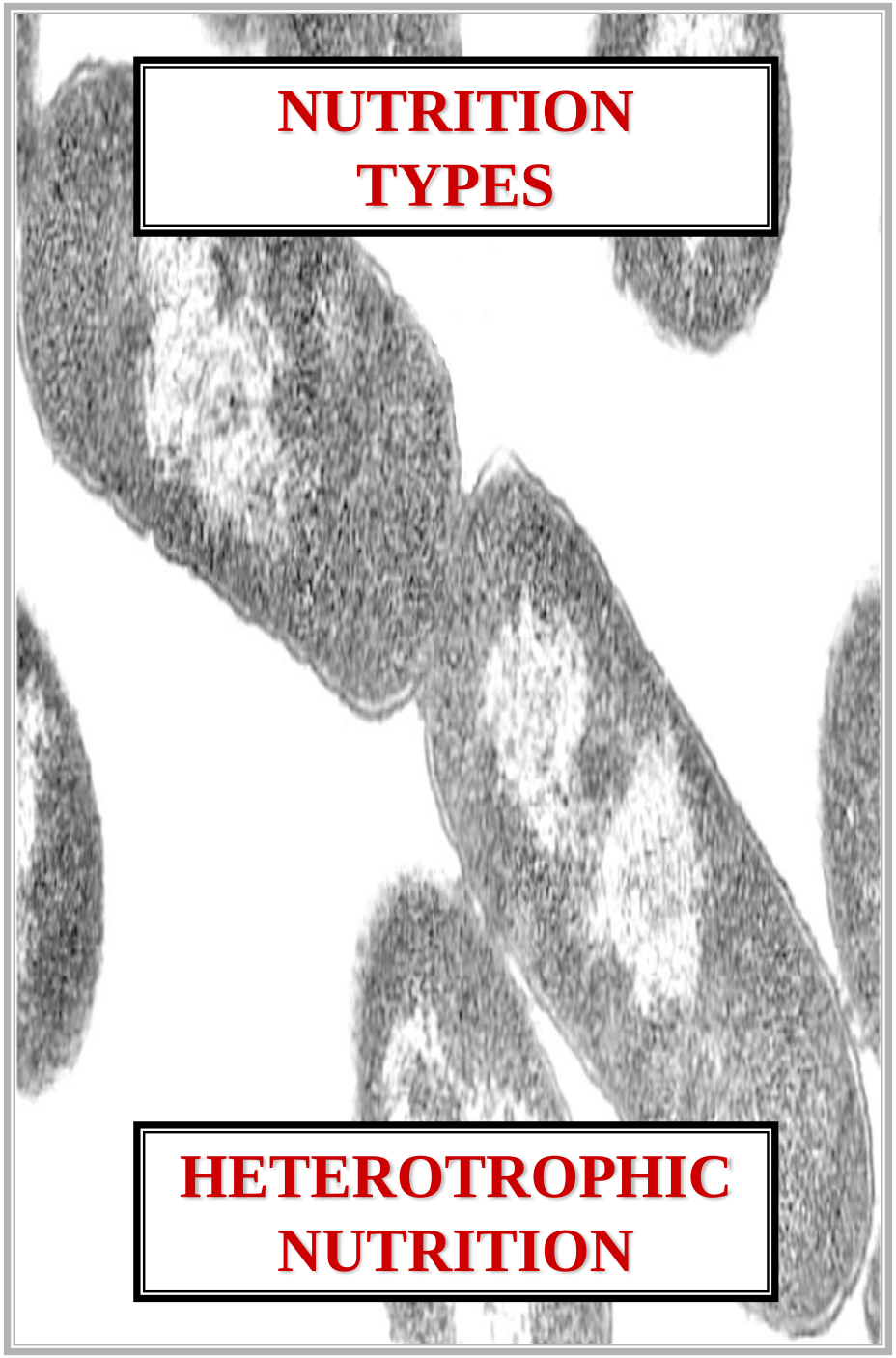
QUESTION

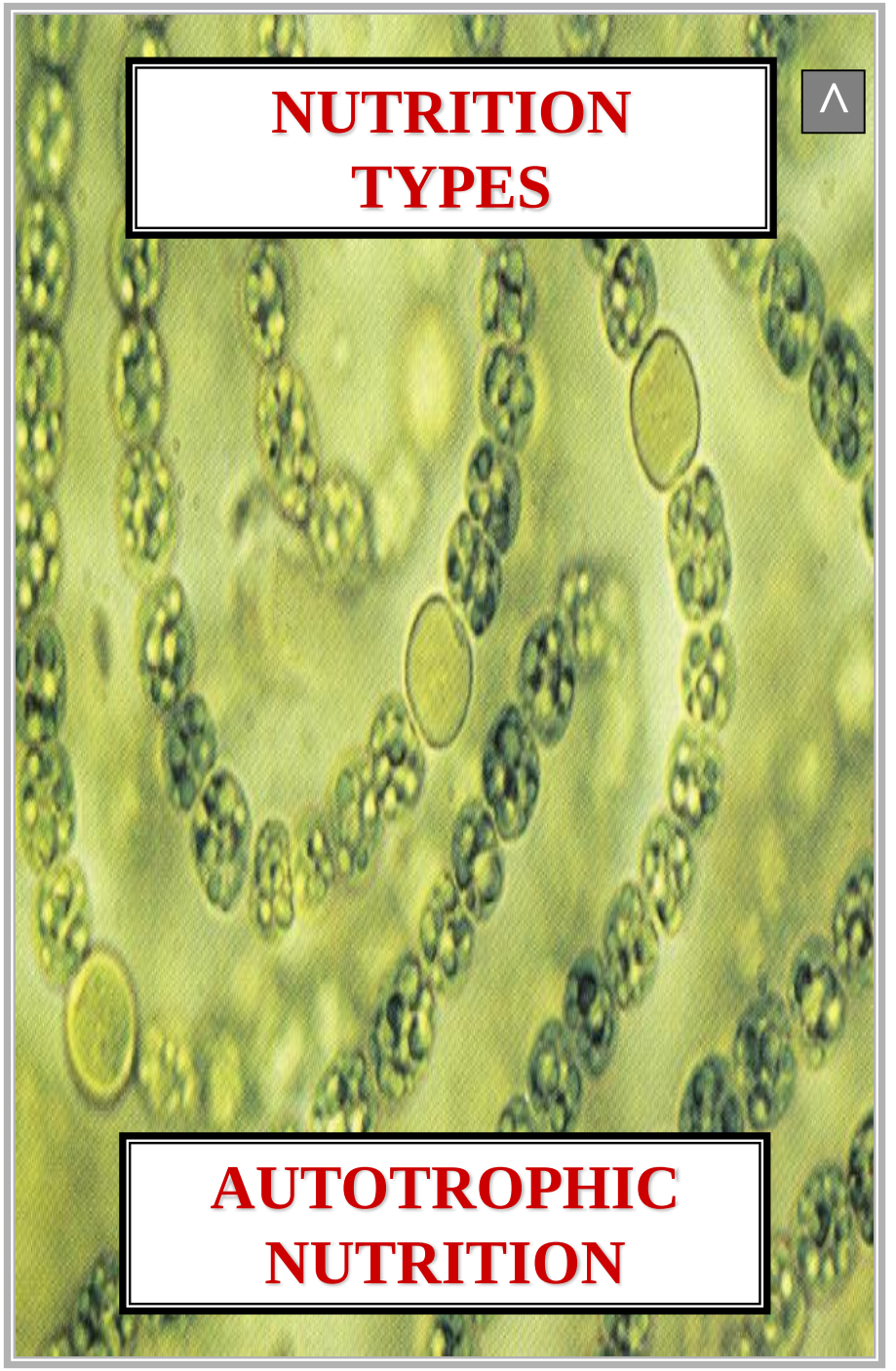
WHAT ARE THE NUTRITION TYPES?

QUESTION


NUTRITION
TYPES
?
NUTRITION


NUTRITION
TYPES
H
A
?
NUTRITION

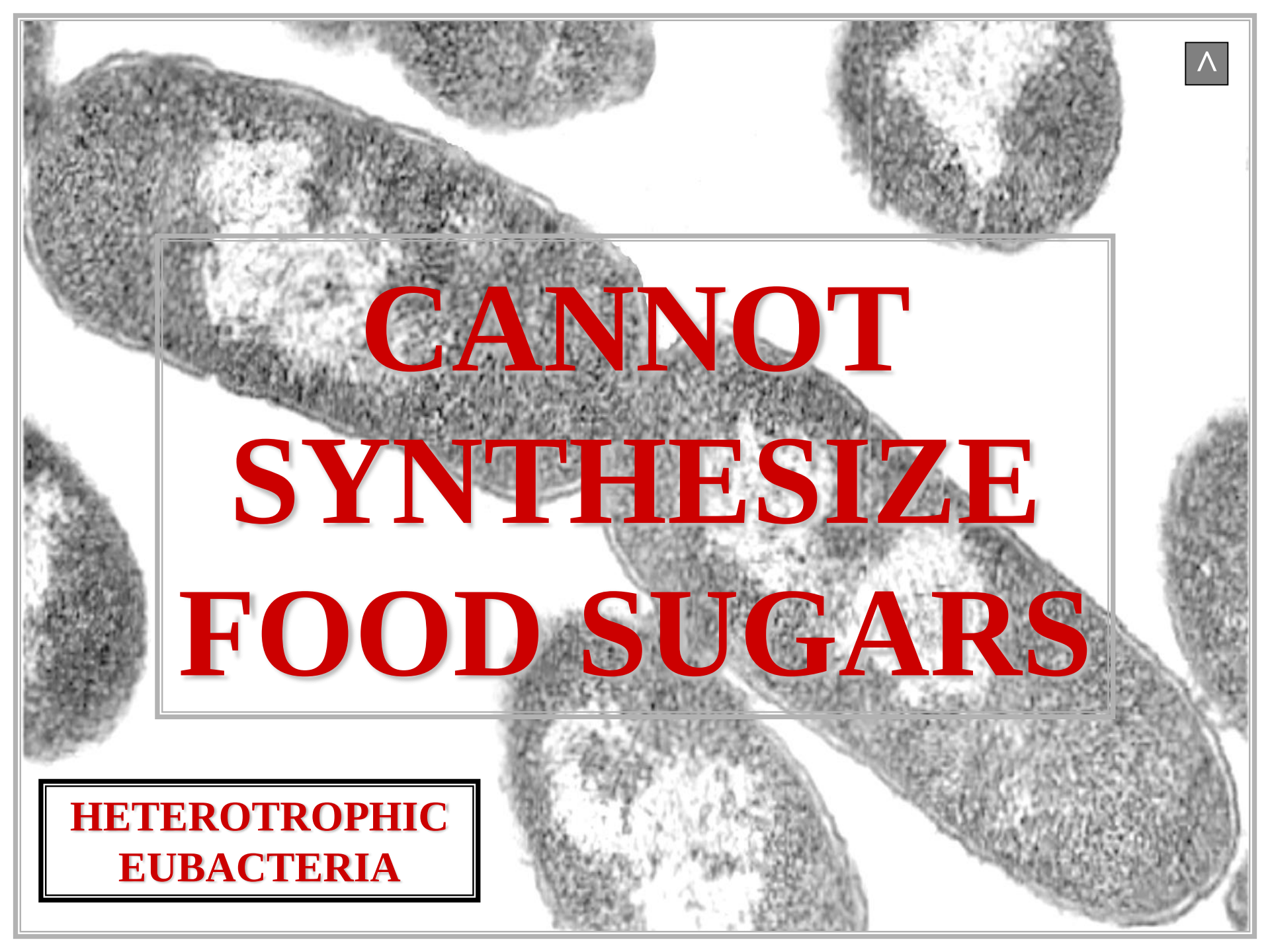

NUTRITION
TYPES
HETEROTROPHIC
NUTRITION


NUTRITION
TYPES
AUTOTROPHIC
NUTRITION

EUBACTERIA NUTRITION MODES

HETEROTROPHIC EUBACTERIA

HETEROTROPHIC EUBACTERIA

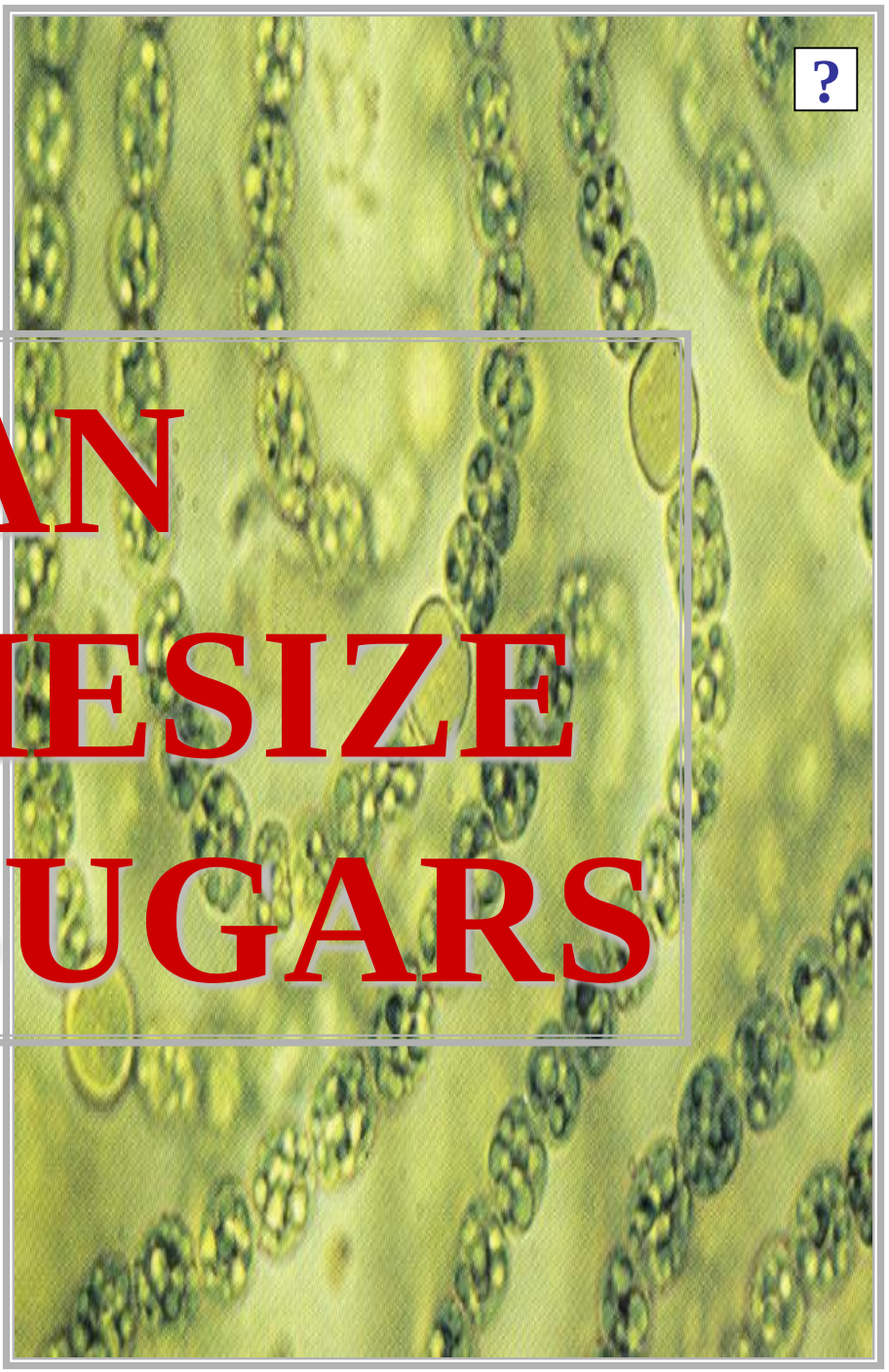


CANNOT SYNTHESIZE FOOD SUGARS

HETEROTROPHIC EUBACTERIA

AUTOTROPHIC EUBACTERIA

AUTOTROPHIC EUBACTERIA



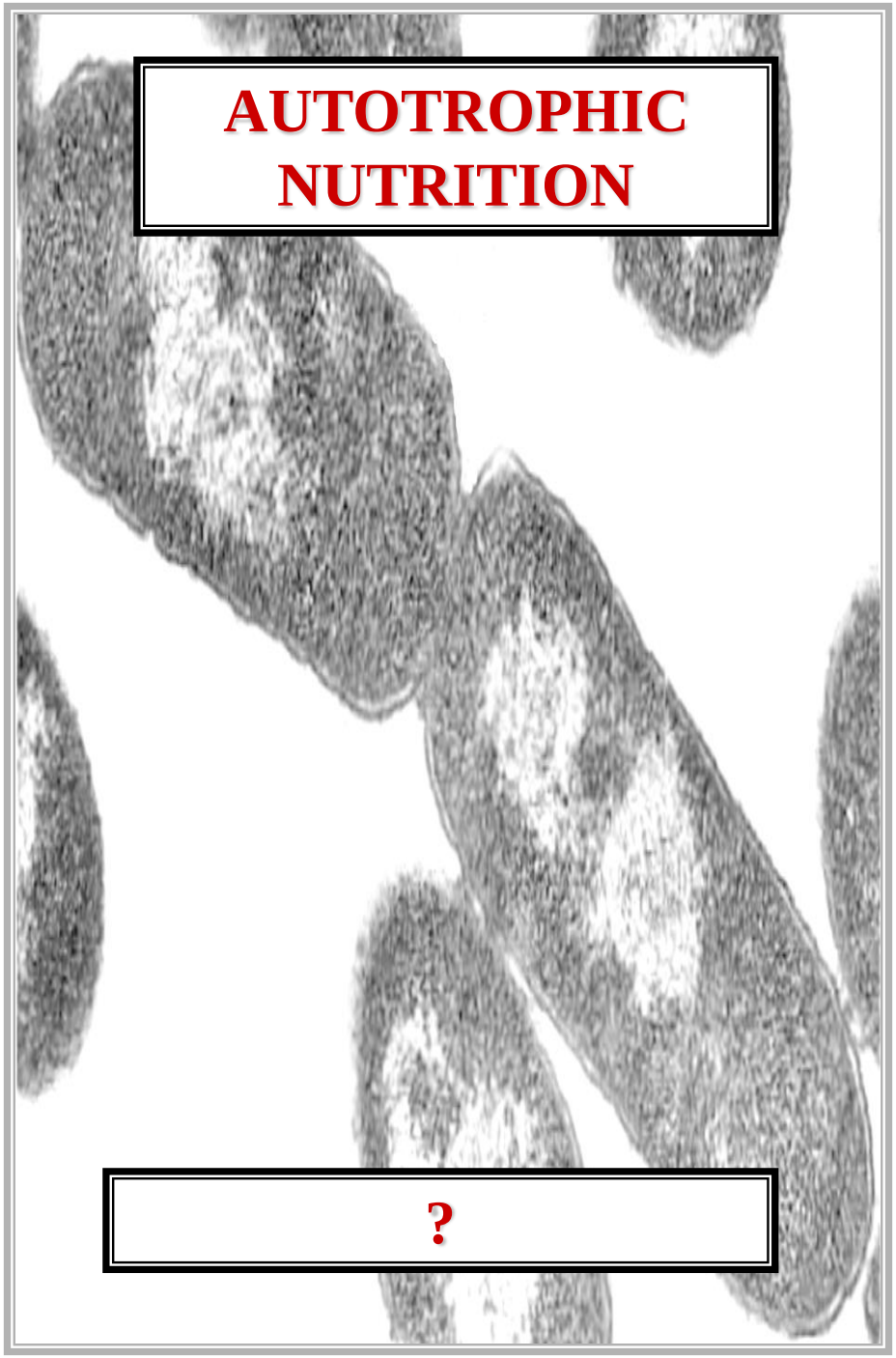
?

CAN SYNTHESIZE FOOD SUGARS

QUESTION

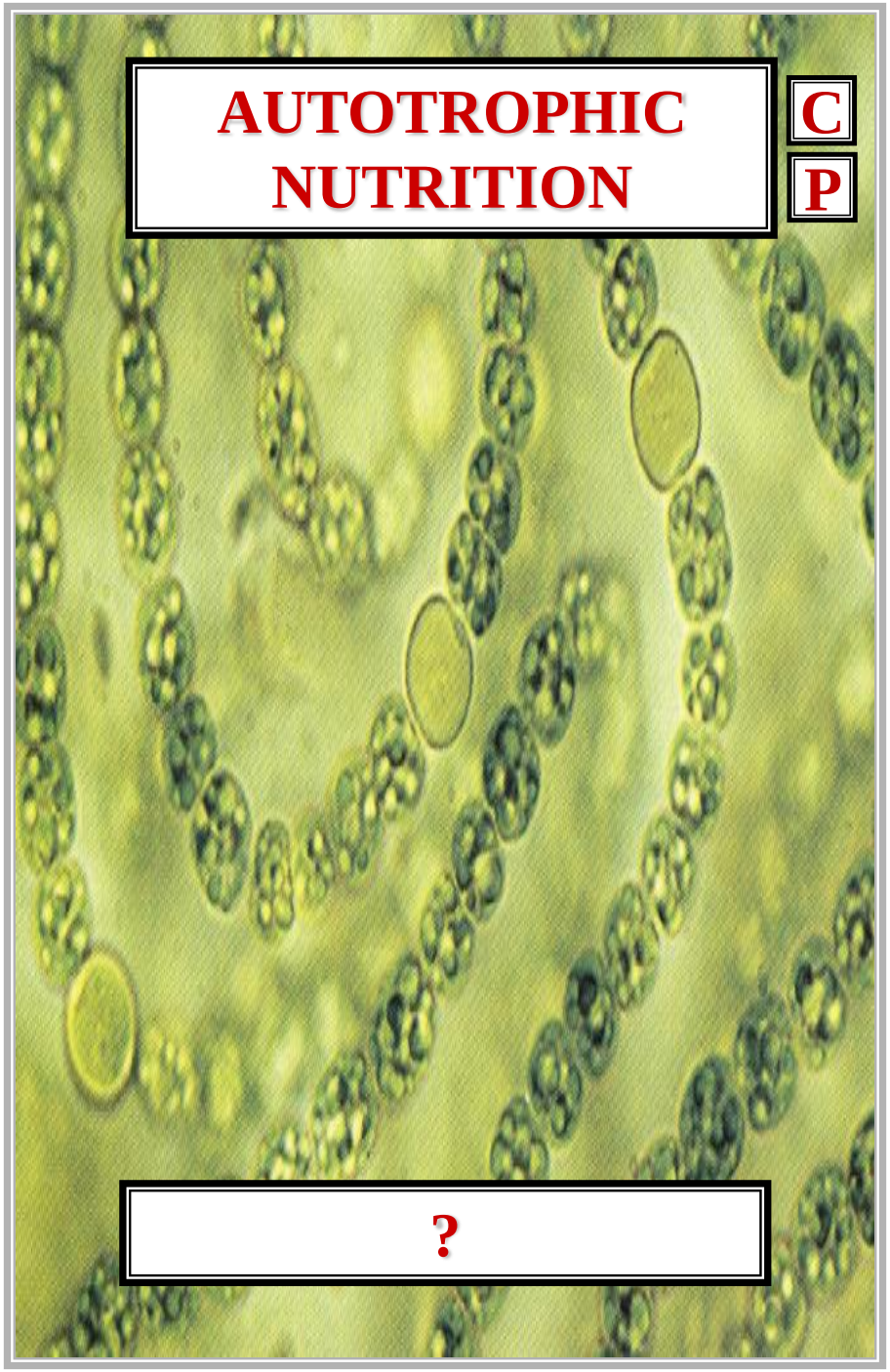
WHAT ARE THE AUTOTROPHIC NUTRITION MODES?

QUESTION



AUTOTROPHIC NUTRITION

?

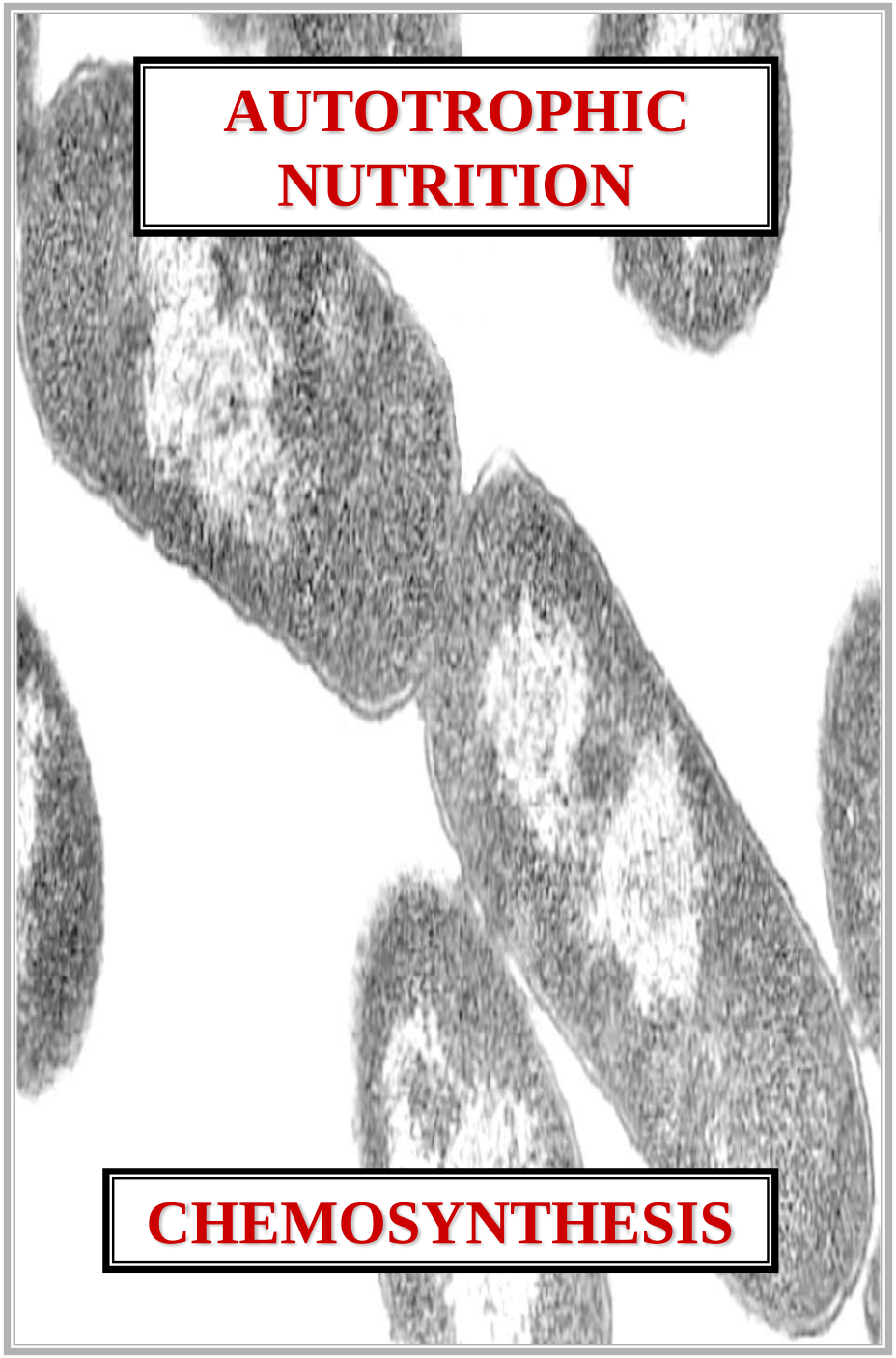


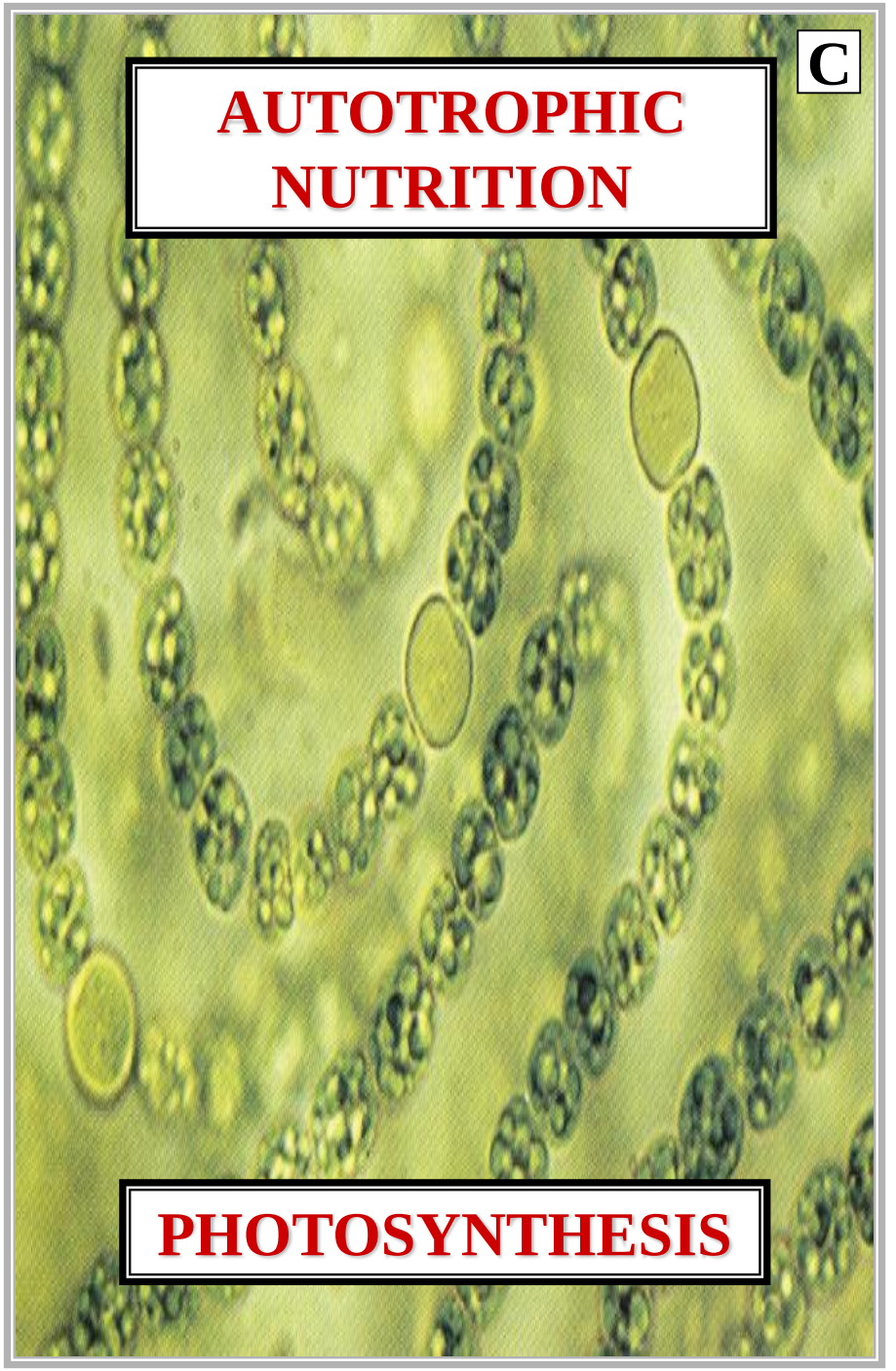
AUTOTROPHIC NUTRITION

C

P

?

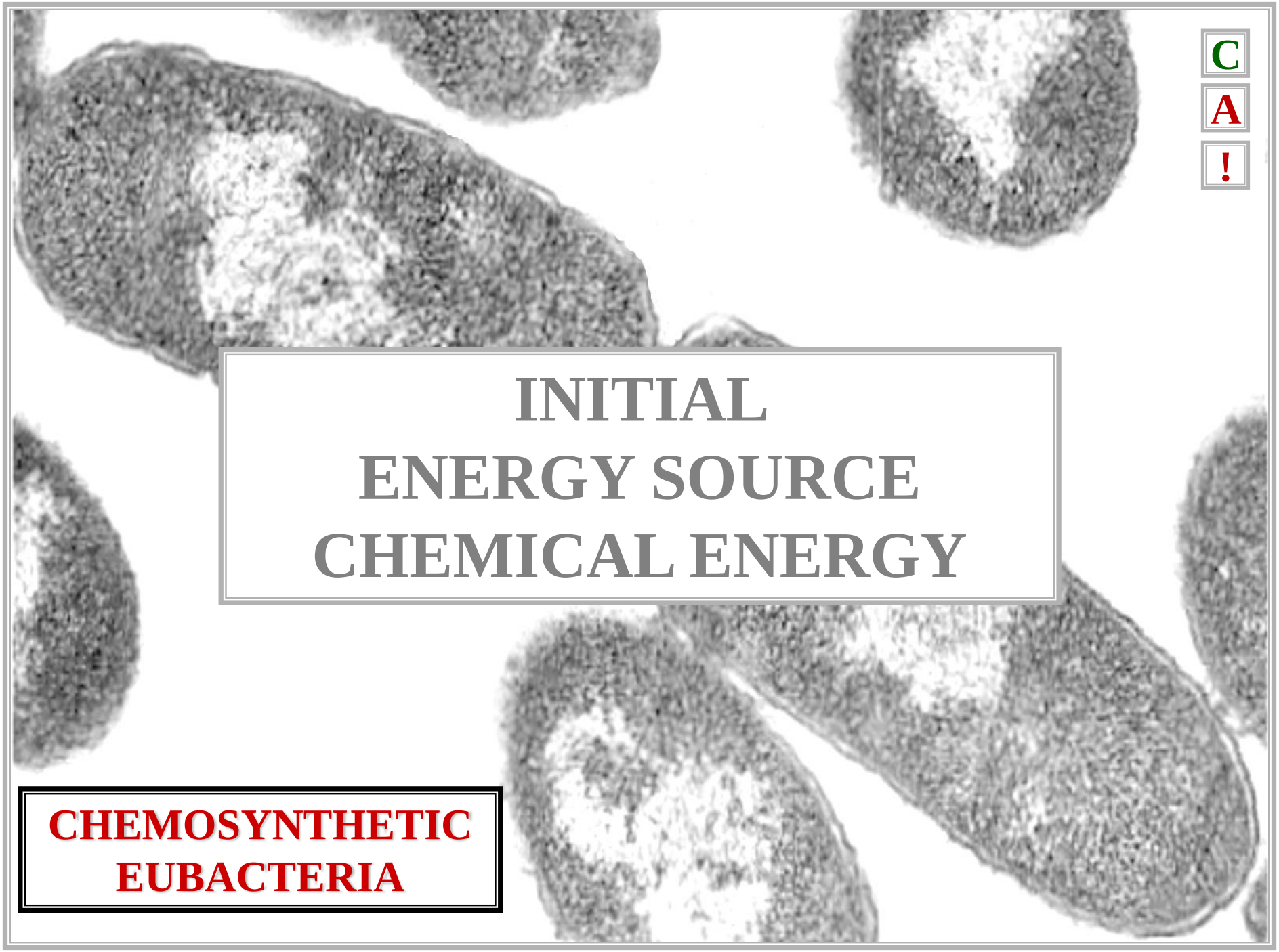

AUTOTROPHIC NUTRITION
CHEMOSYNTHESIS


C
AUTOTROPHIC NUTRITION
PHOTOSYNTHESIS

CHEMOSYNTHESIS

INITIAL ENERGY SOURCE

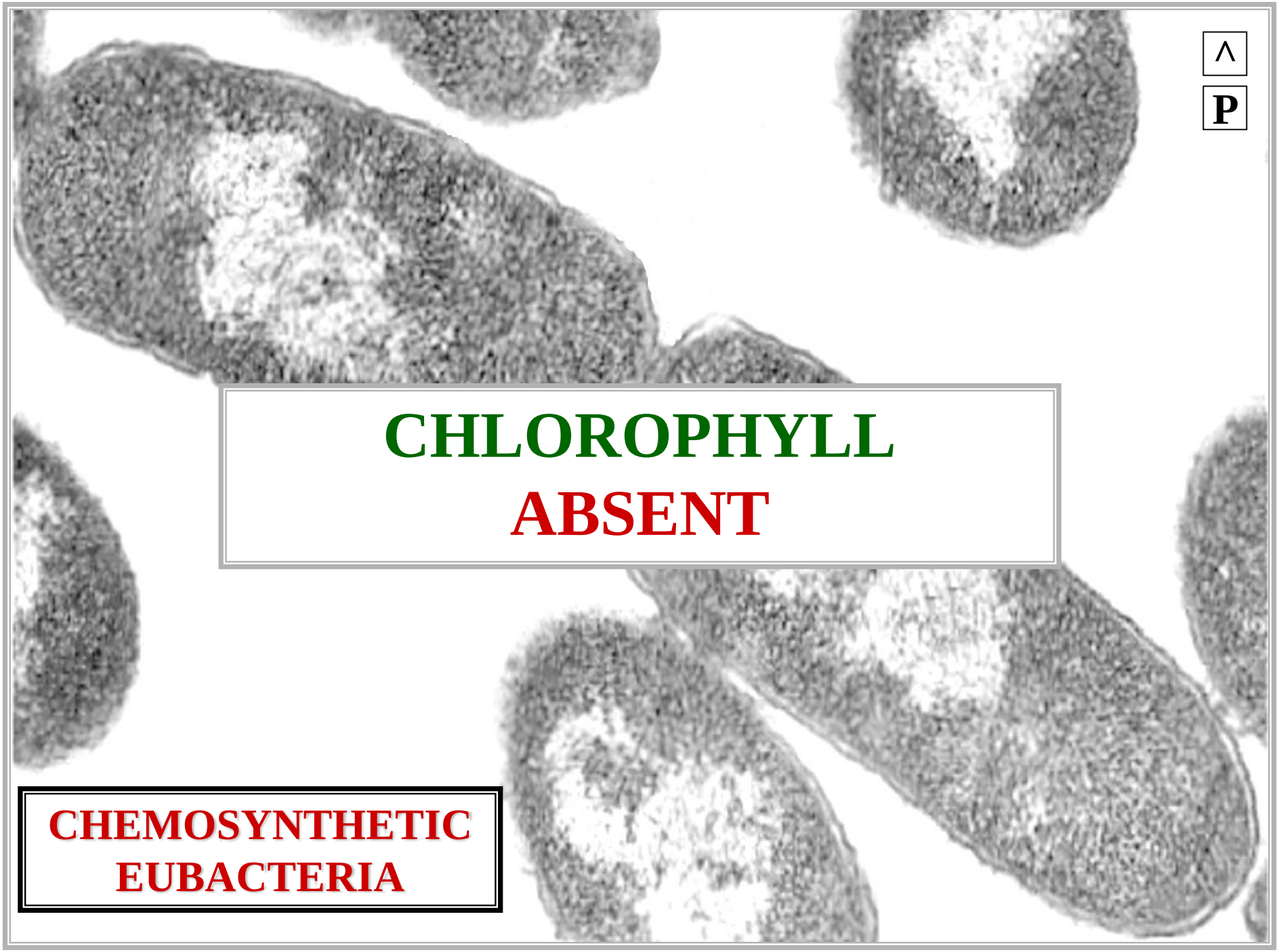
CHEMOSYNTHETIC EUBACTERIA



C
A
!

INITIAL
ENERGY SOURCE
CHEMICAL ENERGY

CHEMOSYNTHETIC EUBACTERIA



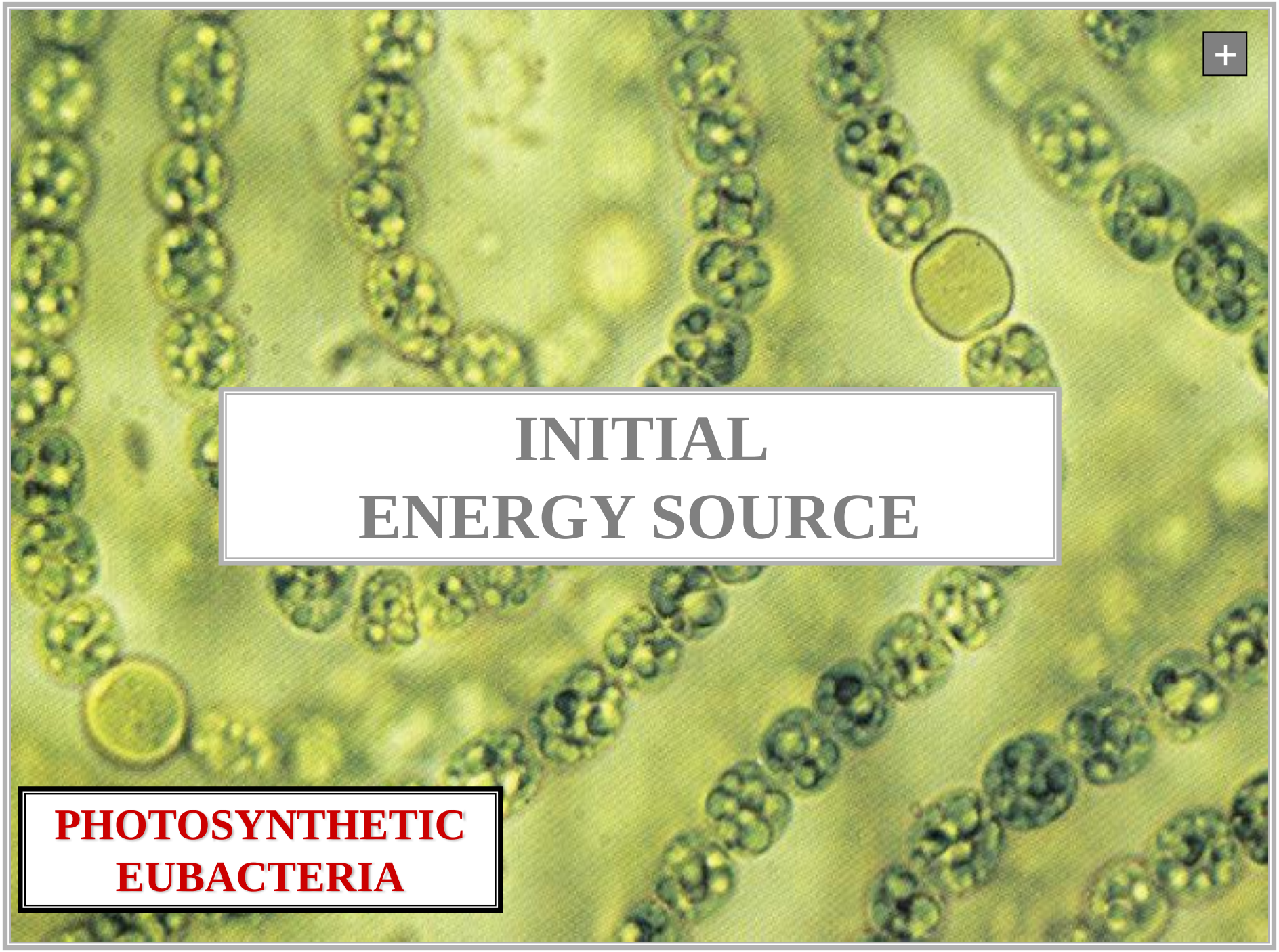
^

P

CHLOROPHYLL ABSENT

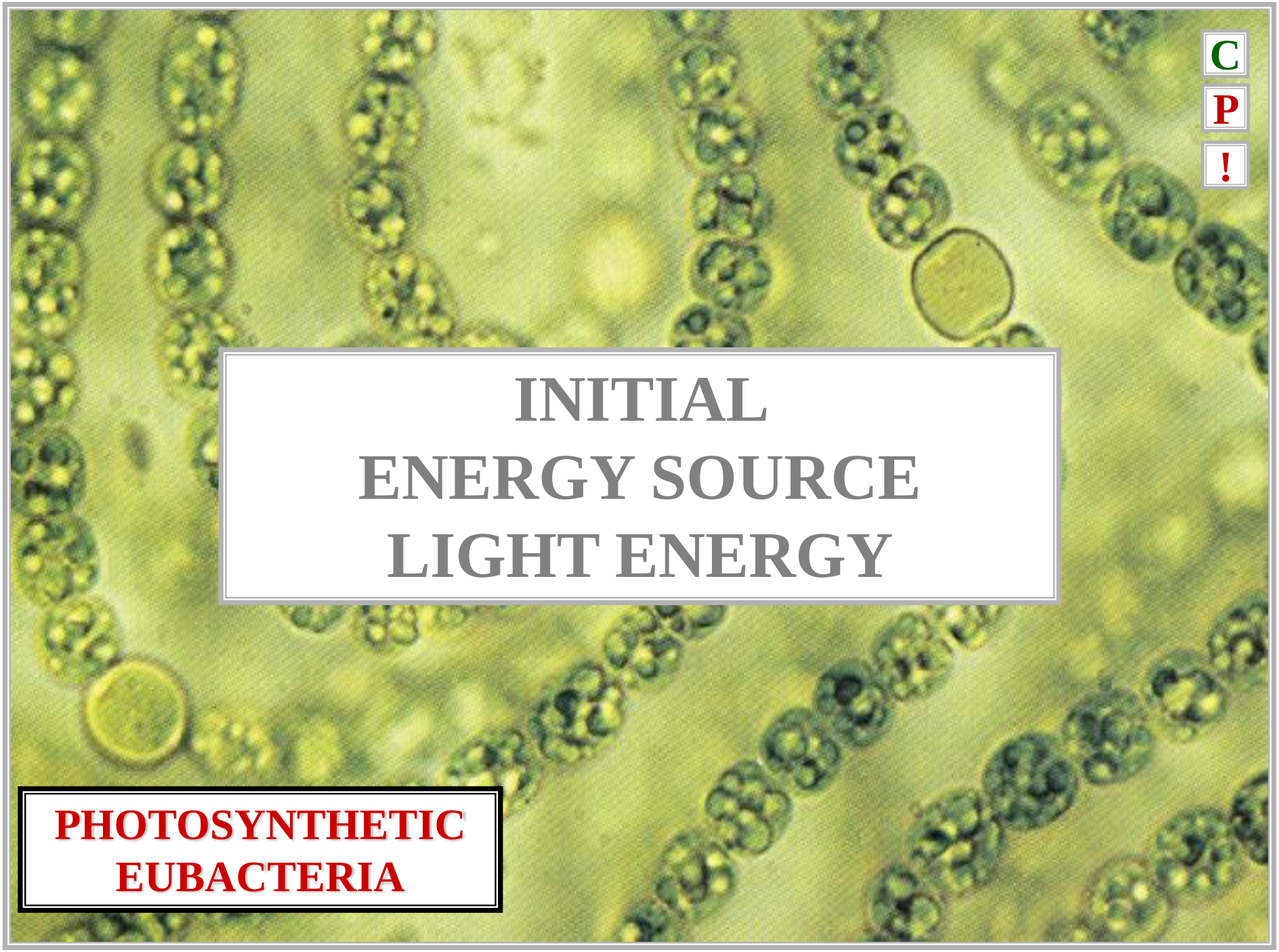
CHEMOSYNTHETIC EUBACTERIA

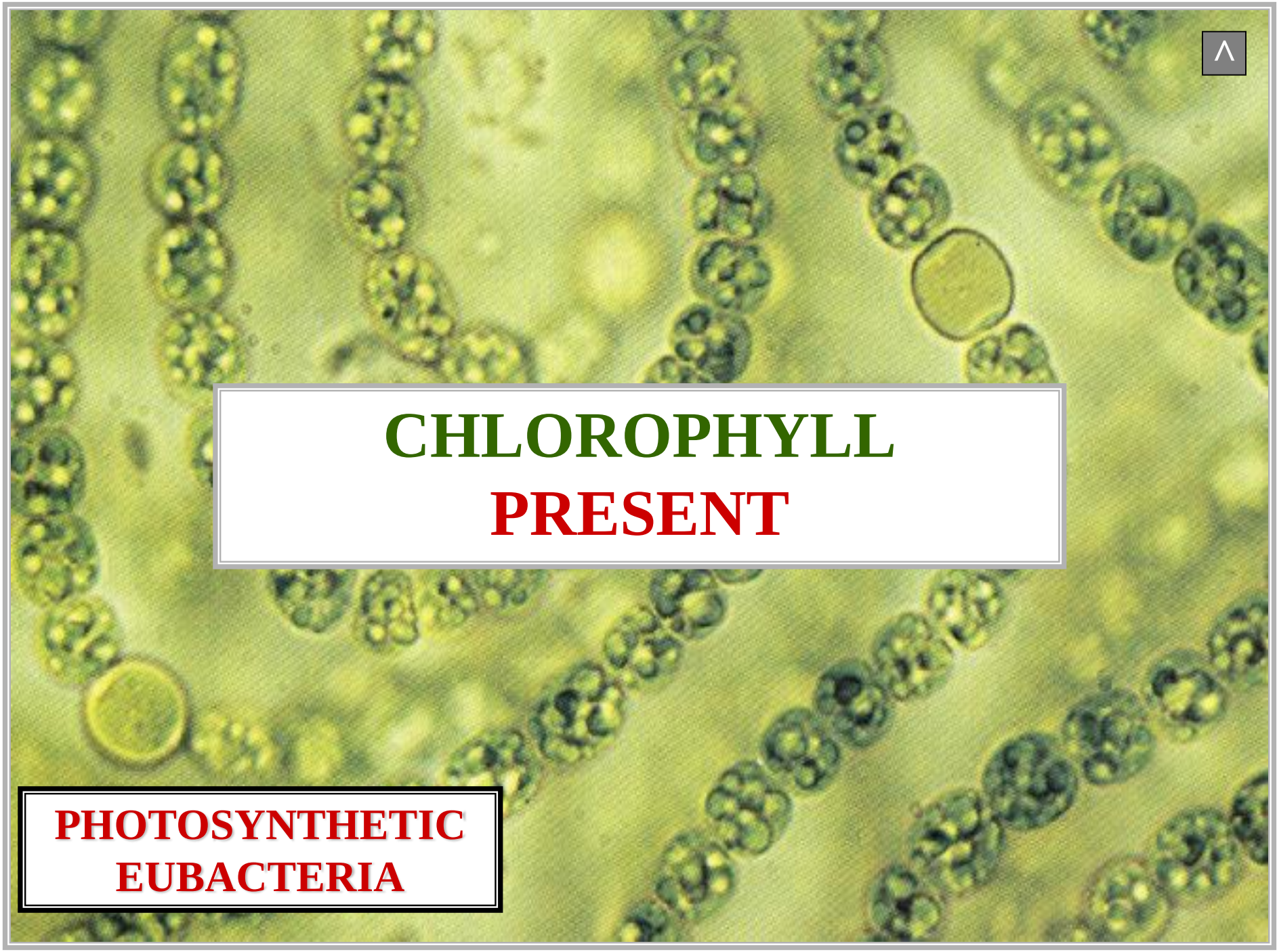
PHOTOSYNTHESIS



INITIAL ENERGY SOURCE

PHOTOSYNTHETIC EUBACTERIA


C
P
!
INITIAL
ENERGY SOURCE
LIGHT ENERGY
PHOTOSYNTHETIC
EUBACTERIA


CHLOROPHYLL
PRESENT
PHOTOSYNTHETIC
EUBACTERIA

EUBACTERIA CHLOROPHYLLS TYPES

B

BACTERIA CHLOROPHYLL

E-

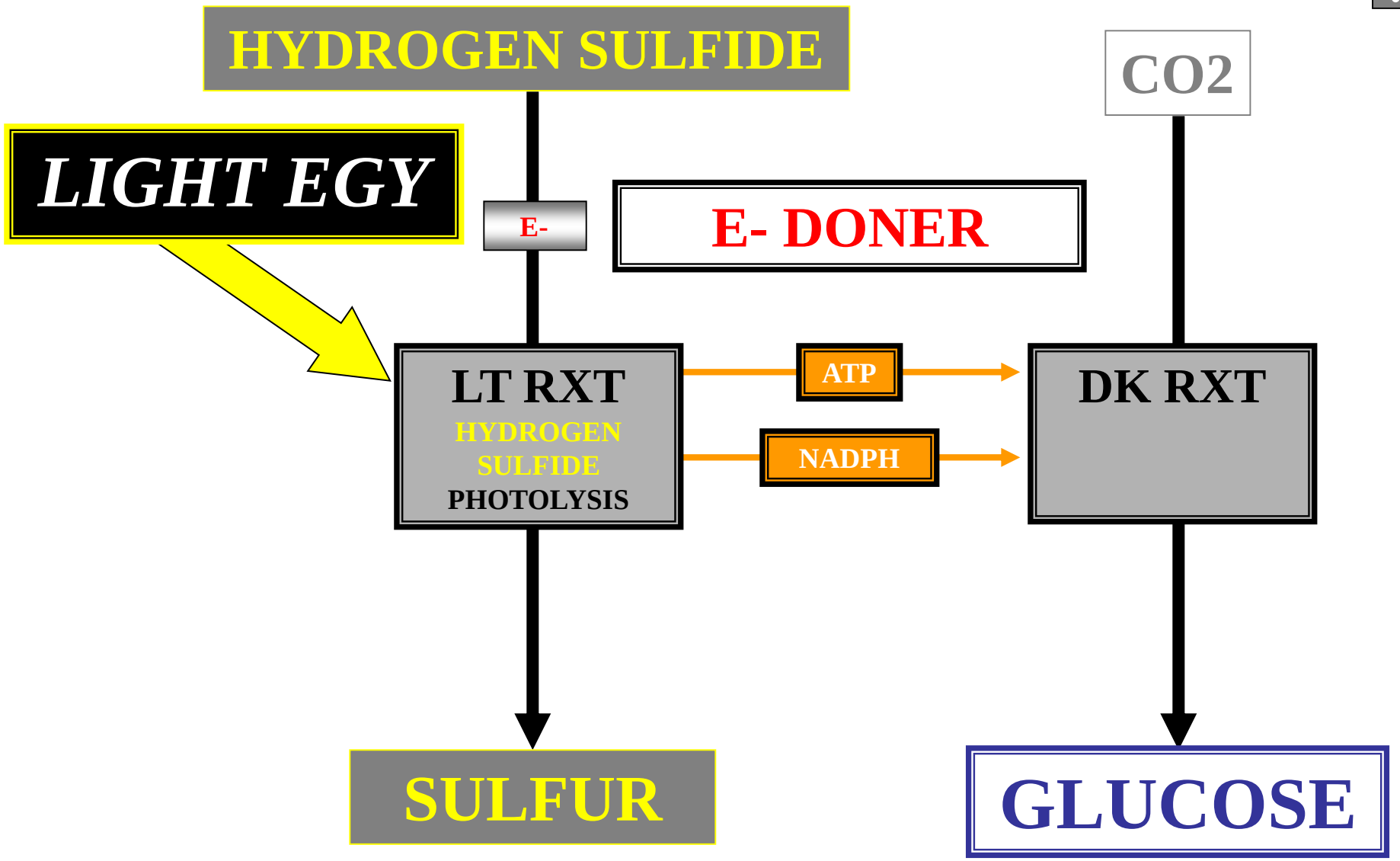
BACTERIA CHLOROPHYLL

BACTERIA CHLOROPHLL
LT RXT E- DONOR

HYDROGEN SULFIDE

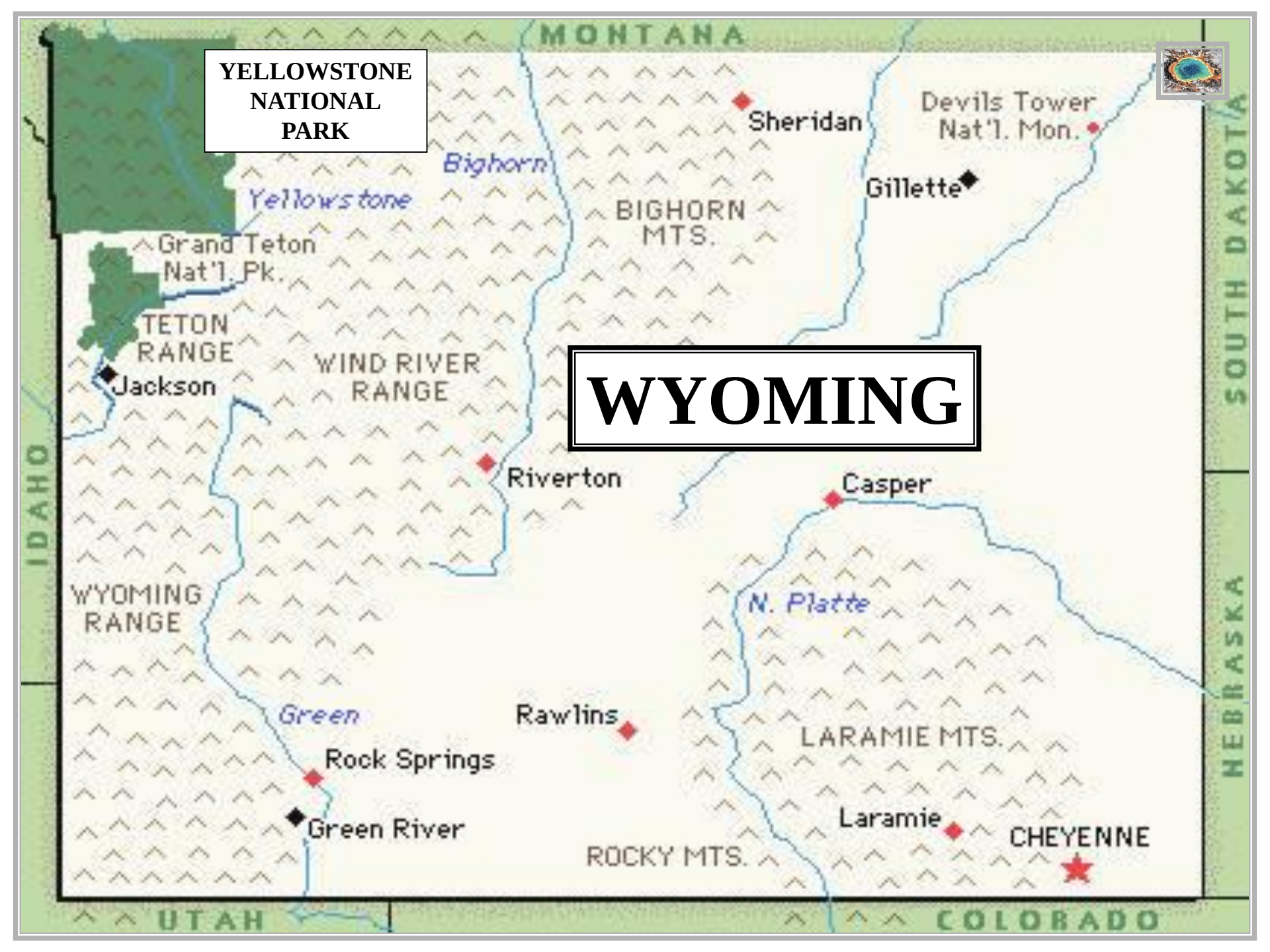
BACTERIA CHLOROPHLL
LT RXT E- DONOR

BACTERIA CHLOROPHYLL PHOTOSYNTHESIS



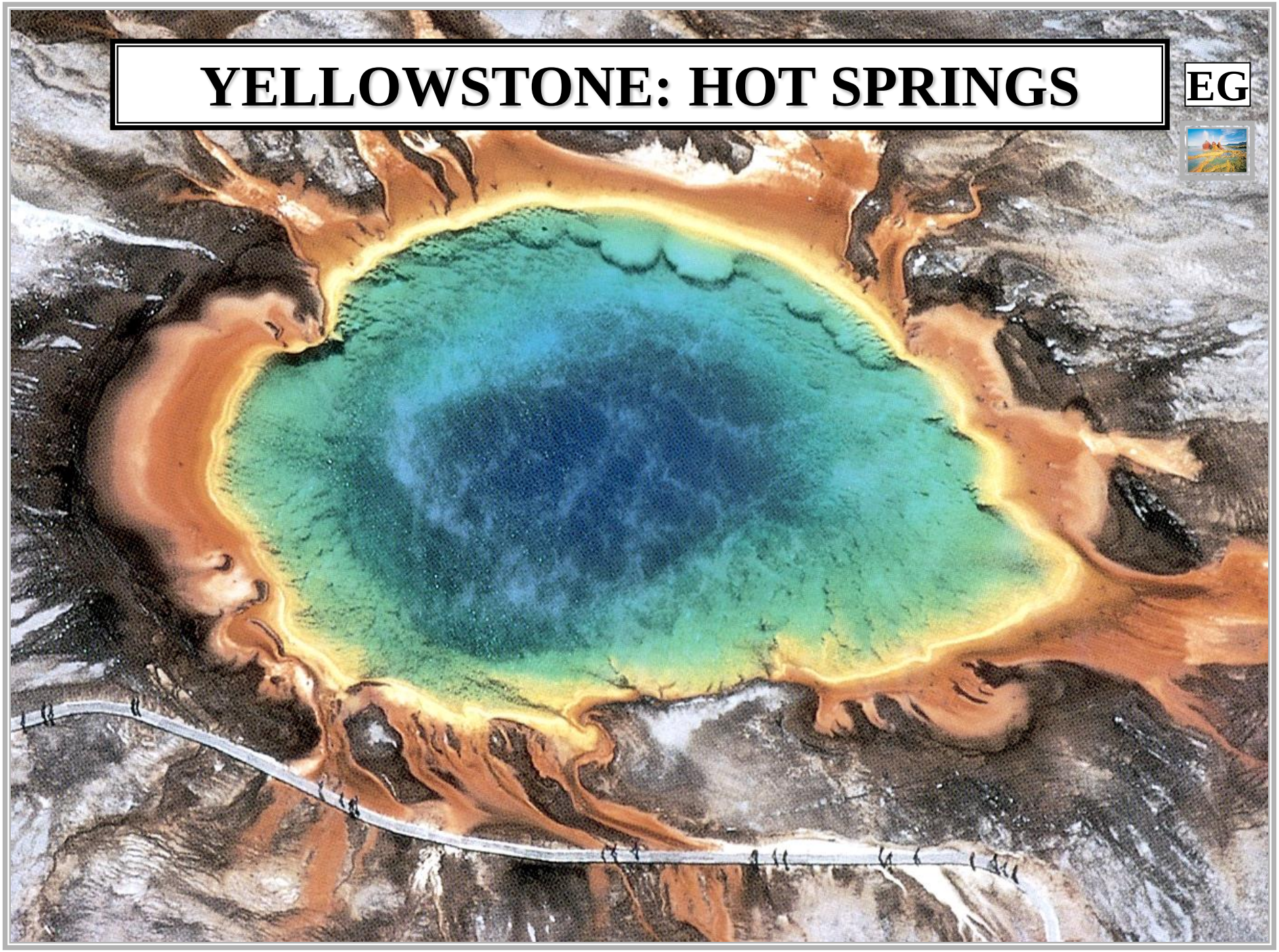
UNITED STATES OF AMERICA

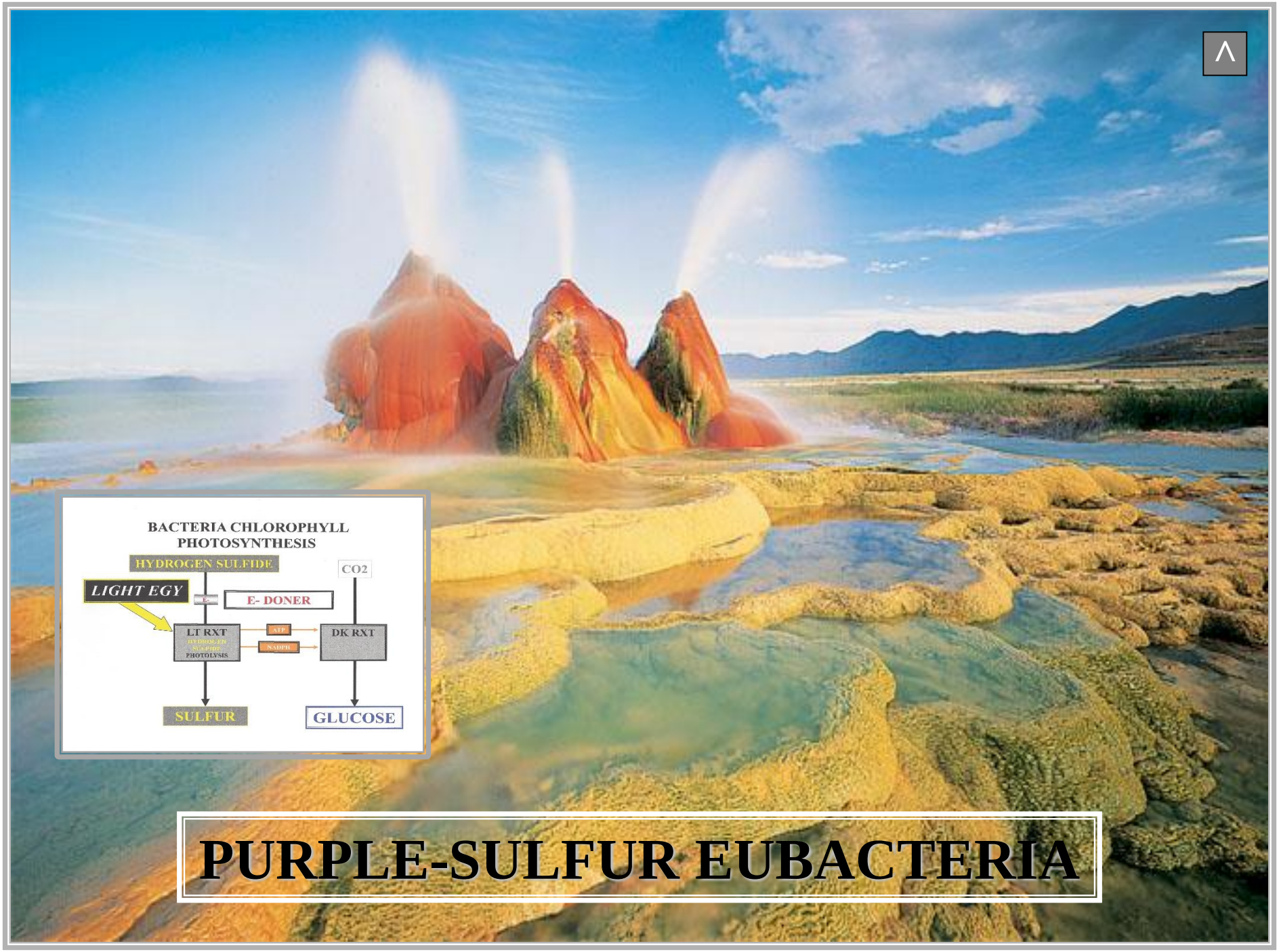
UNITED STATES OF AMERICA


YELLOWSTONE NATIONAL PARK
MONTANA
Sheridan
Devils Tower Nat'l. Mon.
Bighorn
Yellowstone
Gillette
BIGHORN MTS.
Grand Teton Nat'l. Pk.
TETON RANGE
Jackson
WIND RIVER RANGE
WYOMING
Riverton
Casper
IDAHO
SOUTH DAKOTA
WYOMING RANGE
N. Platte
NEBRASKA
Green
Rawlins
LARAMIE MTS.
Rock Springs
Green River
Laramie
CHEYENNE
ROCKY MTS.
UTAH
COLORADO

YELLOWSTONE: HOT SPRINGS

EG





PURPLE-SULFUR EUBACTERIA

TRUE CHLOROPHYLL

E-

TRUE CHLOROPHYLL

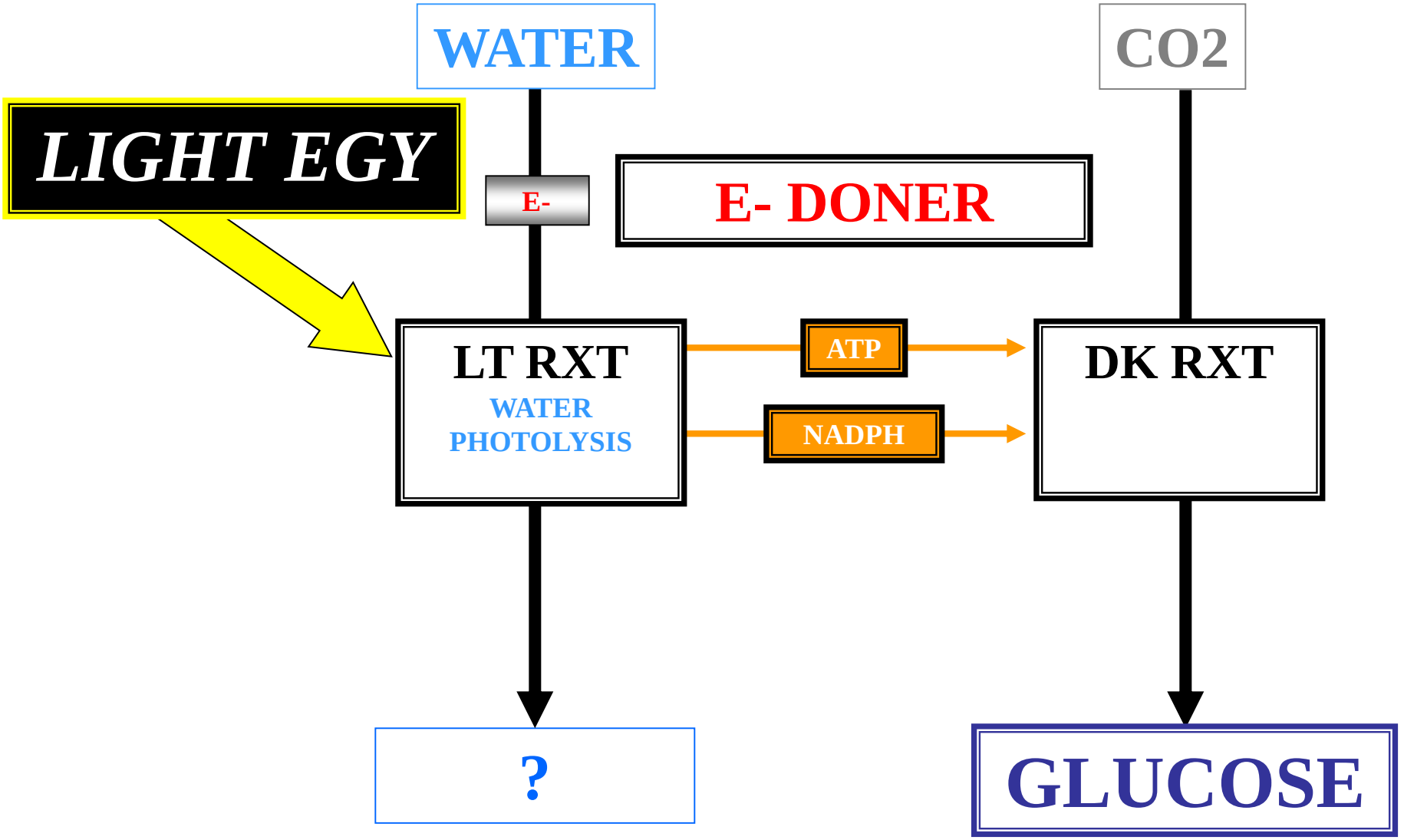
W

TRUE CHLOROPHLL
LT RXT E- DONOR

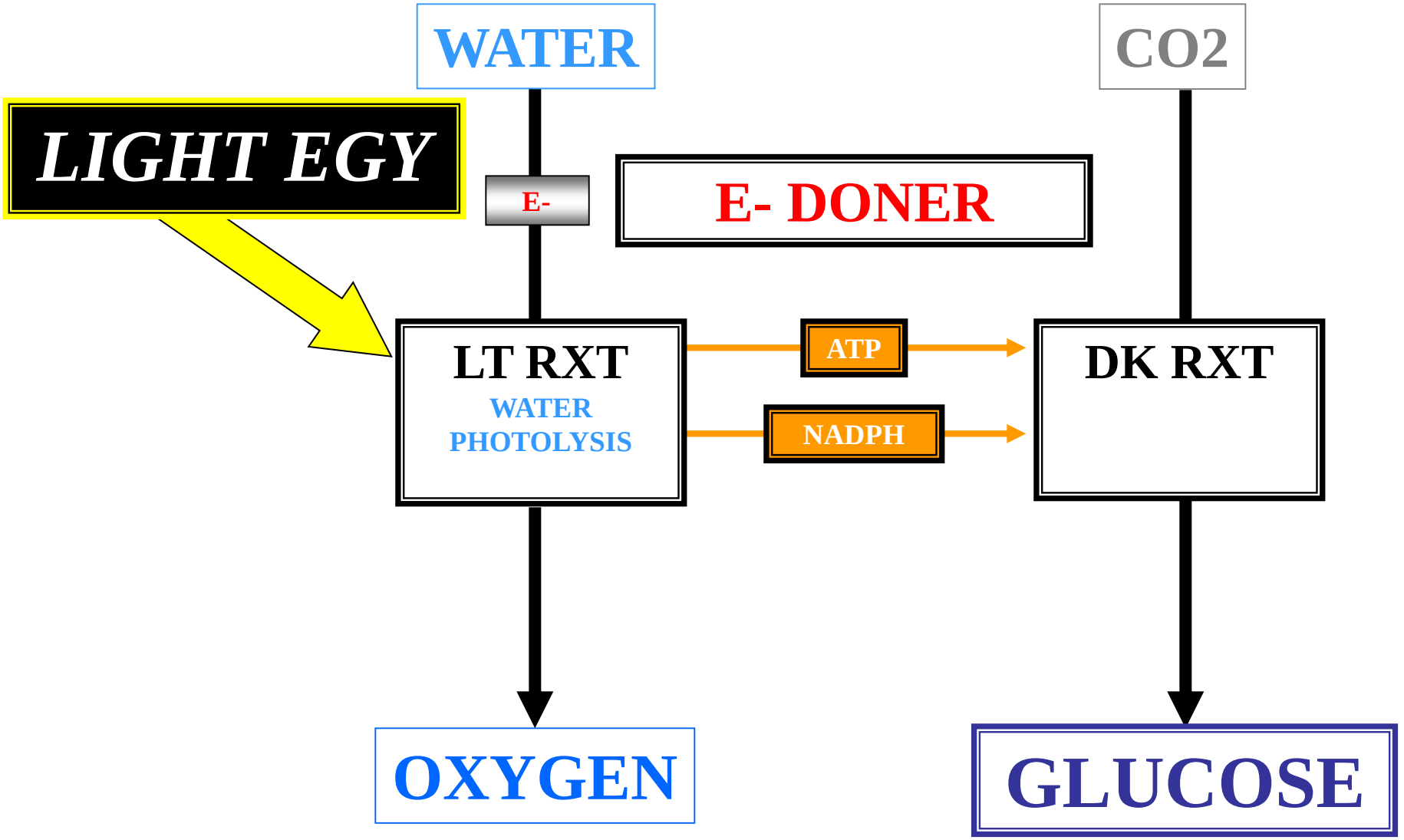
WATER

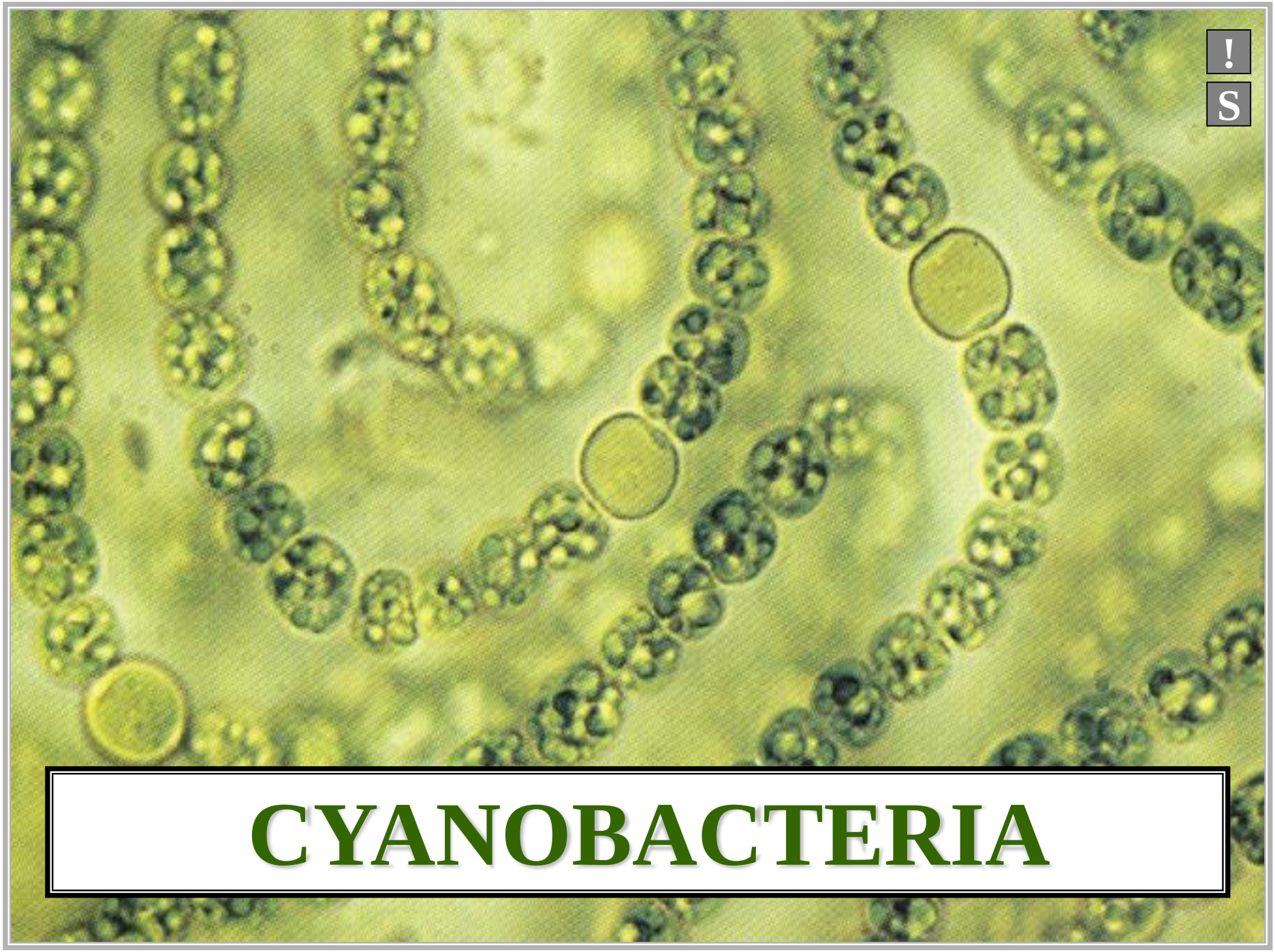
TRUE CHLOROPHLL
LT RXT E- DONOR

TRUE CHLOROPHYLL PHOTOSYNTHESIS



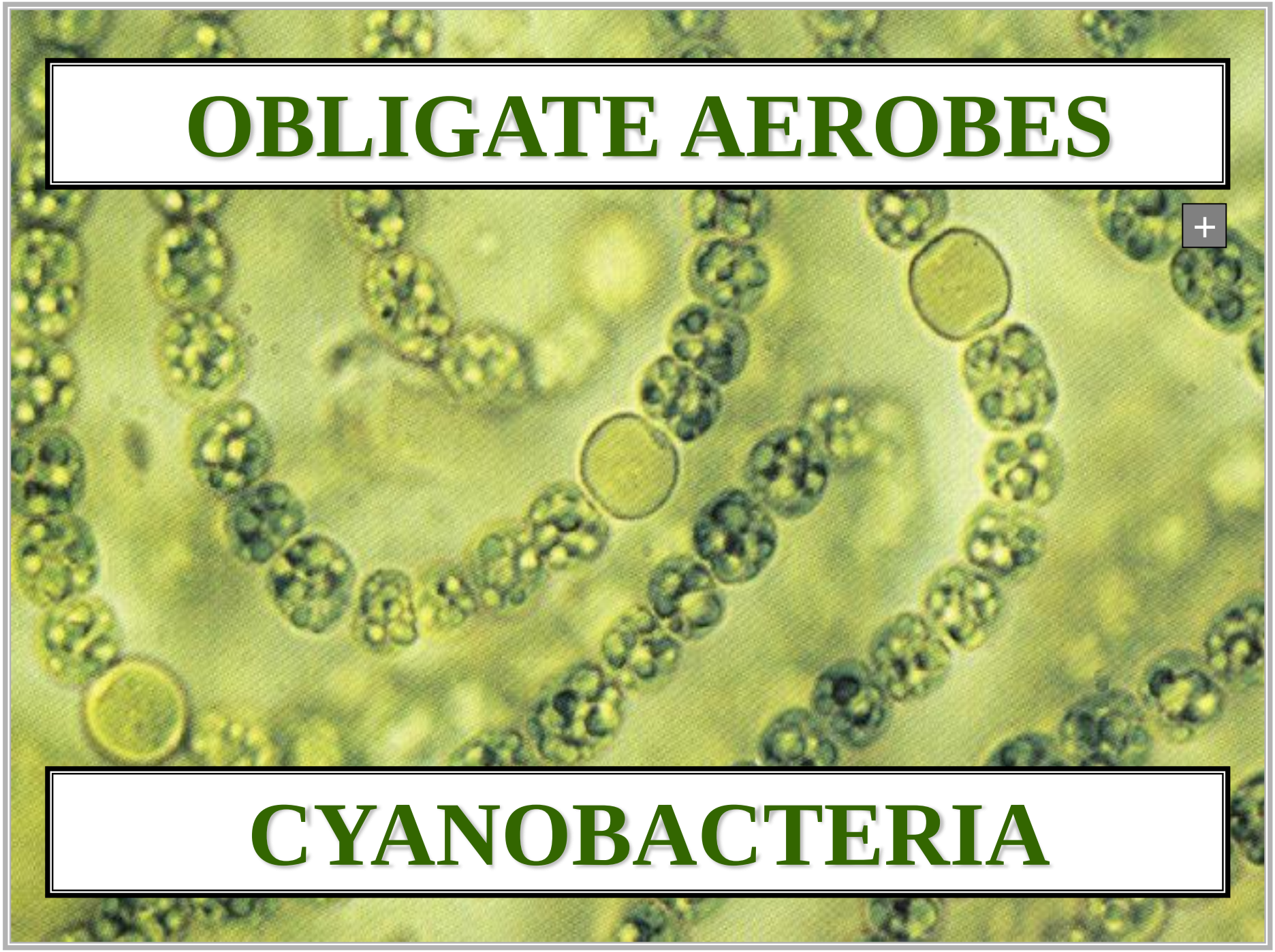
TRUE CHLOROPHYLL PHOTOSYNTHESIS





CYANOBACTERIA

OBLIGATE AEROBES



CYANOBACTERIA

OBLIGATE AEROBES

PHOTOSYNTHETIC

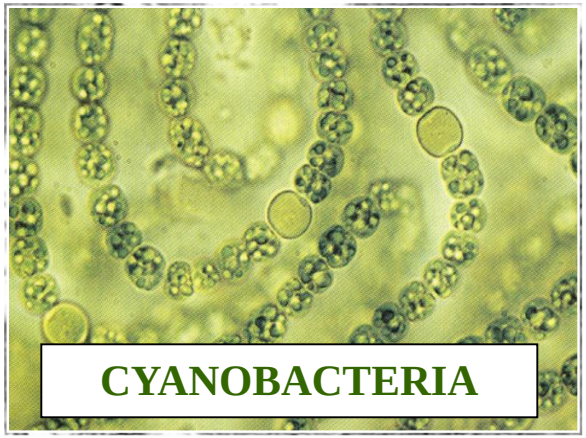
CYANOBACTERIA

OBLIGATE AEROBES

PHOTOSYNTHETIC

TRUE CHLOROPHYLL

CYANOBACTERIA



CYANOBACTERIA

CHLOROPLAST

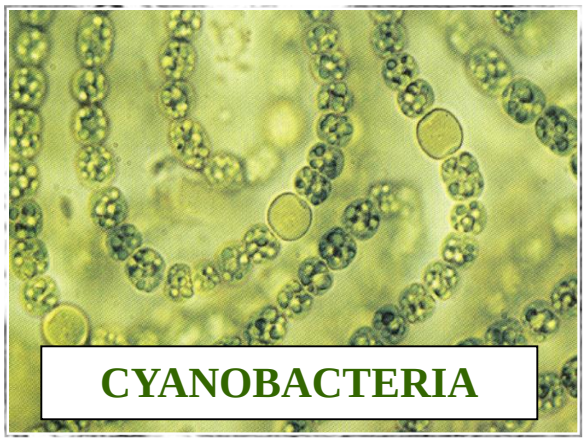
CYANOBACTERIA EVOLVED TRUE PLANT CHLOROPLASTS

TRUE PLANT CELL

>

¿

EN



CYANOBACTERIA

CHLOROPLAST

ENDOSYMBIOTIC THEORY

TRUE PLANT CELL

VASCULAR PLANT EVOLUTION

2.7
BILLION YEARS


~2.7 BILLION YEARS AGO
CYANOPHYTA EVOLVE