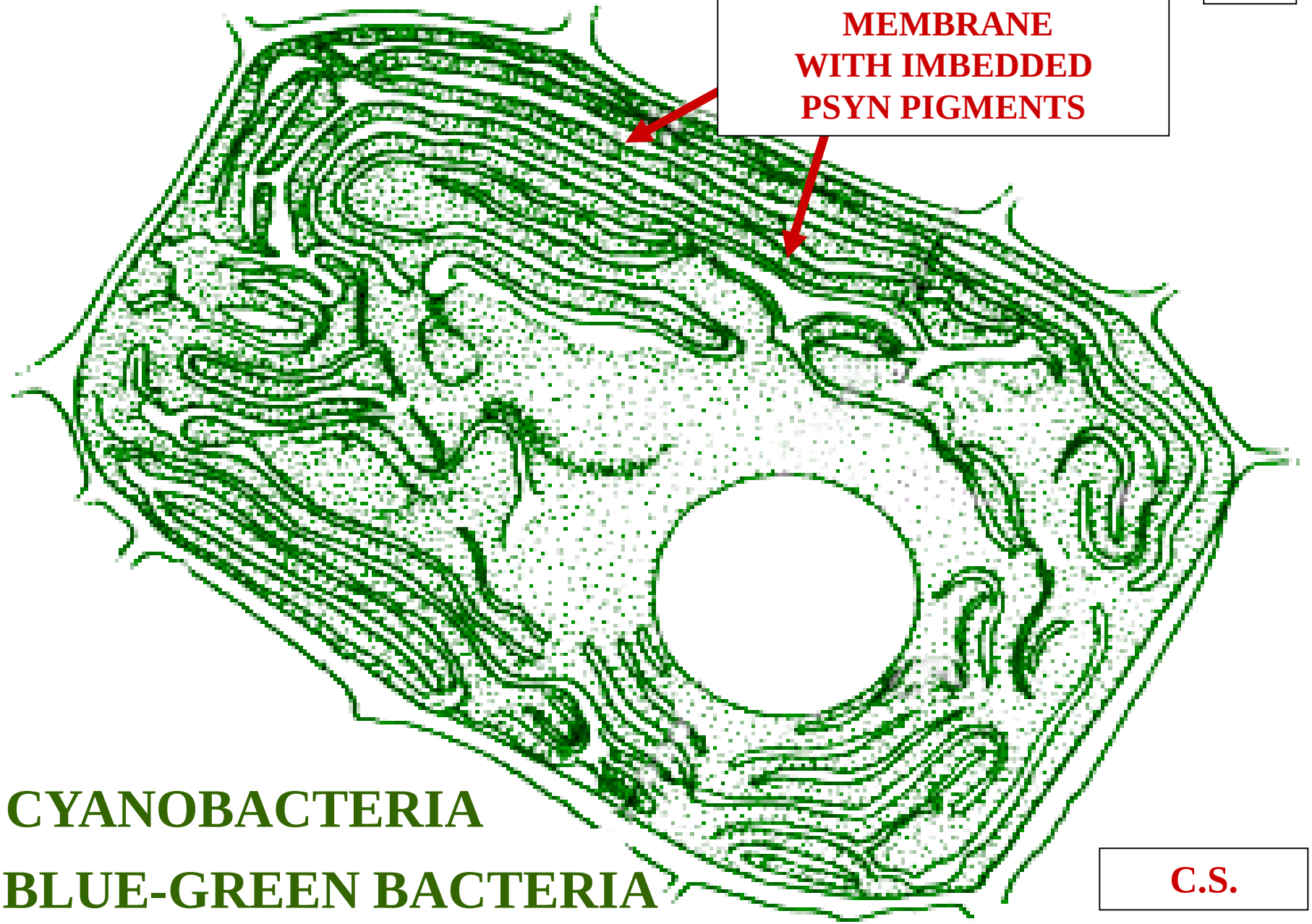
# THYLAKOID

# MEMBRANE WITH IMBEDDED PSYN PIGMENTS

# THYLAKOID

# CYANOBACTERIUM




GA

## CYANOBACTERIA

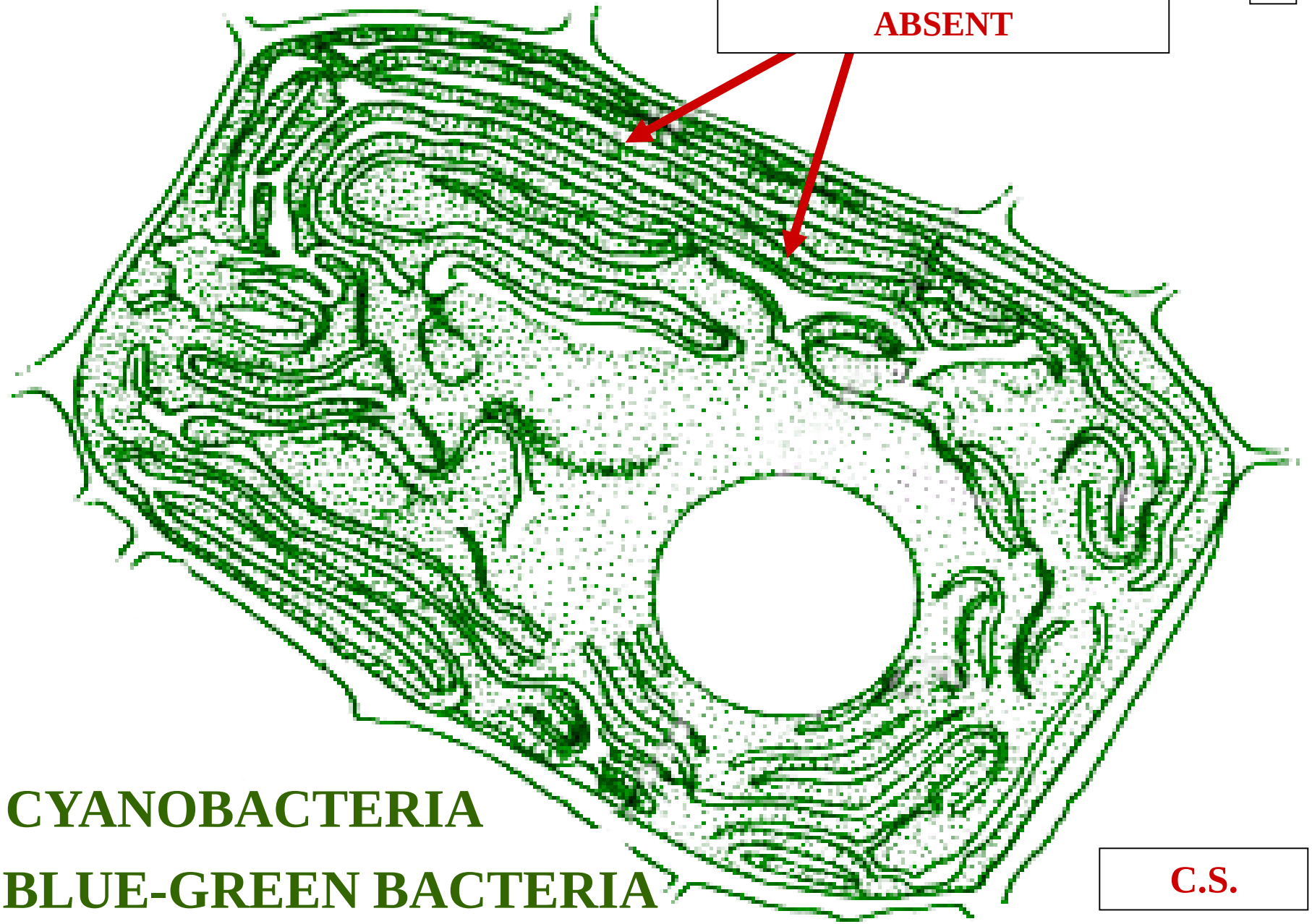
## BLUE-GREEN BACTERIA

C.S.

# CYANOBACTERIUM

THYLAKOID GRANA ABSENT

G



## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

# GRANA

THYLAKOID

GRANA

STACKED

THYLAKOID

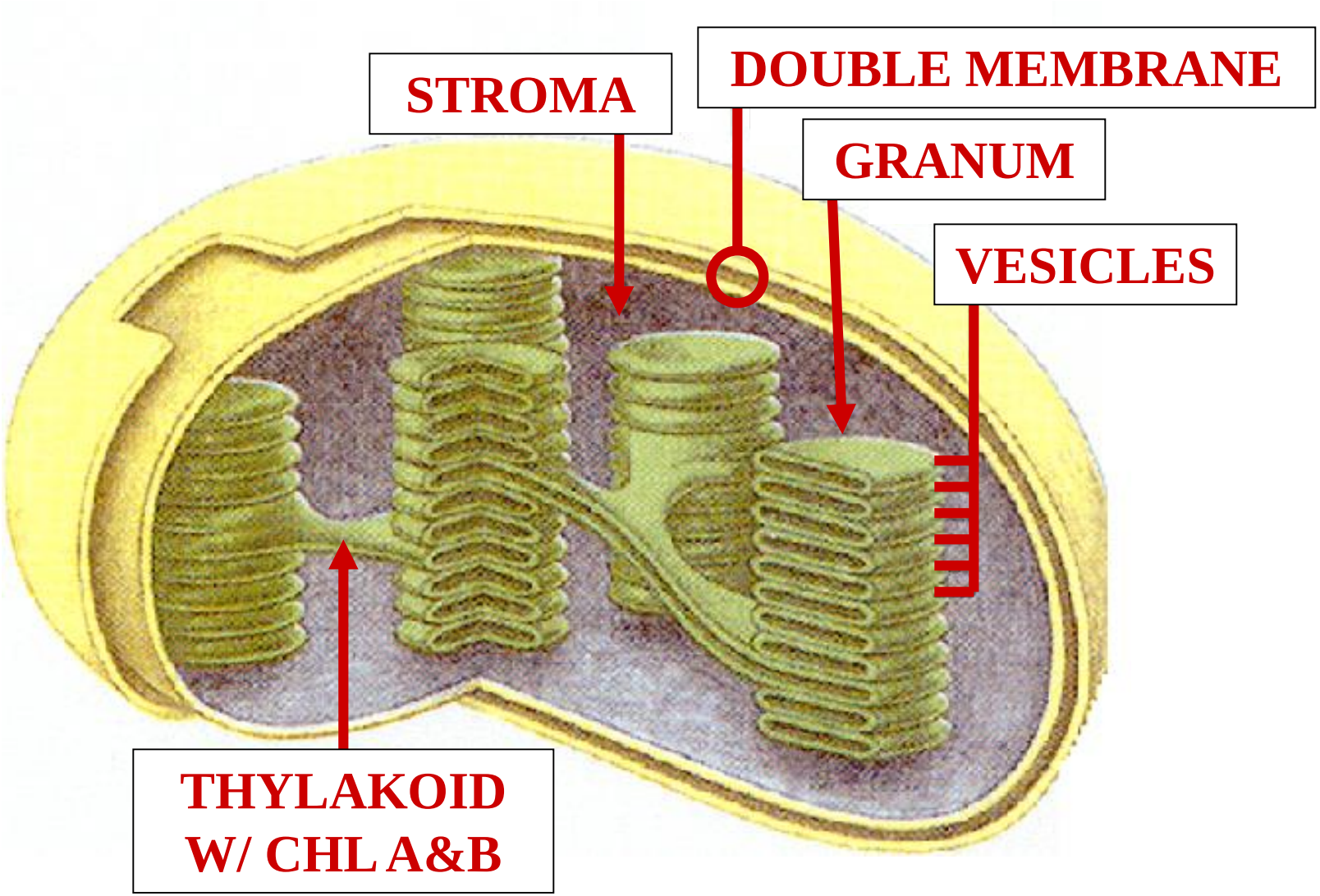
VESICLES

THYLAKOID

GRANA

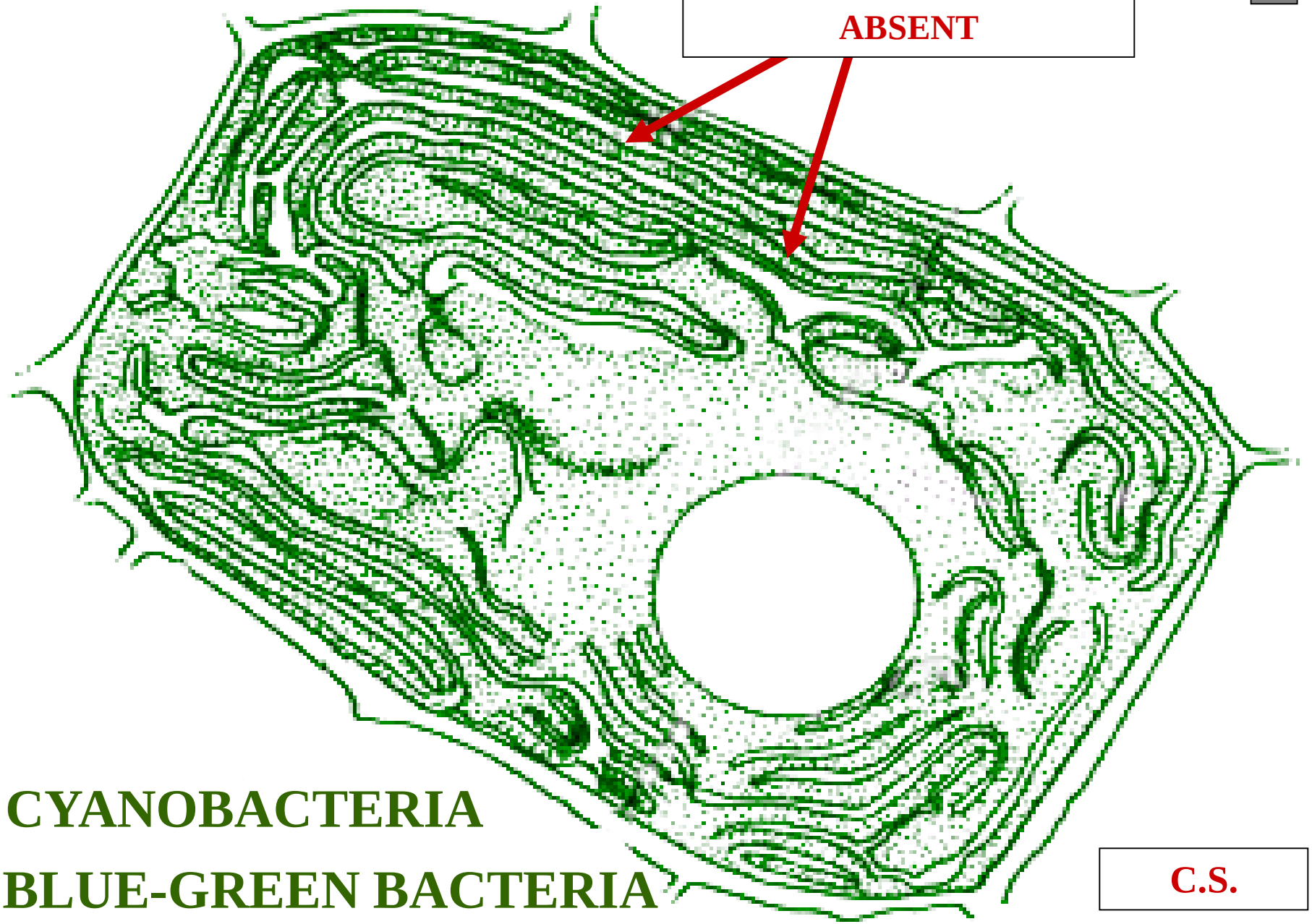
# TRUE PLANT CHLOROPLAST ULTRASTRUCTURE

GA



# CYANOBACTERIUM

THYLAKOID GRANA ABSENT



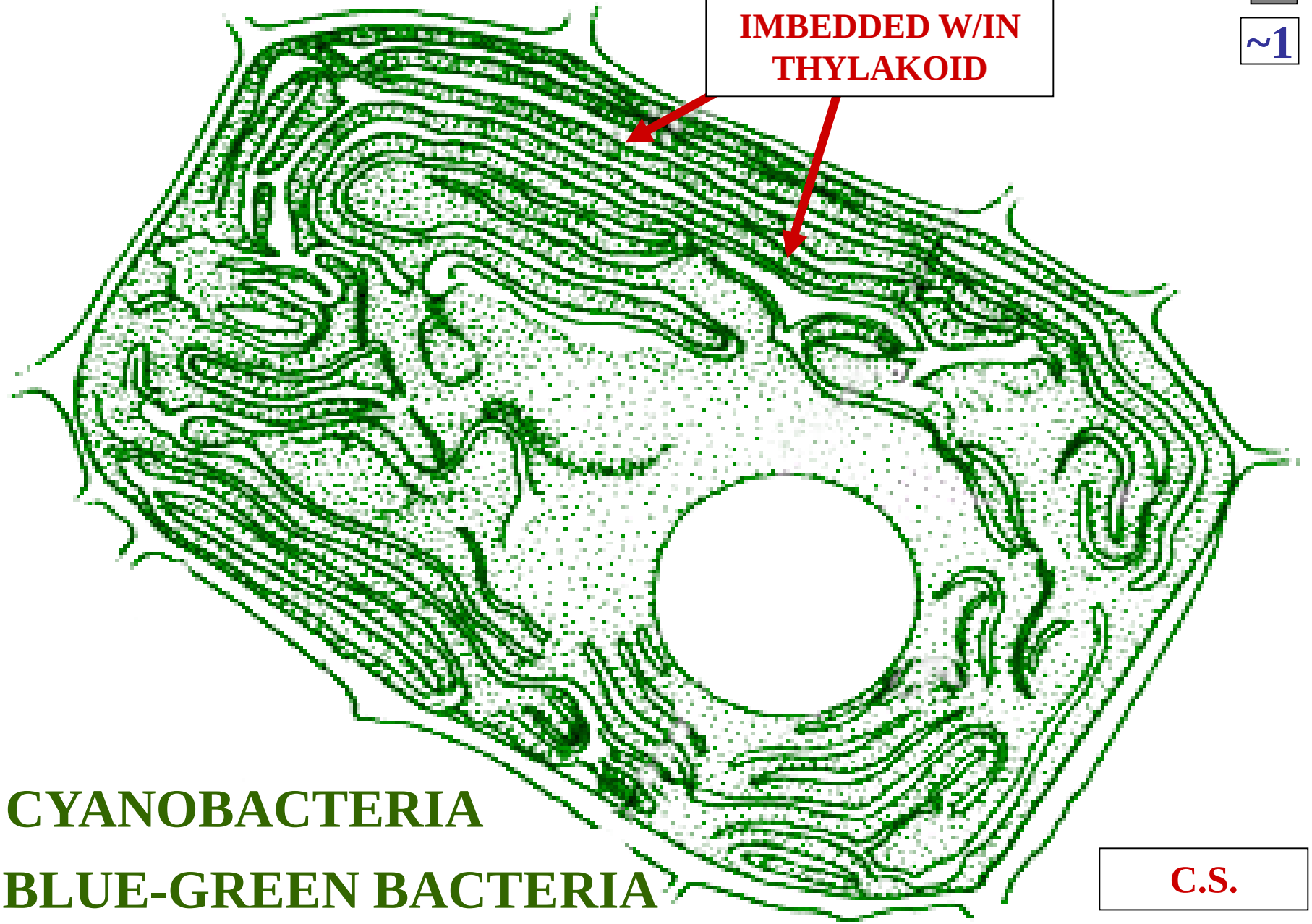
## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

# PIGMENTATION

# CYANOBACTERIUM

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~1

## CYANOBACTERIA

## BLUE-GREEN BACTERIA

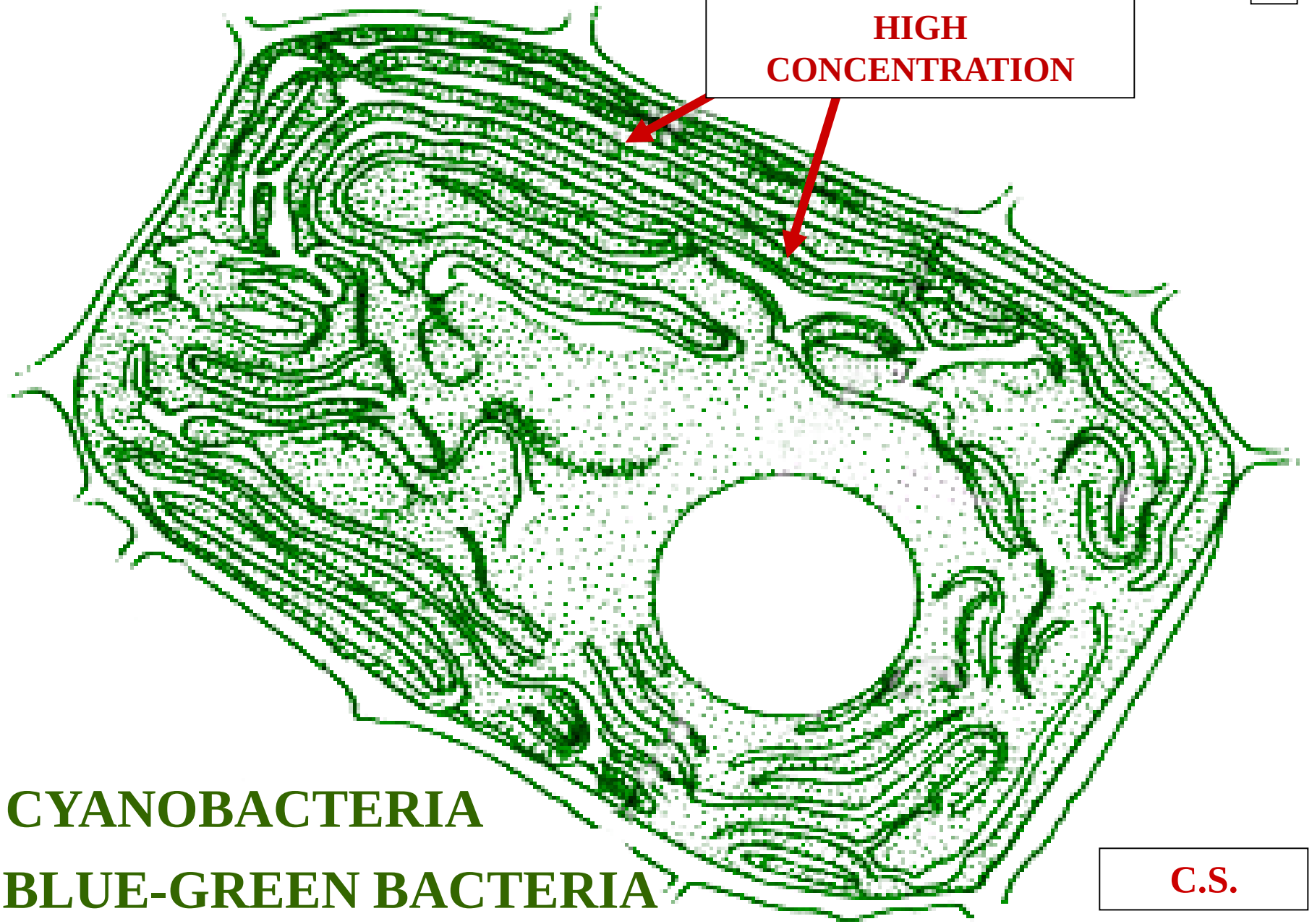
C.S.

# PRIMARY PHOTOSYNTHETIC PIGMENT

# CYANOBACTERIUM

~1 PSYN PIGMENT
HIGH
CONCENTRATION

A

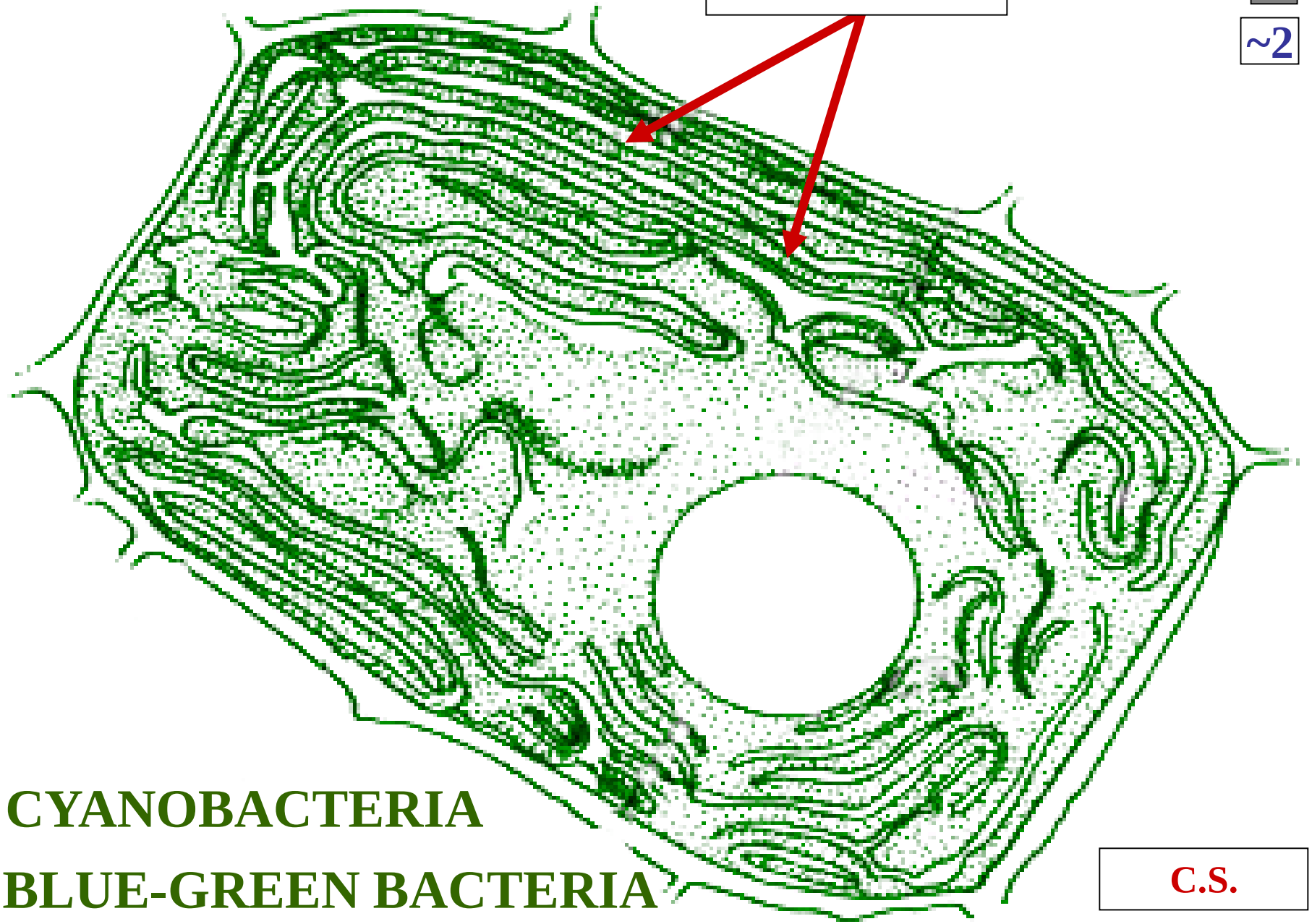


# CYANOBACTERIA

# BLUE-GREEN BACTERIA

C.S.

# CYANOBACTERIUM

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~2

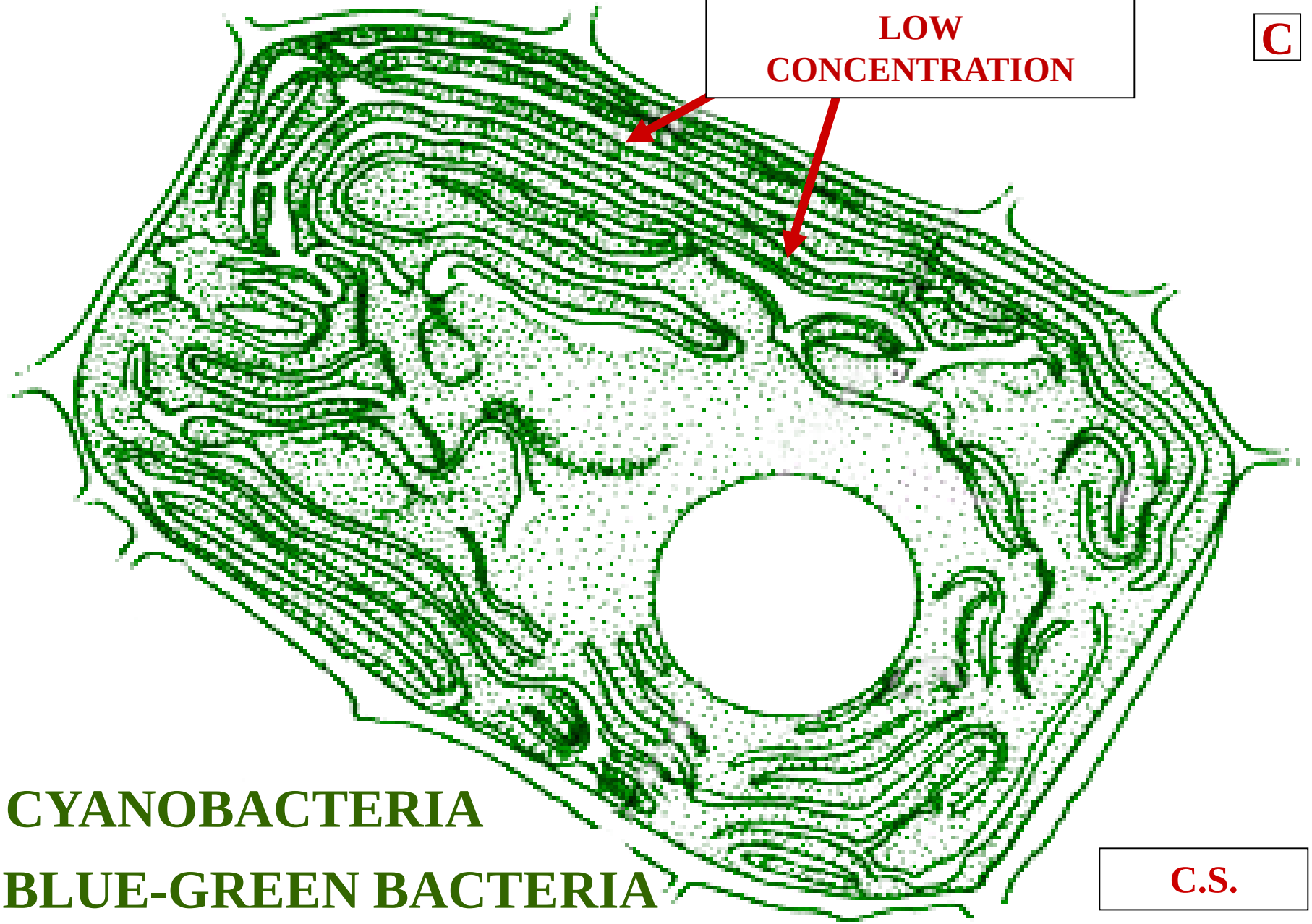
## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

# SECONDARY PHOTOSYNTHETIC PIGMENTS

# CYANOBACTERIUM

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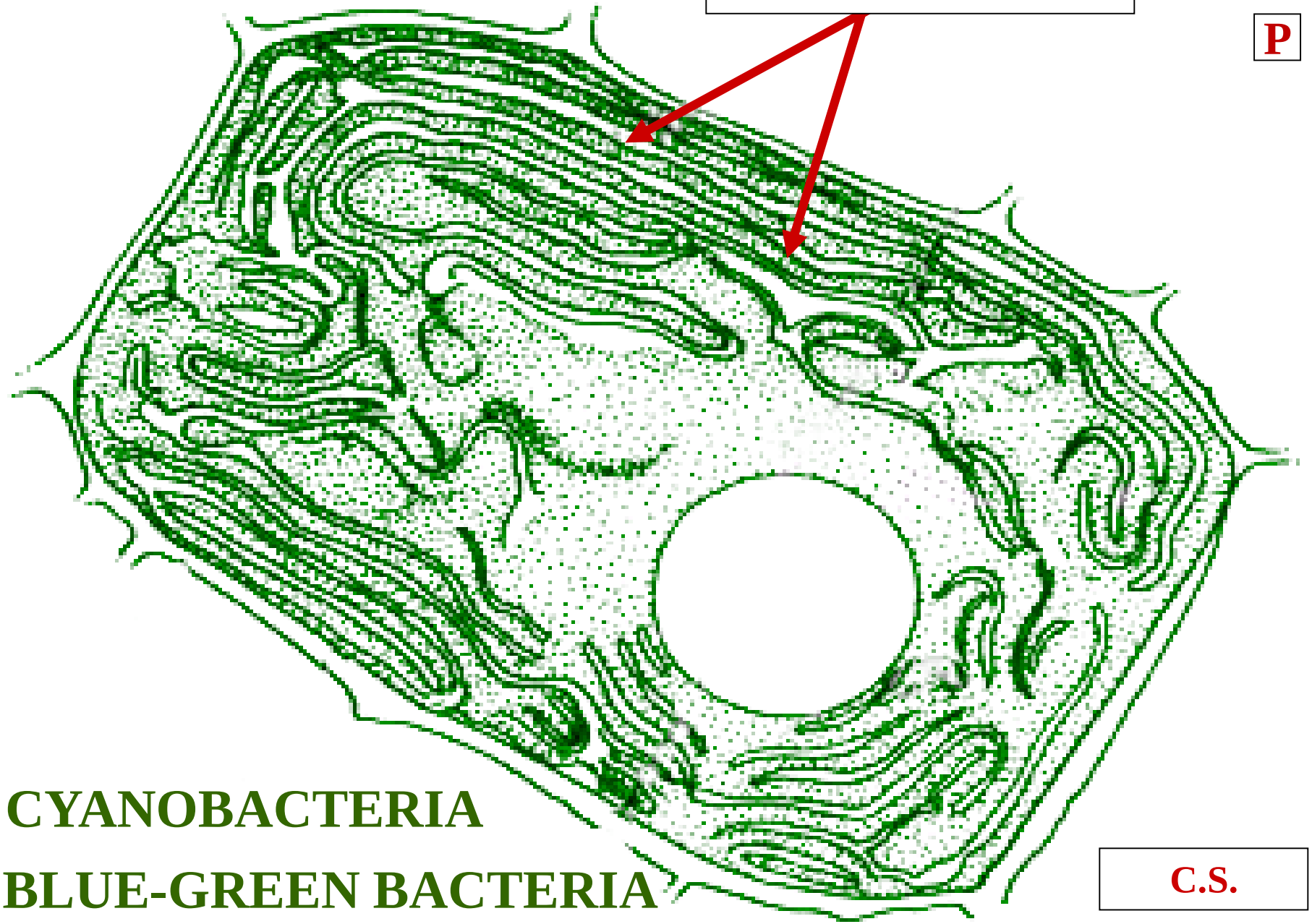
C

## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

# CYANOBACTERIUM

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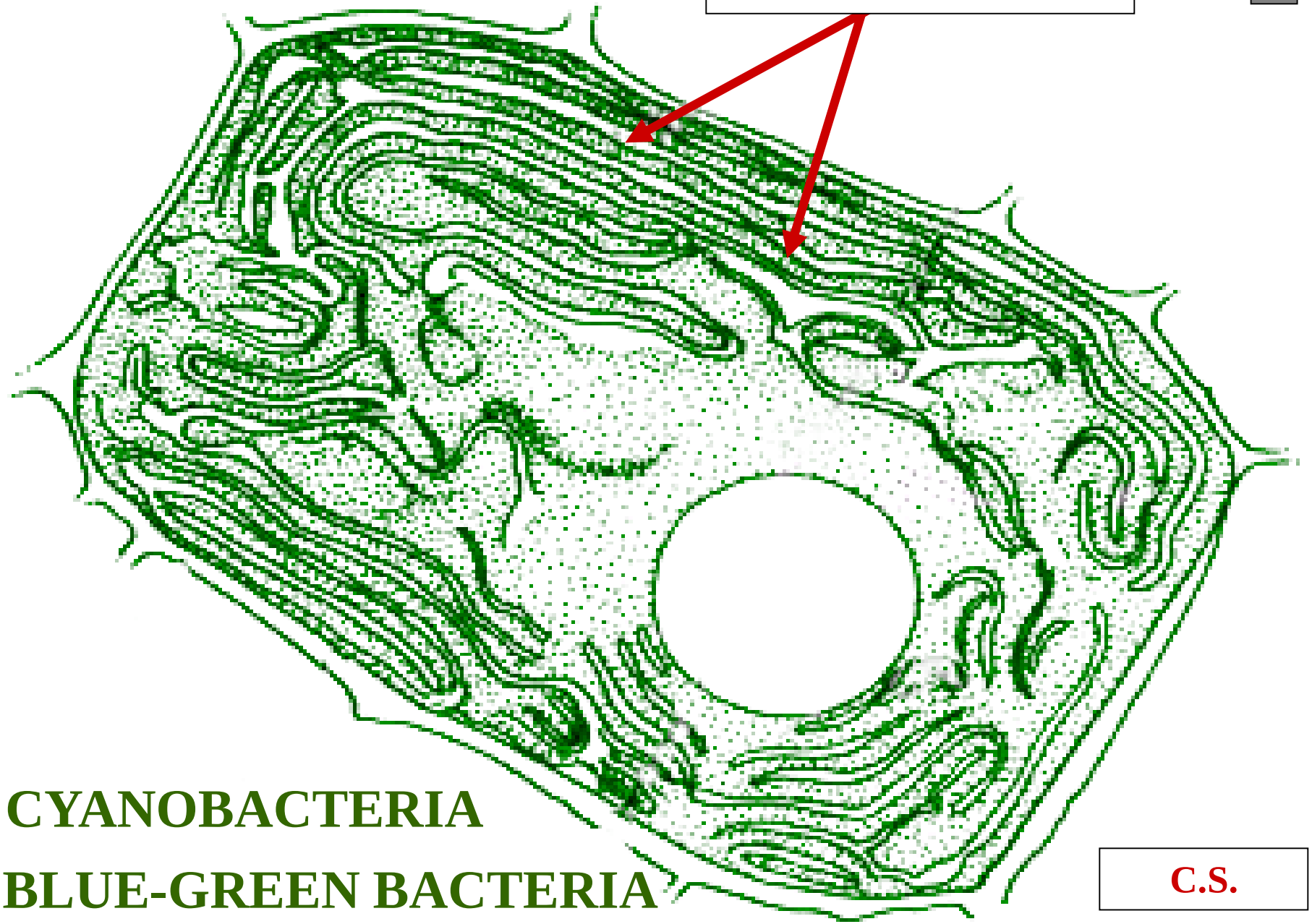
P

## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

# CYANOBACTERIUM




## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

C

# CAROTENOIDS

# CAROTENOIDS

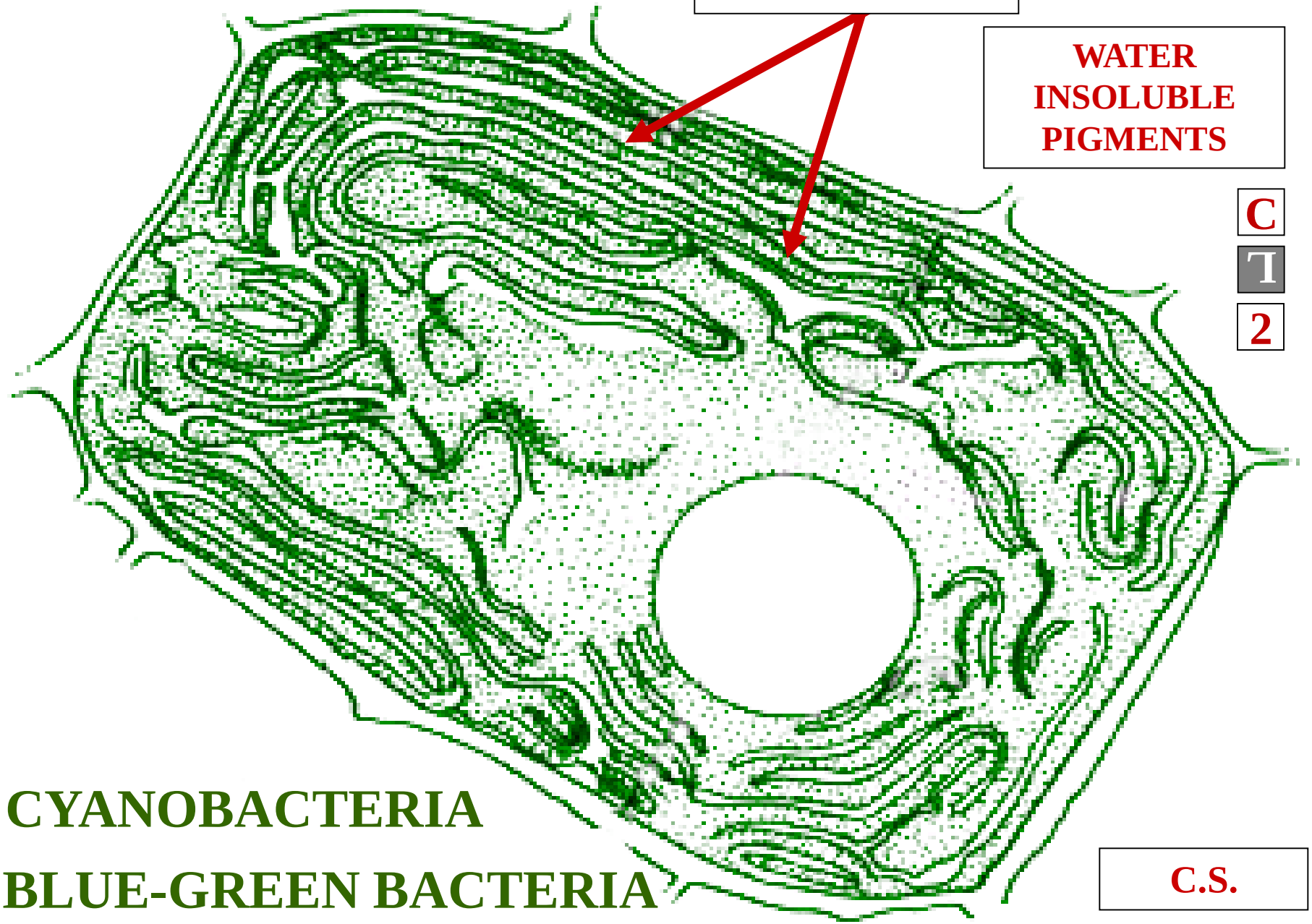
# CAROTENOIDS

I

# WATER INSOLUBLE PIGMENTS

# CAROTENOIDS

# CYANOBACTERIUM




C

T

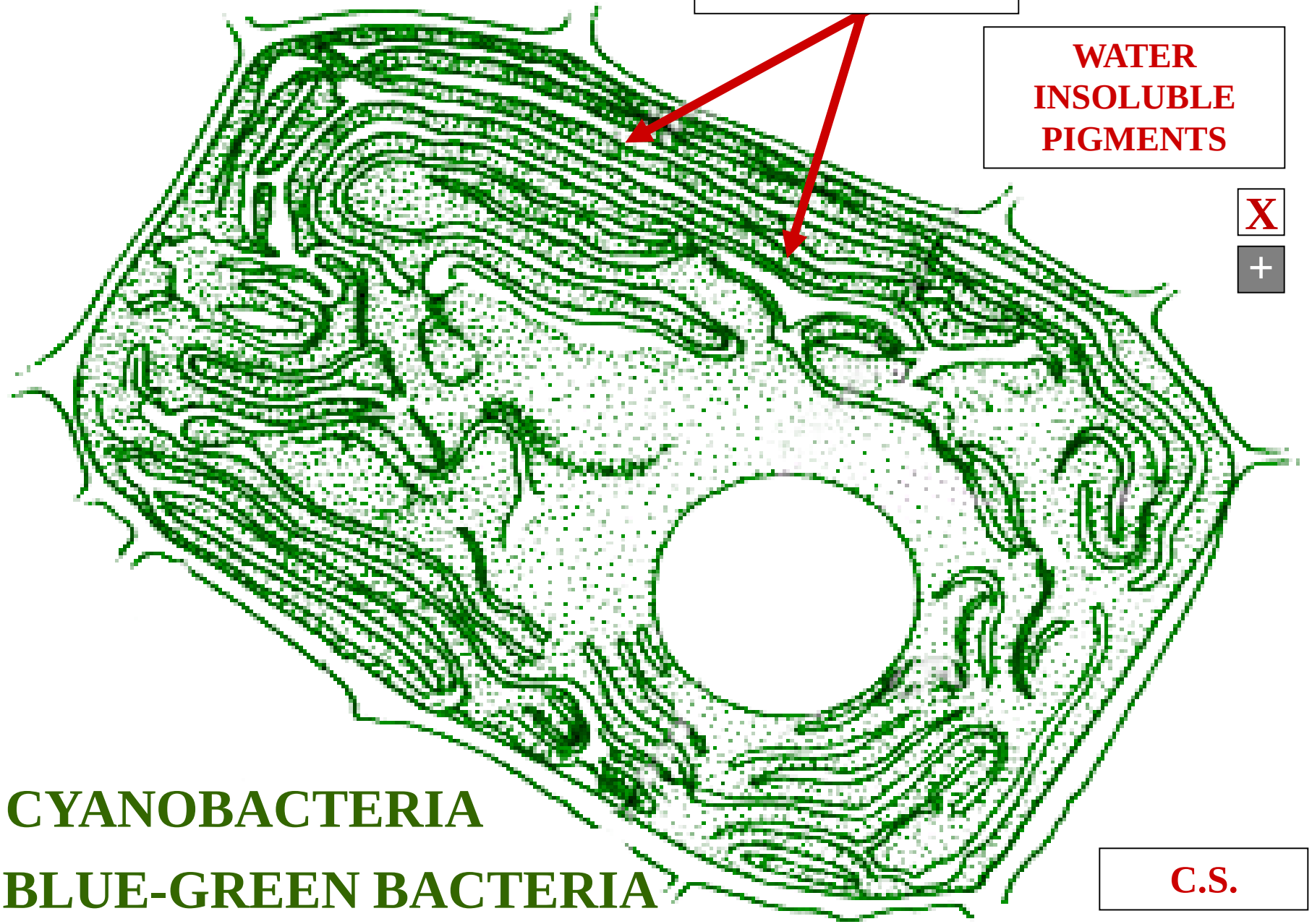
2

## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

# CYANOBACTERIUM

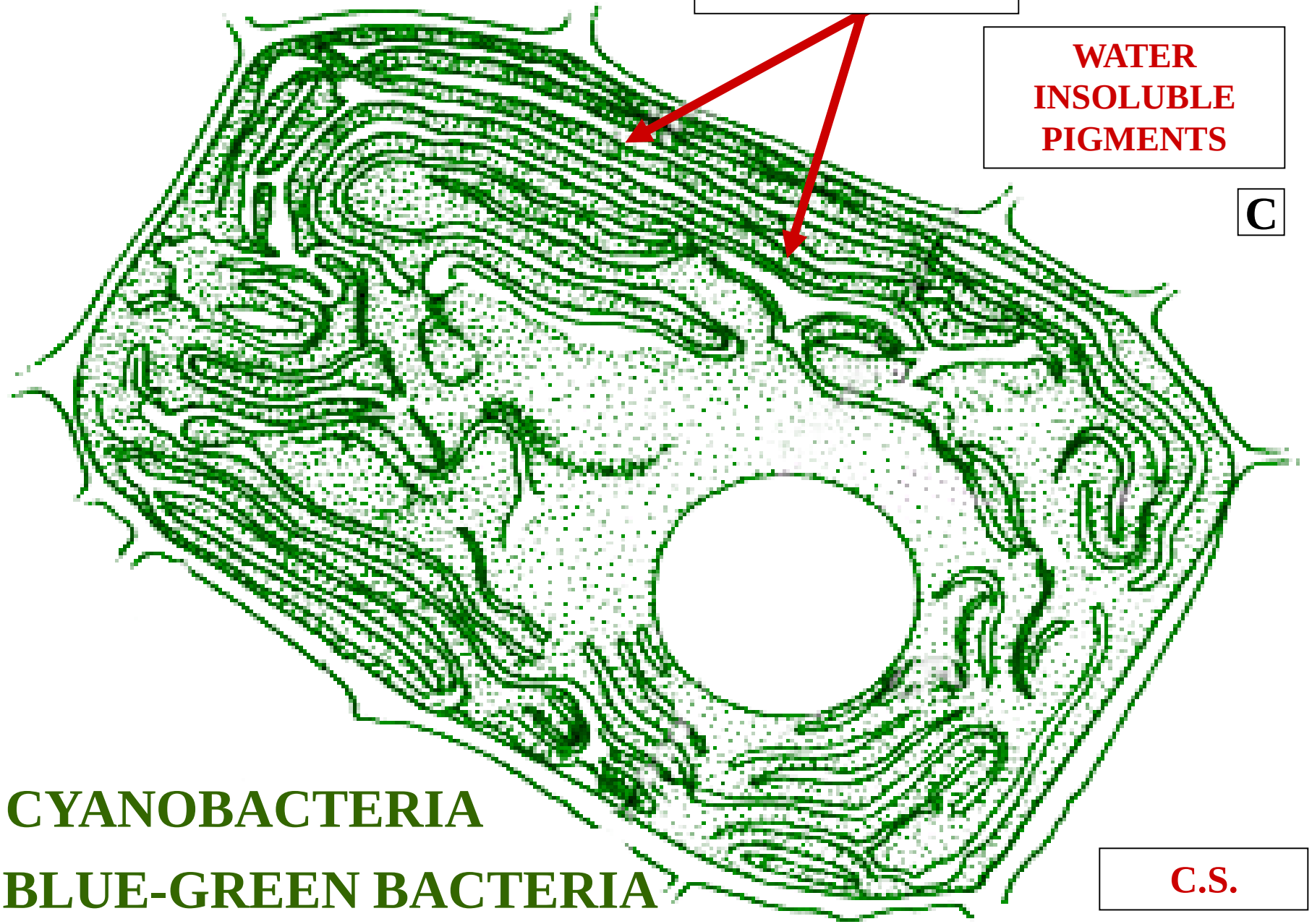



## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

# CYANOBACTERIUM




## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

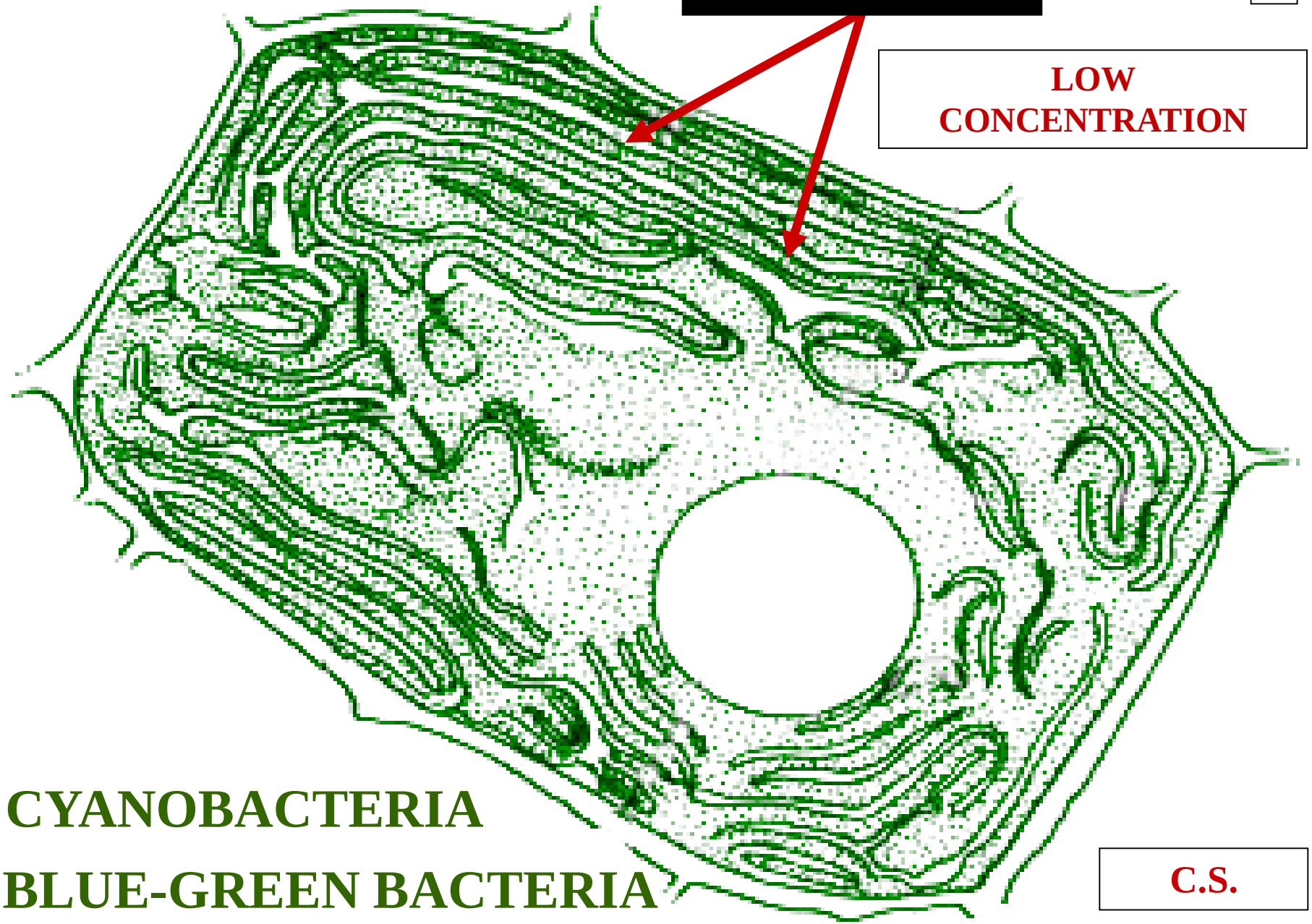
# CAROTENES

# CAROTENOIDS
# CAROTENES


# ORANGE CAROTENOIDS


# CAROTENOIDS
# CAROTENES

# CYANOBACTERIUM




## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

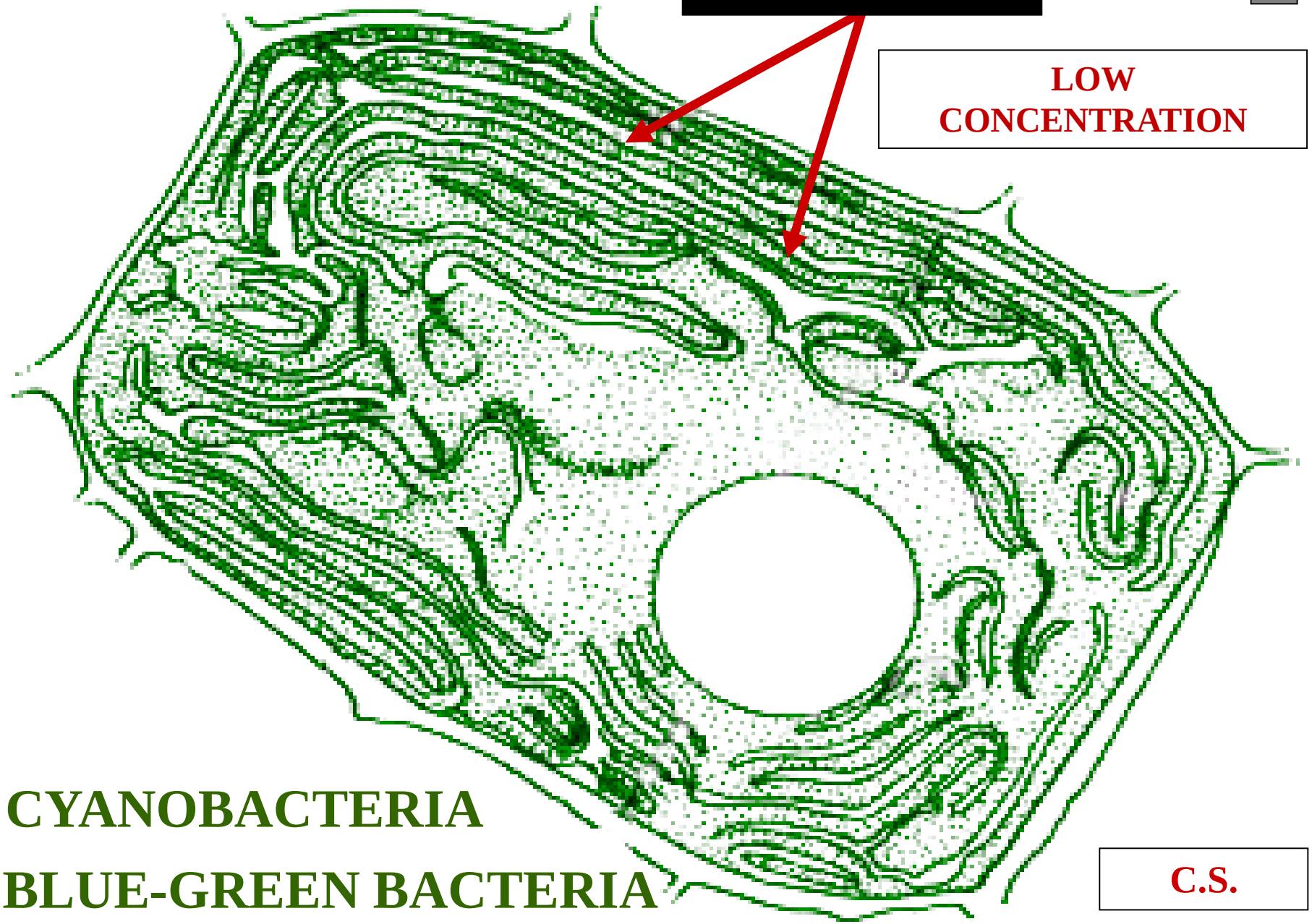
# XANTHOPHYLLS

# CAROTENOIDS
# XANTHOPHYLLS

# YELLOW CAROTENOIDS


# CAROTENOIDS
# XANTHOPHYLLS

# CYANOBACTERIUM




## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

# PHYCOBILINS

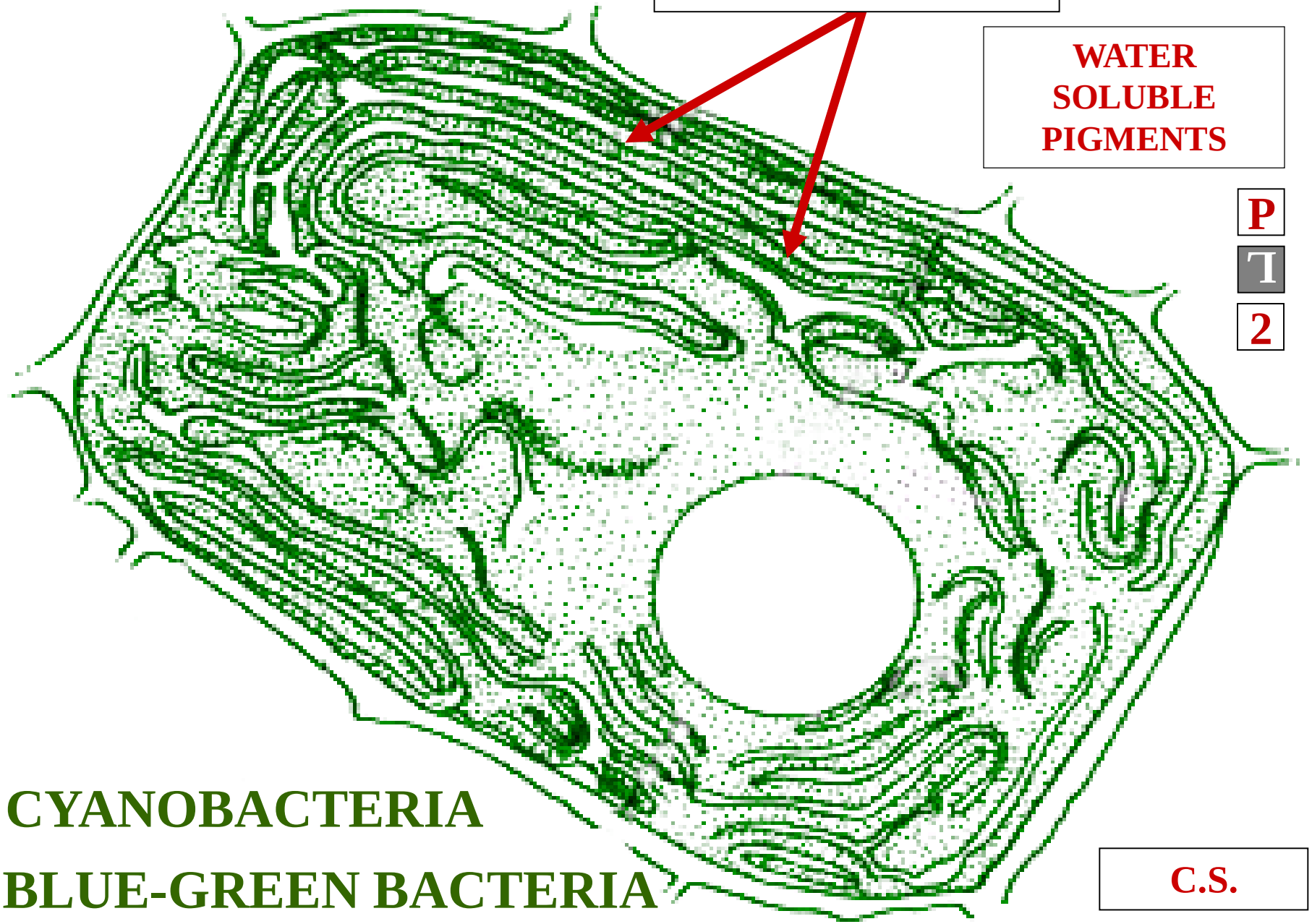
# PHYCOBILINS

# PHYCOBILINS

# WATER SOLUBLE PIGMENTS

PHYCOBILINS

# CYANOBACTERIUM



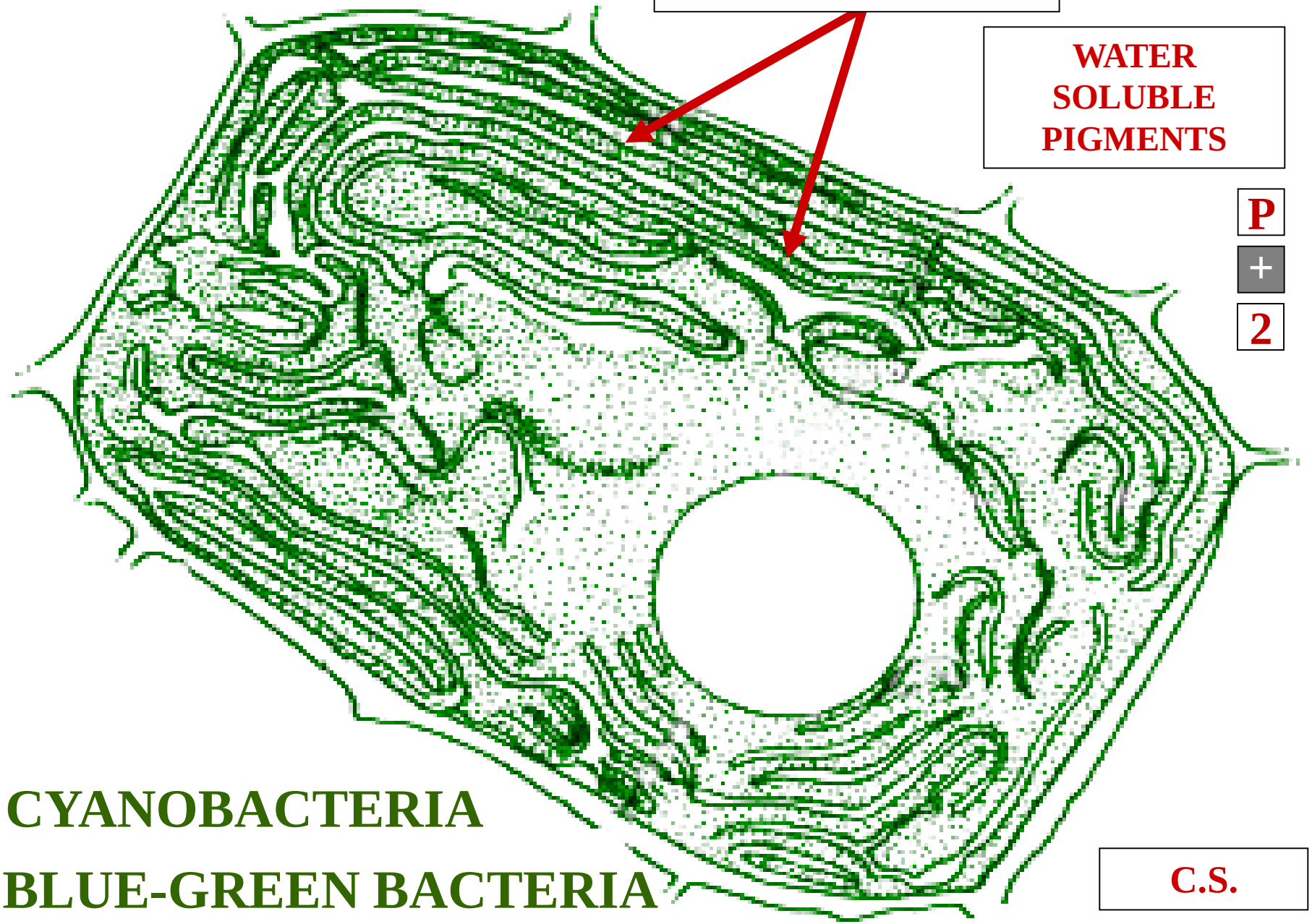

P
T
2

## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

# CYANOBACTERIUM

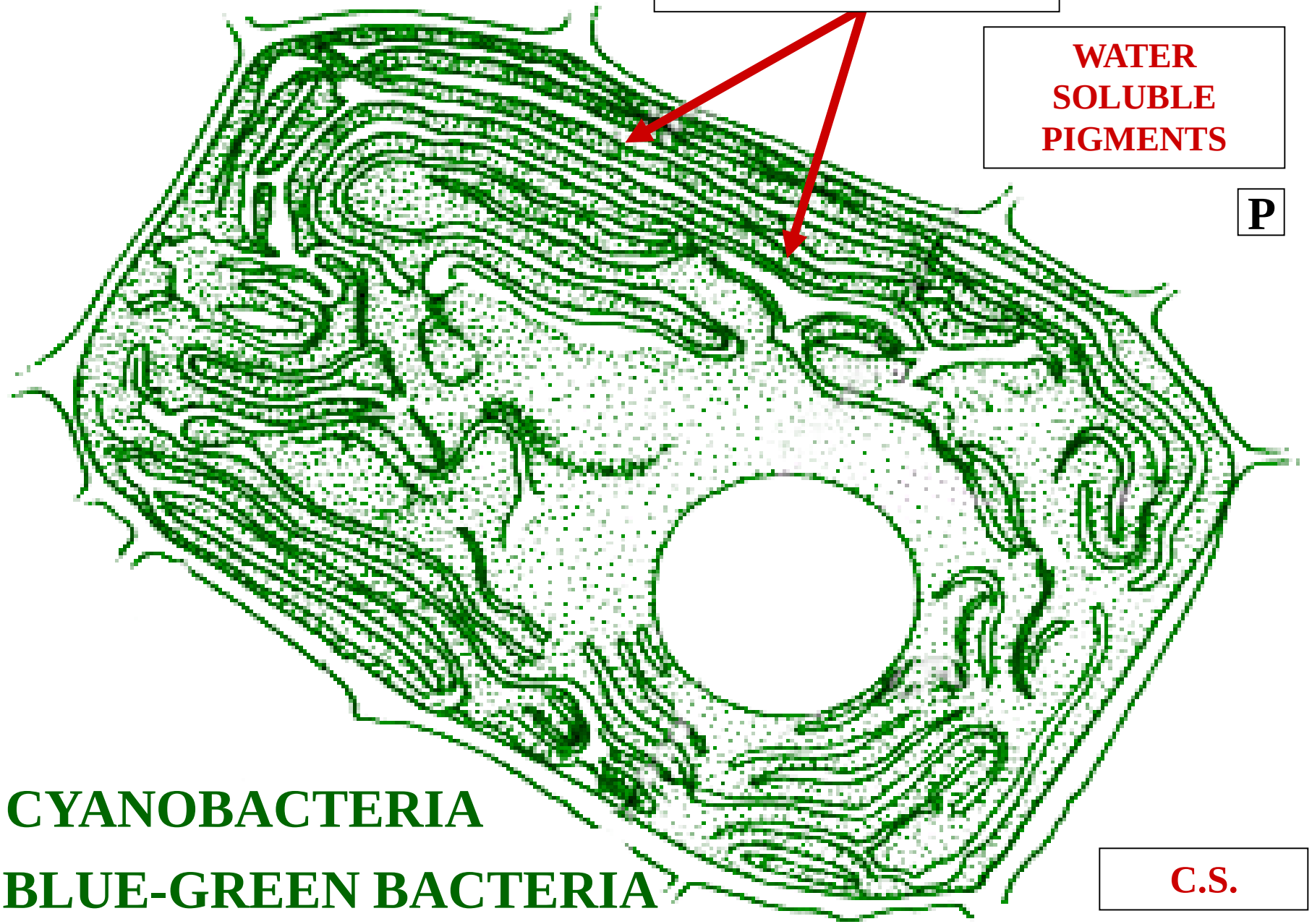



## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

# CYANOBACTERIUM




## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

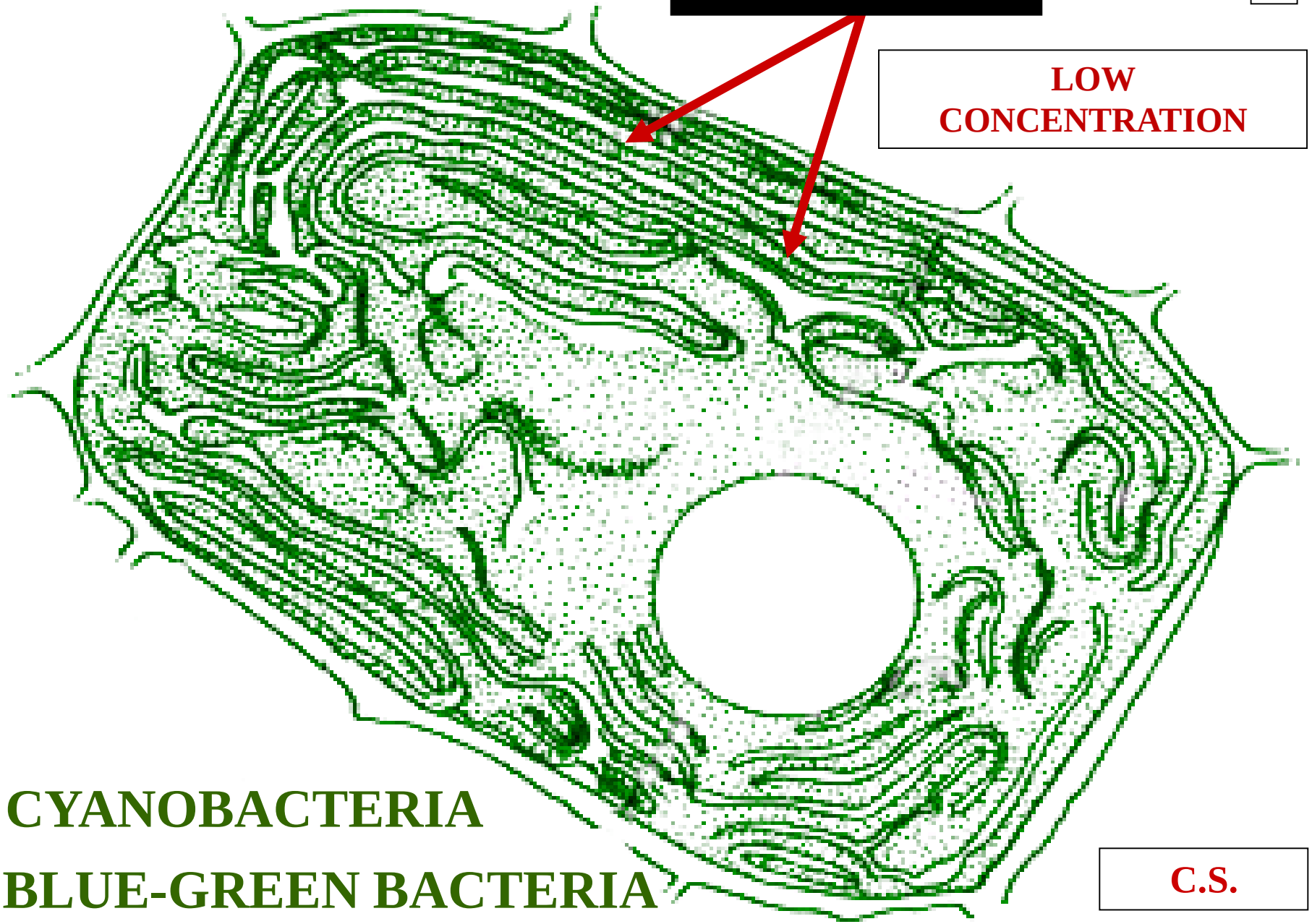
# PHYCOERYTHRINS

# PHYCOBILINS
# PHYCOERYTHRINS


# RED
# PHYCOBILINS


# PHYCOBILINS
# PHYCOERYTHRINS

# CYANOBACTERIUM




## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

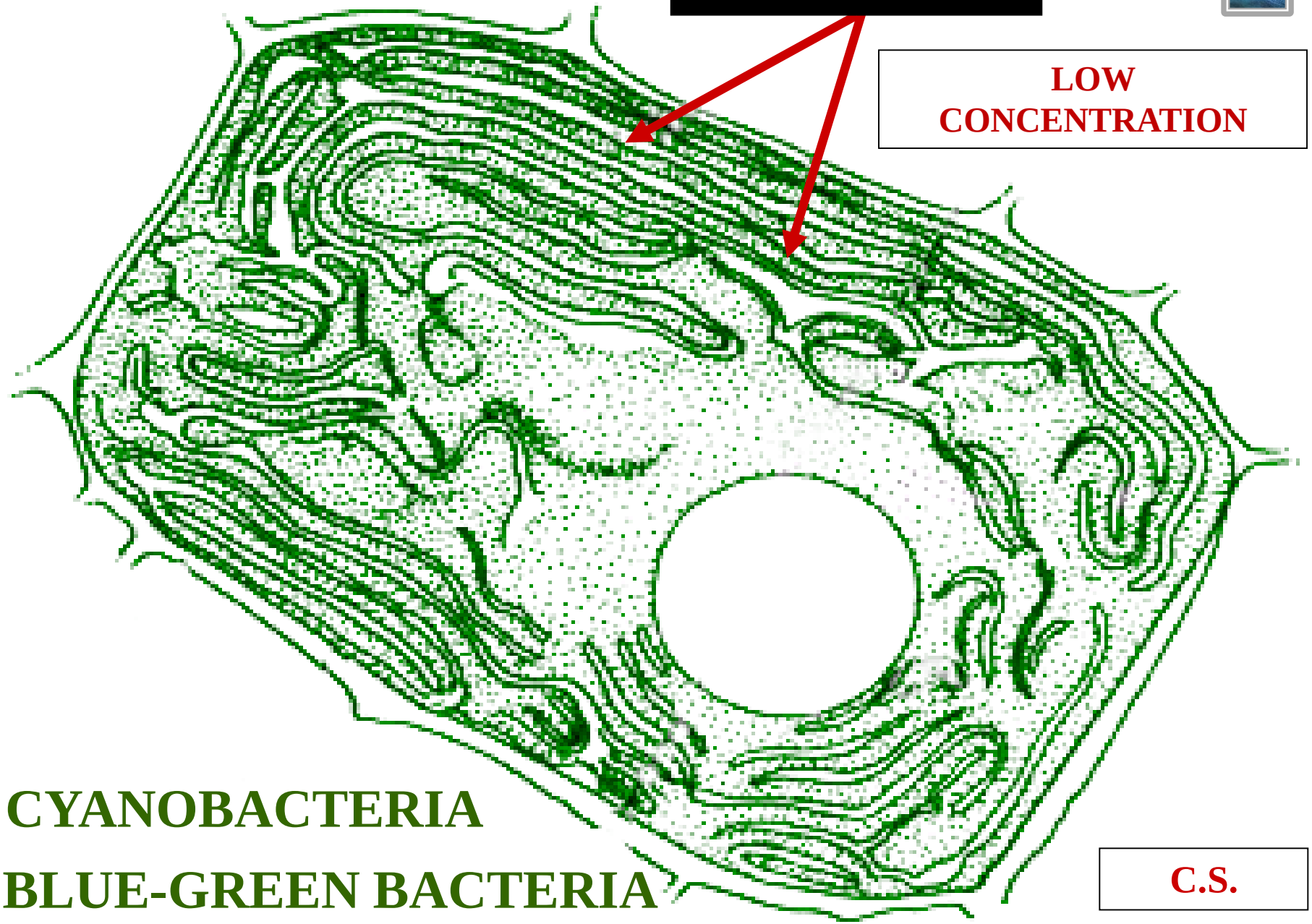
# PHYCOCYANINS

# PHYCOBILINS
# PHYCOCYANINS

# BLUE PHYCOBILINS


# PHYCOBILINS
# PHYCOCYANINS

# CYANOBACTERIUM




## CYANOBACTERIA

## BLUE-GREEN BACTERIA

C.S.

# SECONDARY
# PSYN PIGMENT
# COMPOSITION
# HABITAT SPECIFIC

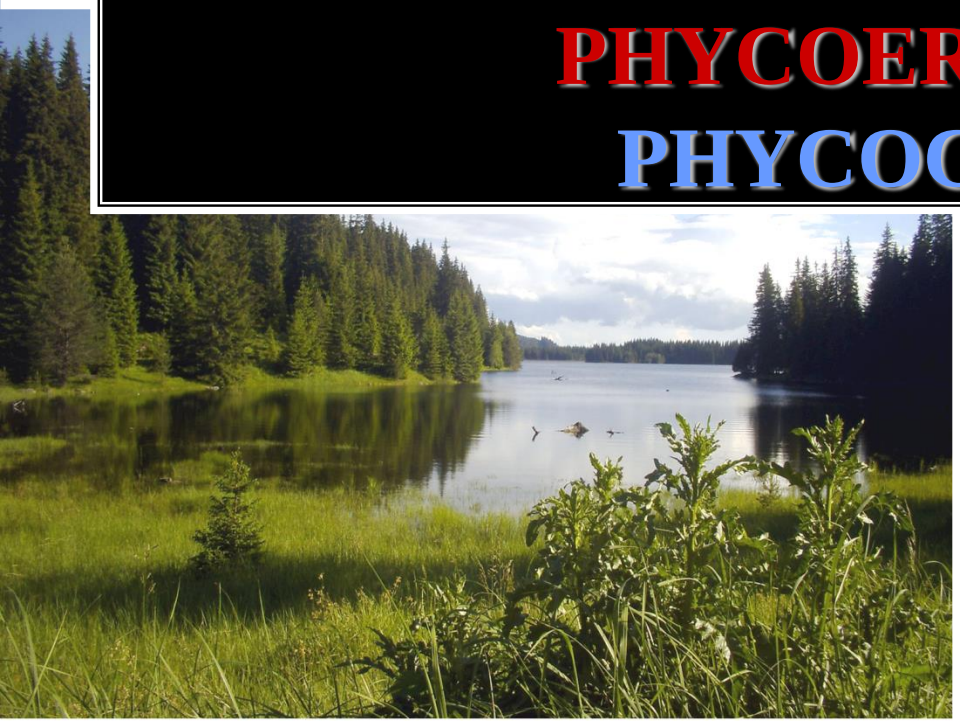
P

CAROTENES

XANTHOPHYLLS

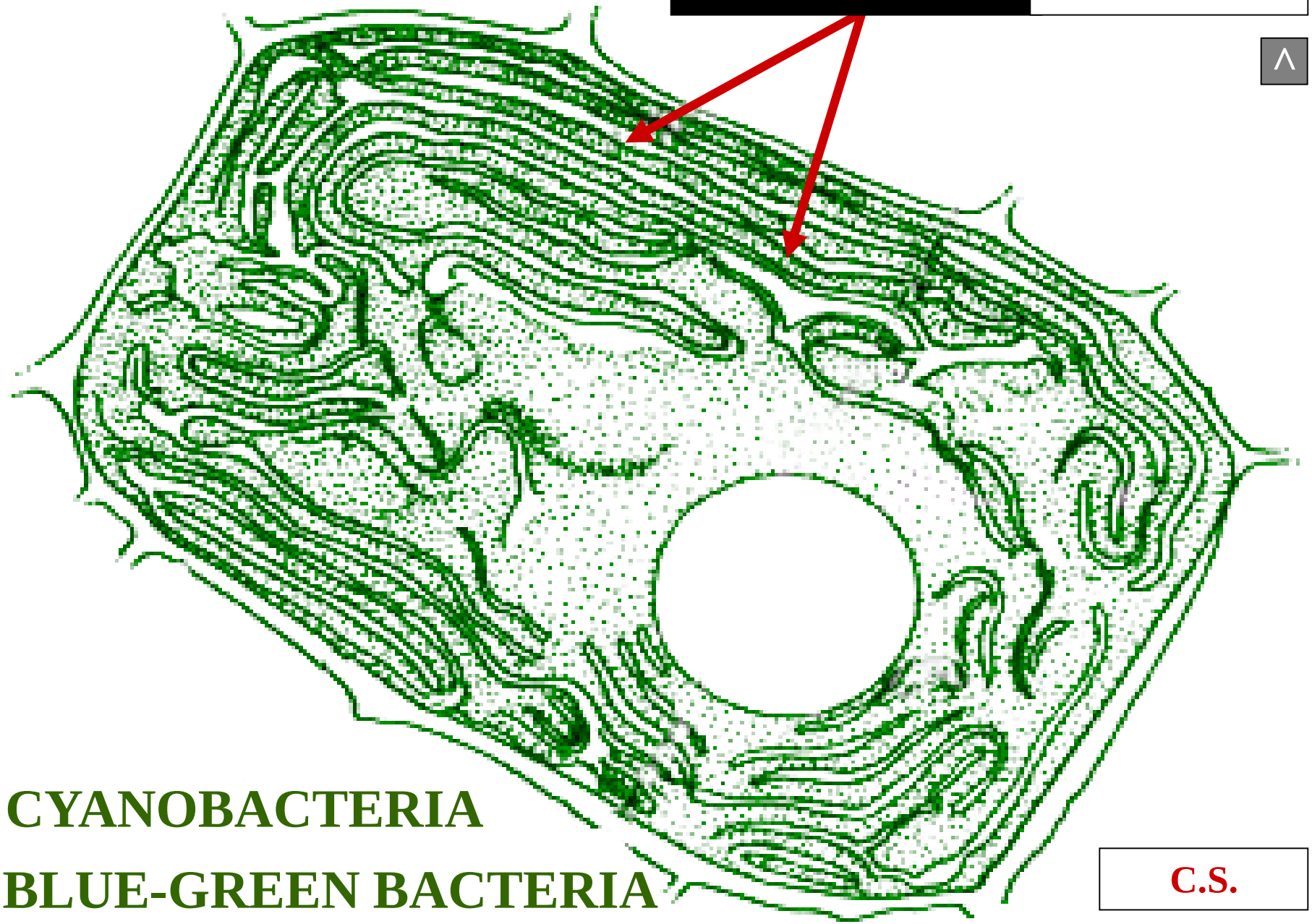
PHYCOERYTHRINS

PHYCOCYANINS



# CYANOBACTERIUM

PHYCOCYANINS | CHL-A



# CYANOBACTERIA

# BLUE-GREEN BACTERIA

C.S.

# FOOD RESERVE


MAGNOLIA
?
P
TRUE PLANT

# PHOTOSYNTHESIS

G

WATER

CO2

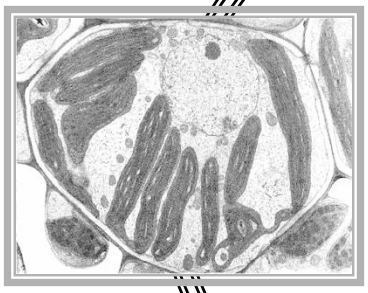
LIGHT EGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT

THYLAKOID

CHEMICAL ENERGY

DK RXT

STROMA

SYNTHESIS

CHEM EGY INPUT

CHLOROPLAST

ATMOSPHERE

OXYGEN

?

# PHOTOSYNTHESIS

S

WATER

CO2

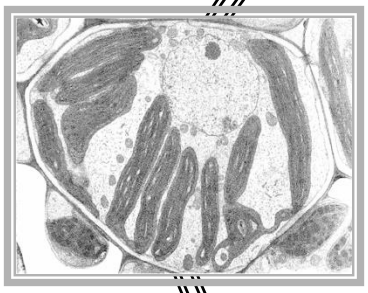
LIGHT EGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT

THYLAKOID

CHEMICAL ENERGY

DK RXT

STROMA

SYNTHESIS

CHEM EGY INPUT

CHLOROPLAST

ATMOSPHERE

OXYGEN

GLUCOSE

# PHOTOSYNTHESIS

WATER

CO2

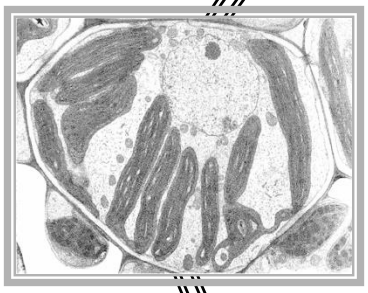
LIGHT EGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT

THYLAKOID

CHEMICAL ENERGY

DK RXT

STROMA

SYNTHESIS

CHEM EGY INPUT

CHLOROPLAST

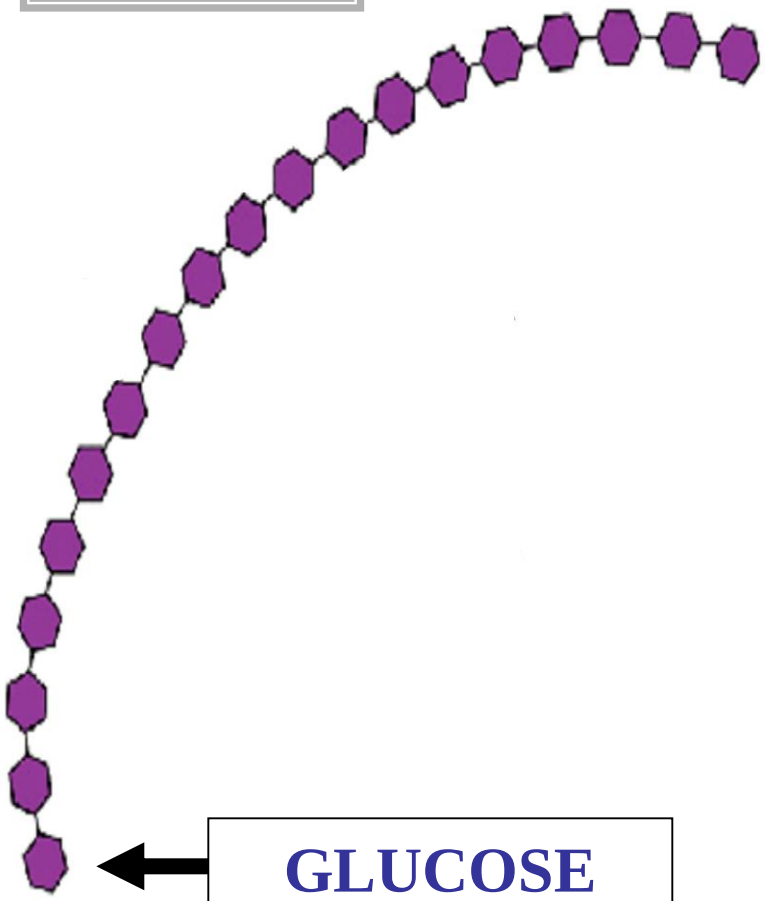
ATMOSPHERE

OXYGEN

STARCH

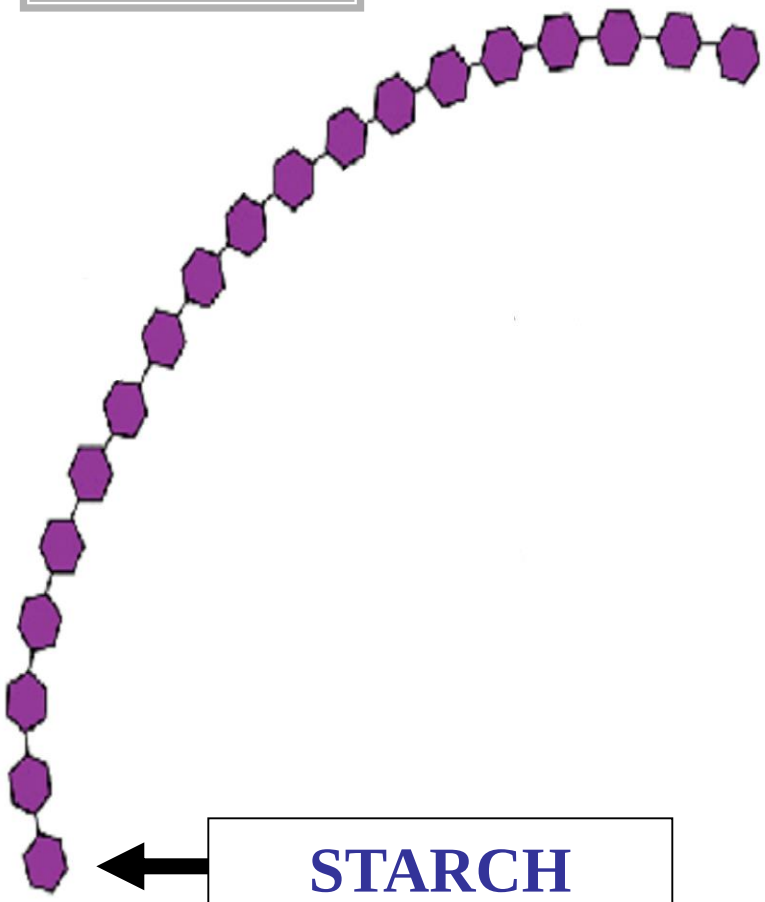
S

# TRUE PLANT

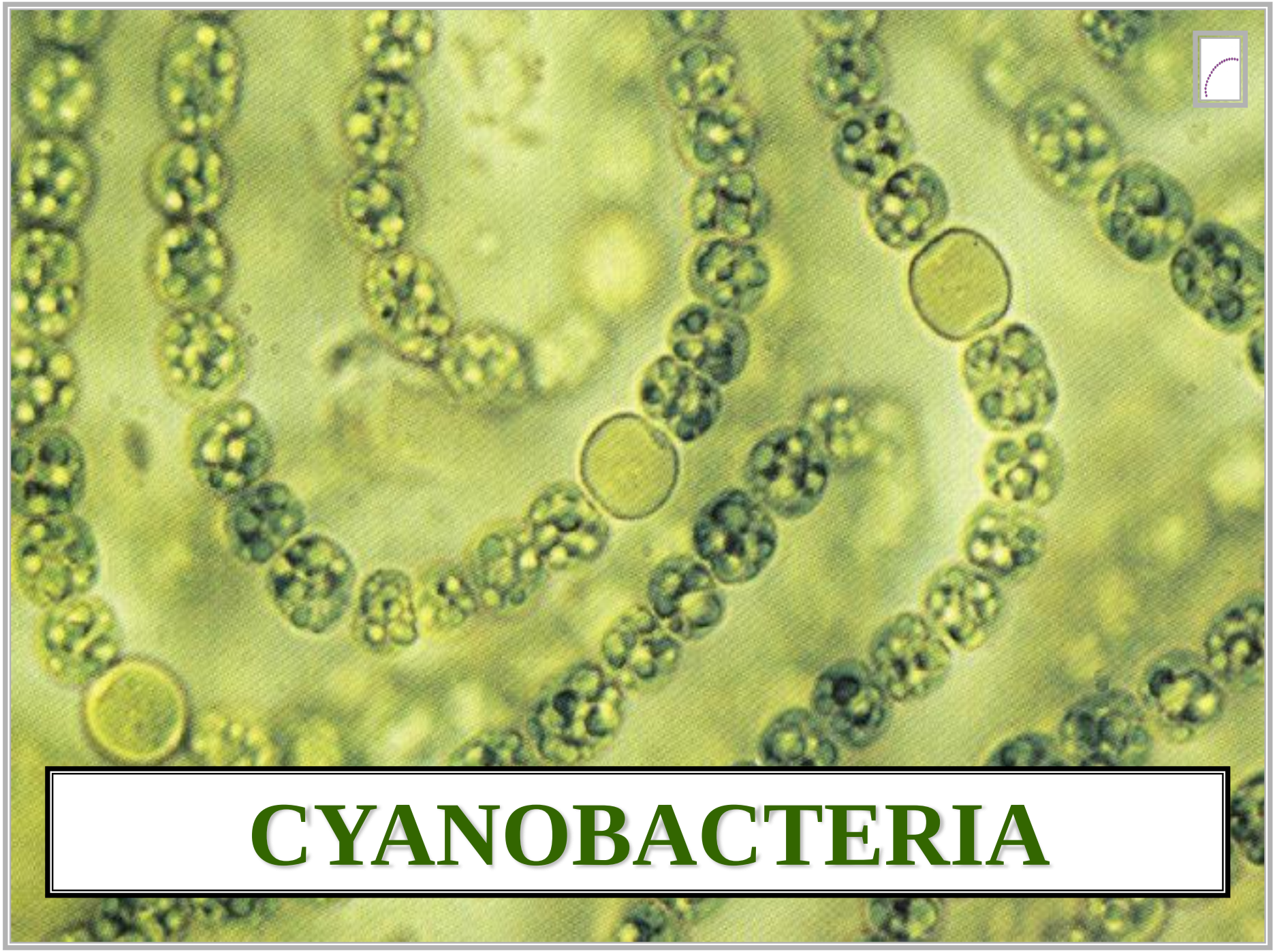


GLUCOSE

# TRUE PLANT

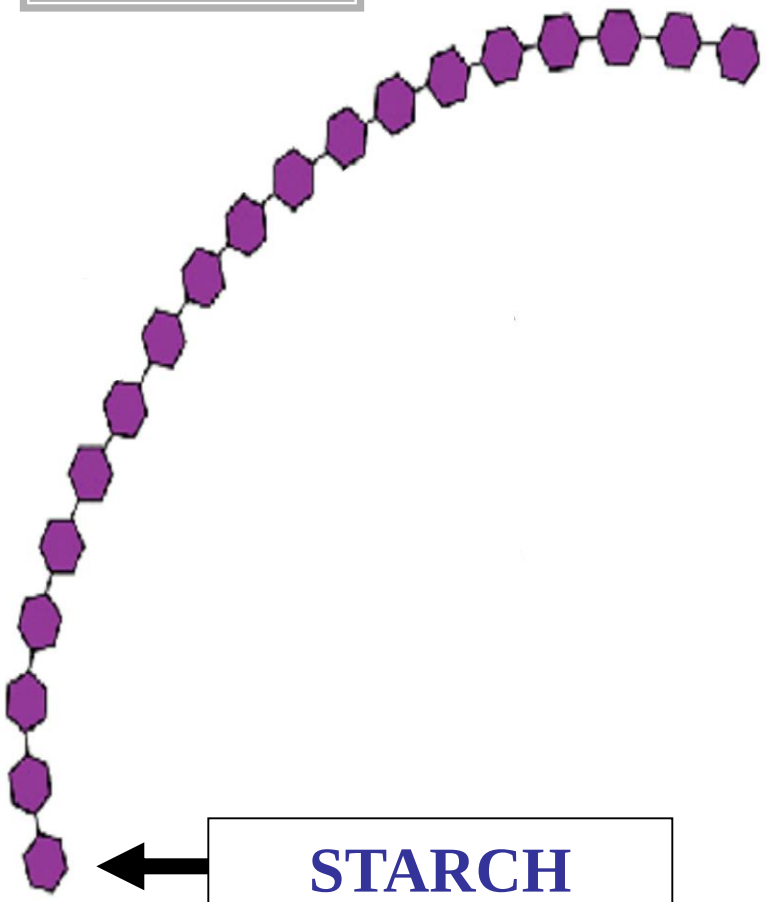


**STARCH**



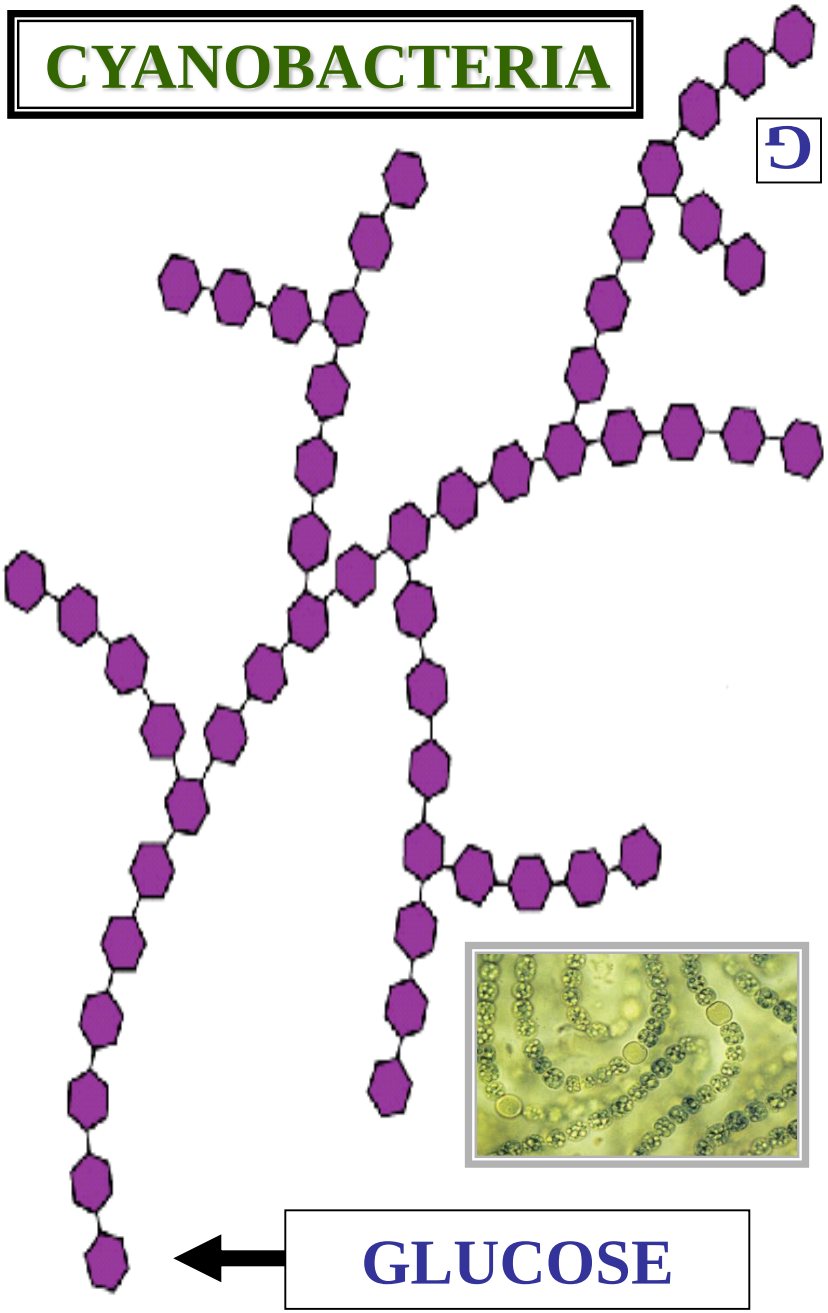
# CYANOBACTERIA

# TRUE PLANT



STARCH

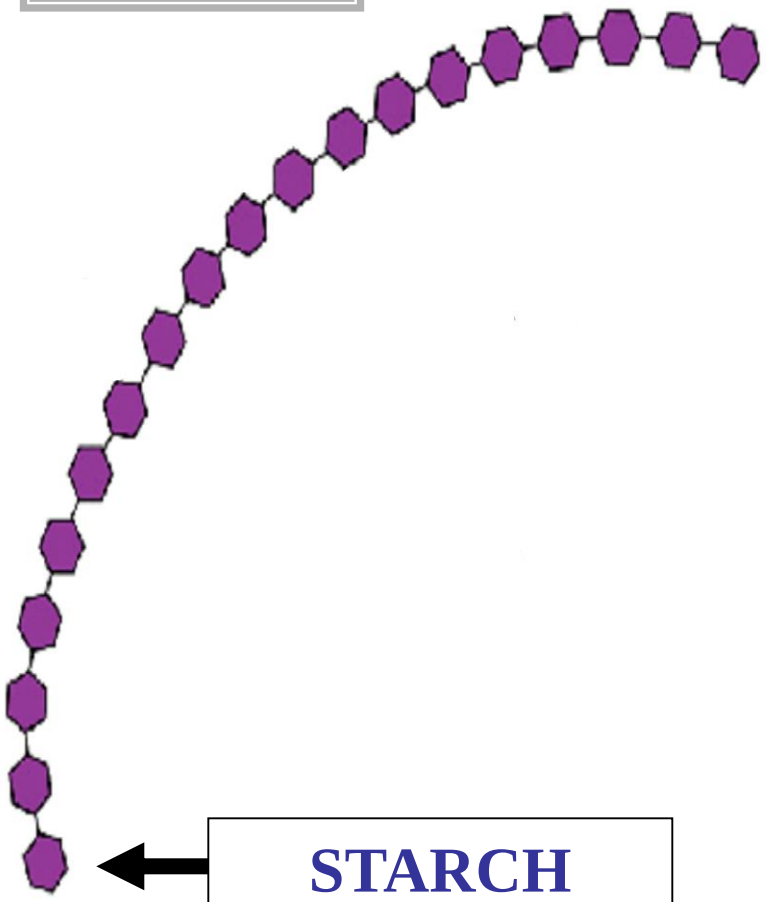
# CYANOBACTERIA





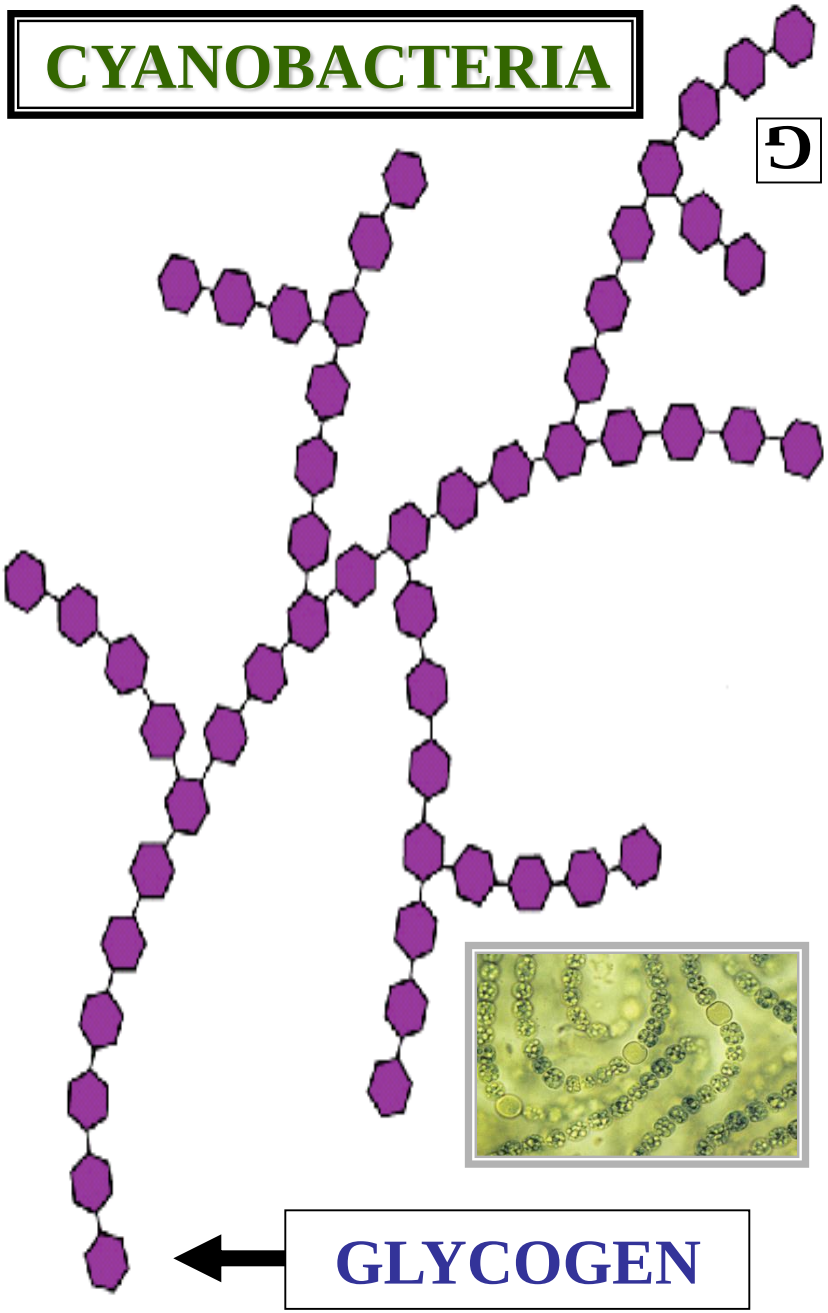
GLUCOSE

# TRUE PLANT



STARCH

# CYANOBACTERIA





GLYCOGEN

# GLYCOGEN

# FOOD RESERVE
# GLYCOGEN

# GLUCOSE POLYMER

# FOOD RESERVE
# GLYCOGEN

# TRUE PLANT

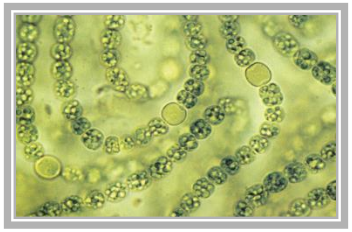
GLUCOSE POLYMER

STARCH

# CYANOBACTERIA

B

GLUCOSE POLYMER



GLYCOGEN

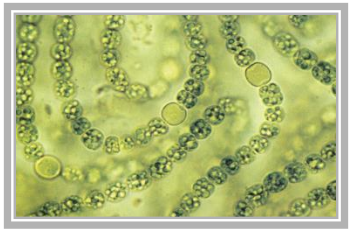
## TRUE PLANT

NOT BRANCHED

STARCH

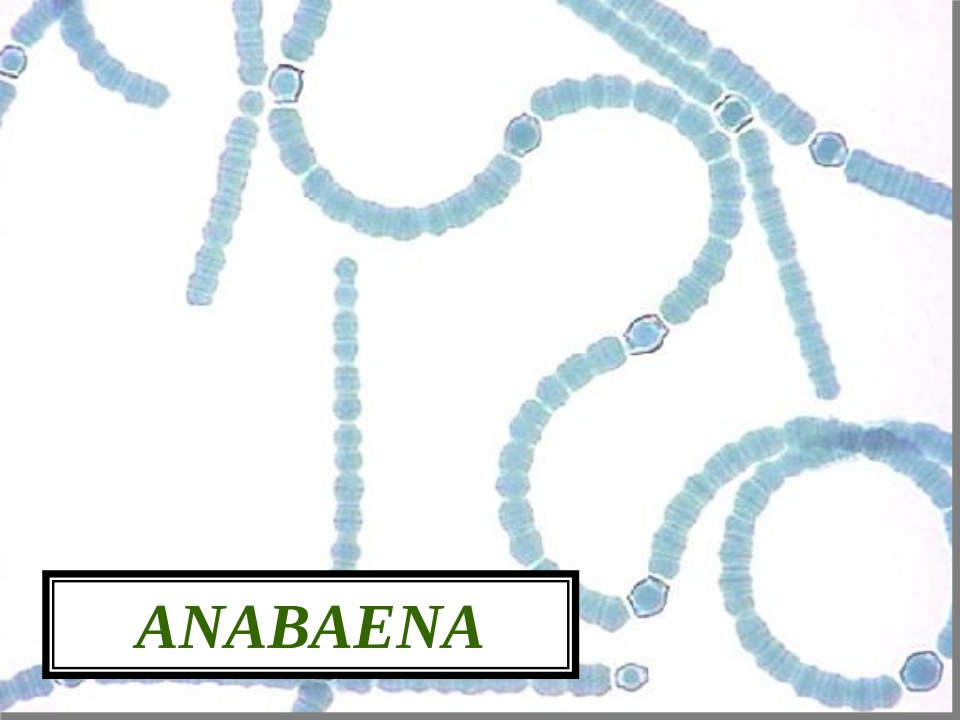
## CYANOBACTERIA

BRANCHED



GLYCOGEN

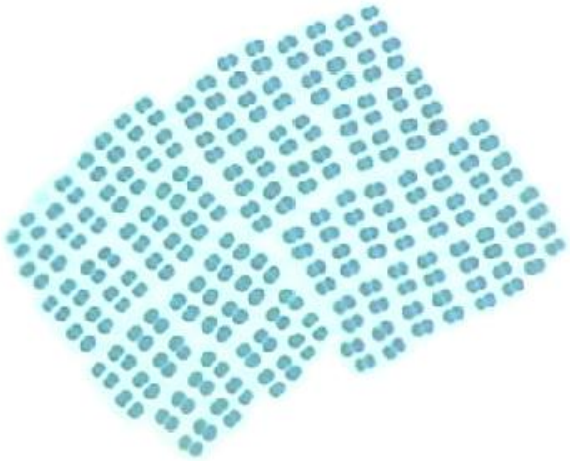
# FLAGELLUM



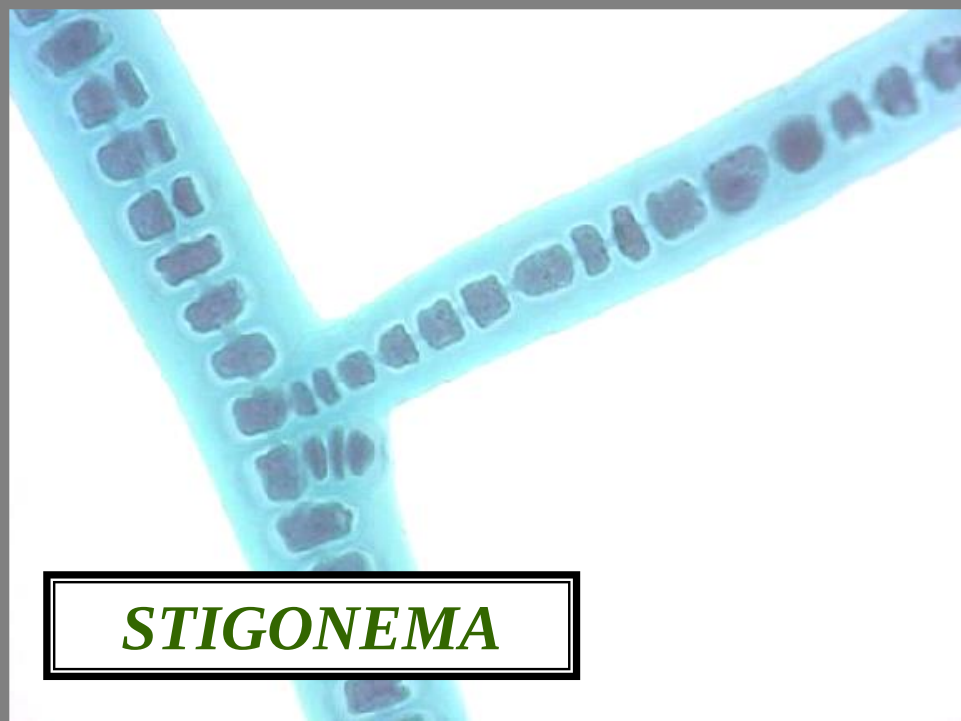
ANABAENA

A

GLOEOTRICHIA



MERISMOPEDIA



STIGONEMA

FLAGELLUM ABSENT

*ANABAENA*

FLAGELLUM ABSENT

*GLOEOTRICHIA*

FLAGELLUM ABSENT

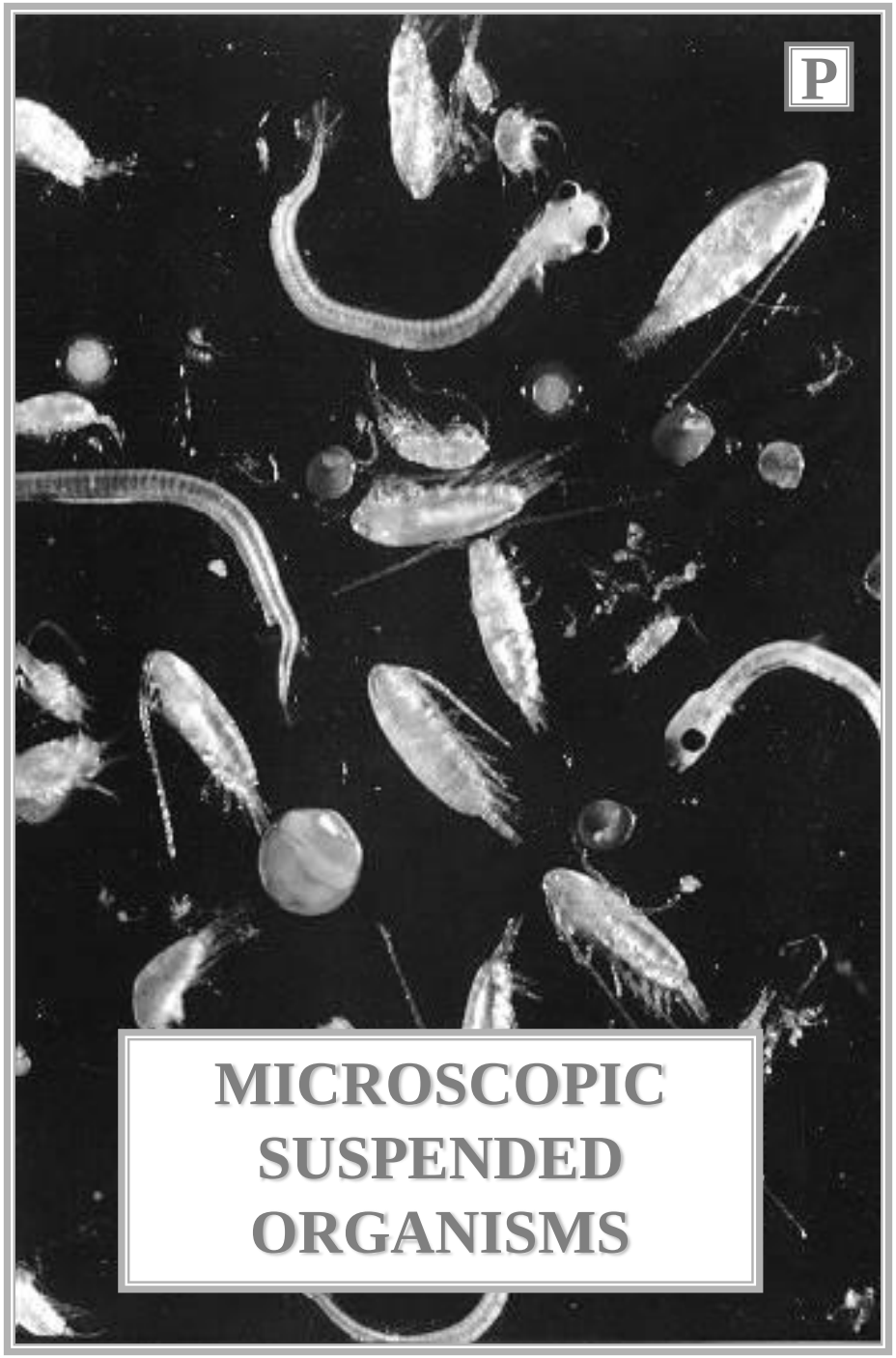
*MERISMOPEDIA*

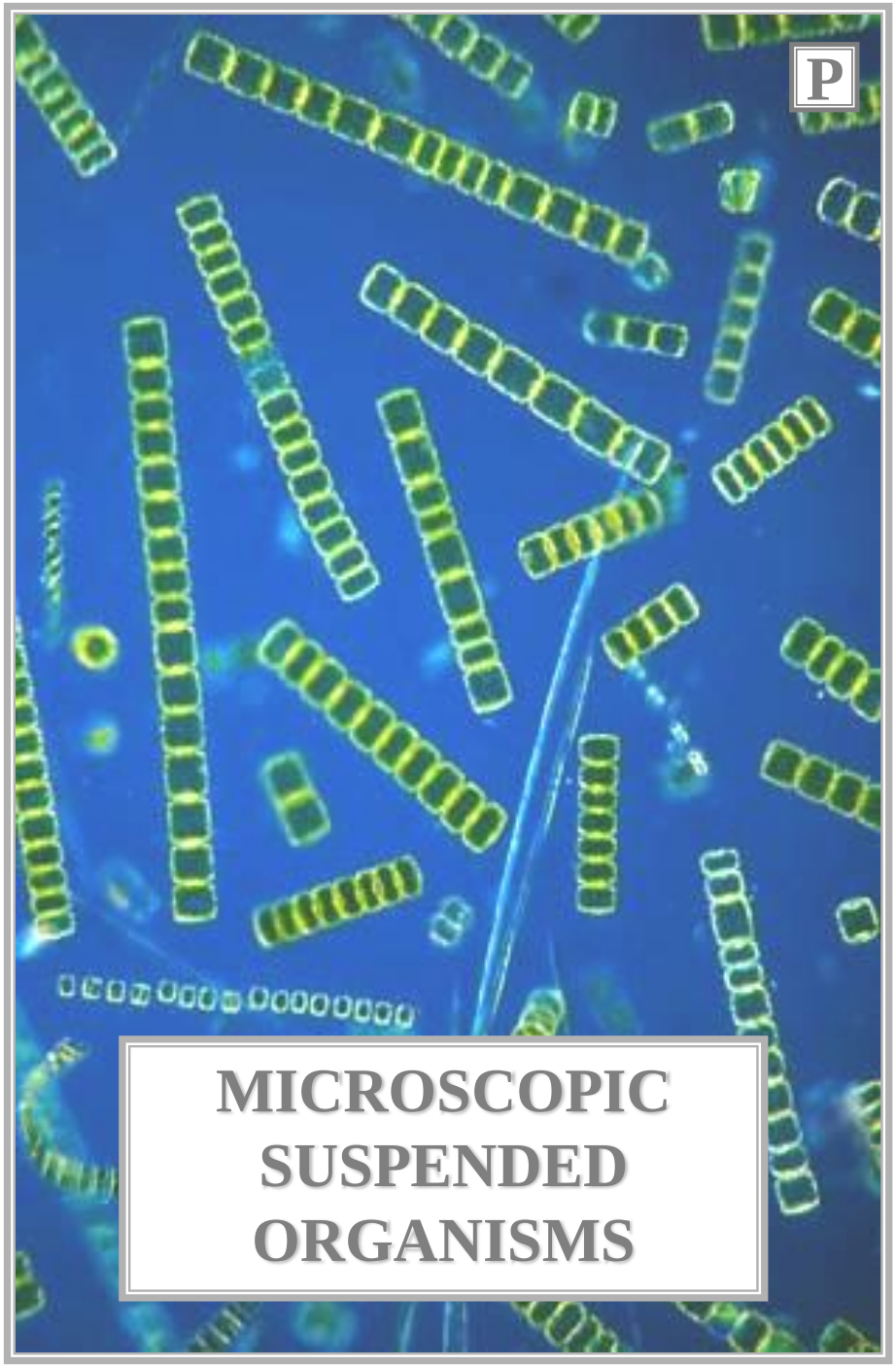
FLAGELLUM ABSENT

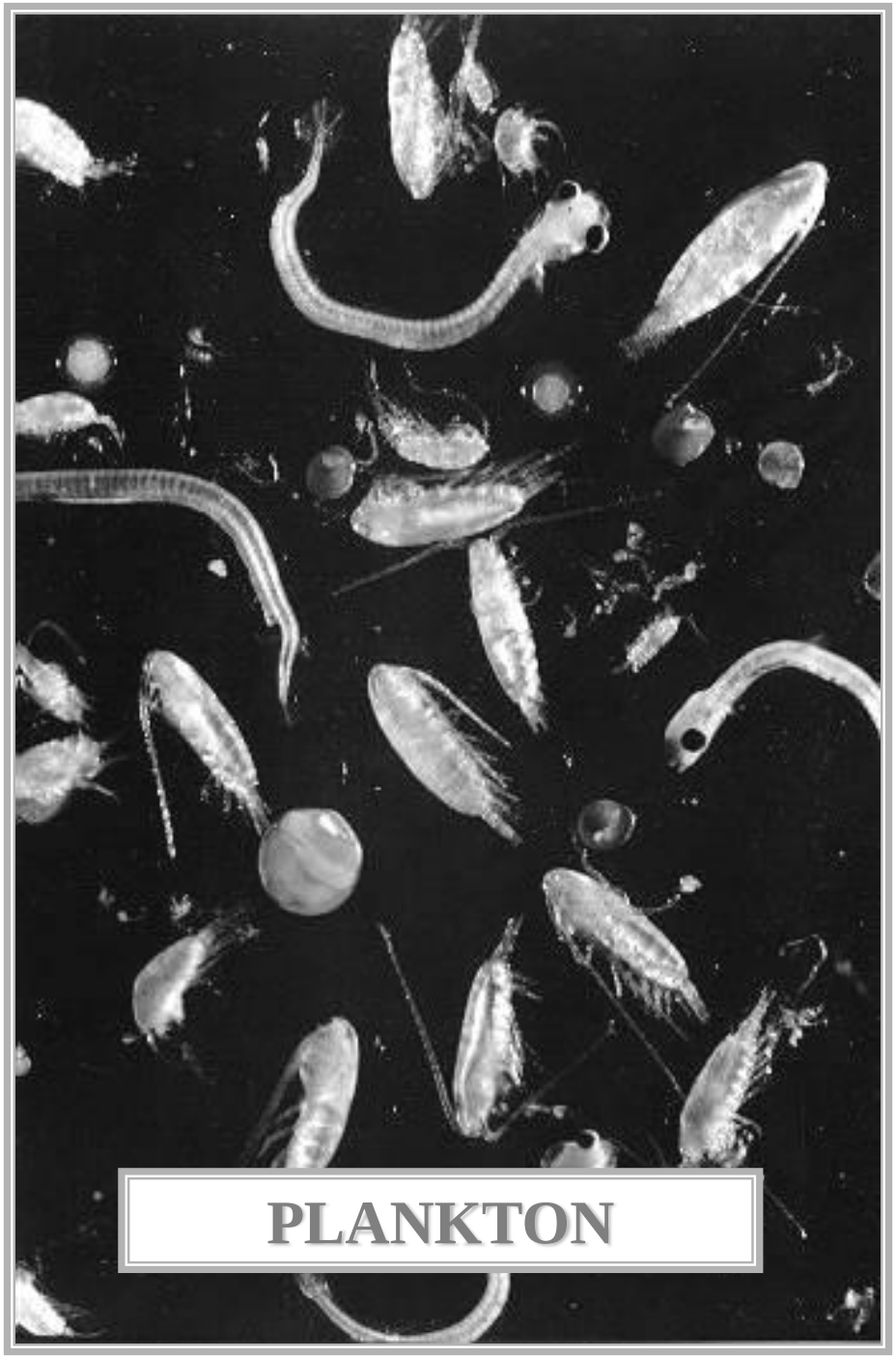
*STIGONEMA*

# ECOLOGY

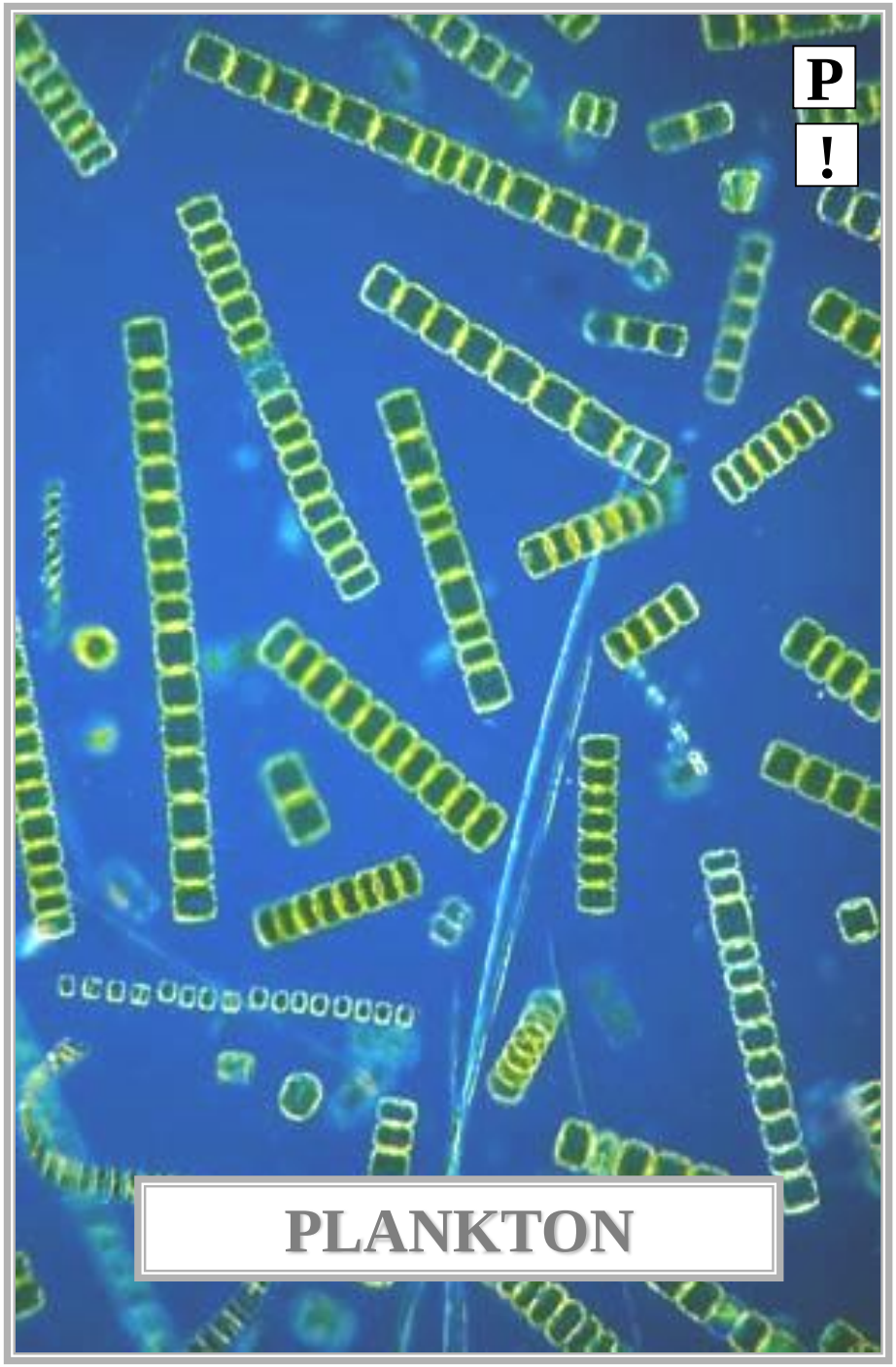
# AQUATIC FOOD CHAIN


P
MICROSCOPIC
SUSPENDED
ORGANISMS


P
MICROSCOPIC
SUSPENDED
ORGANISMS



PLANKTON



P

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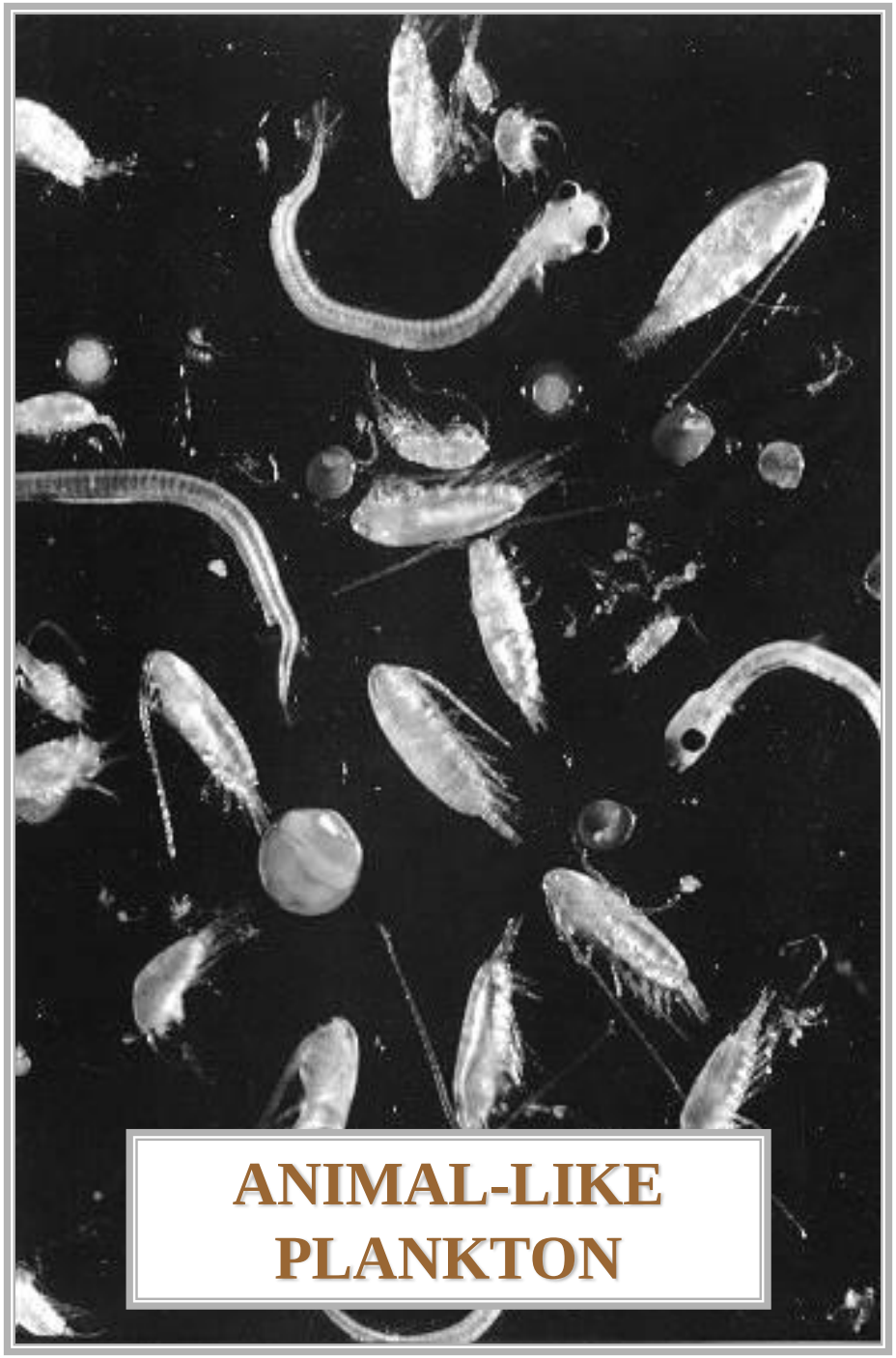
PLANKTON

# PLANKTON

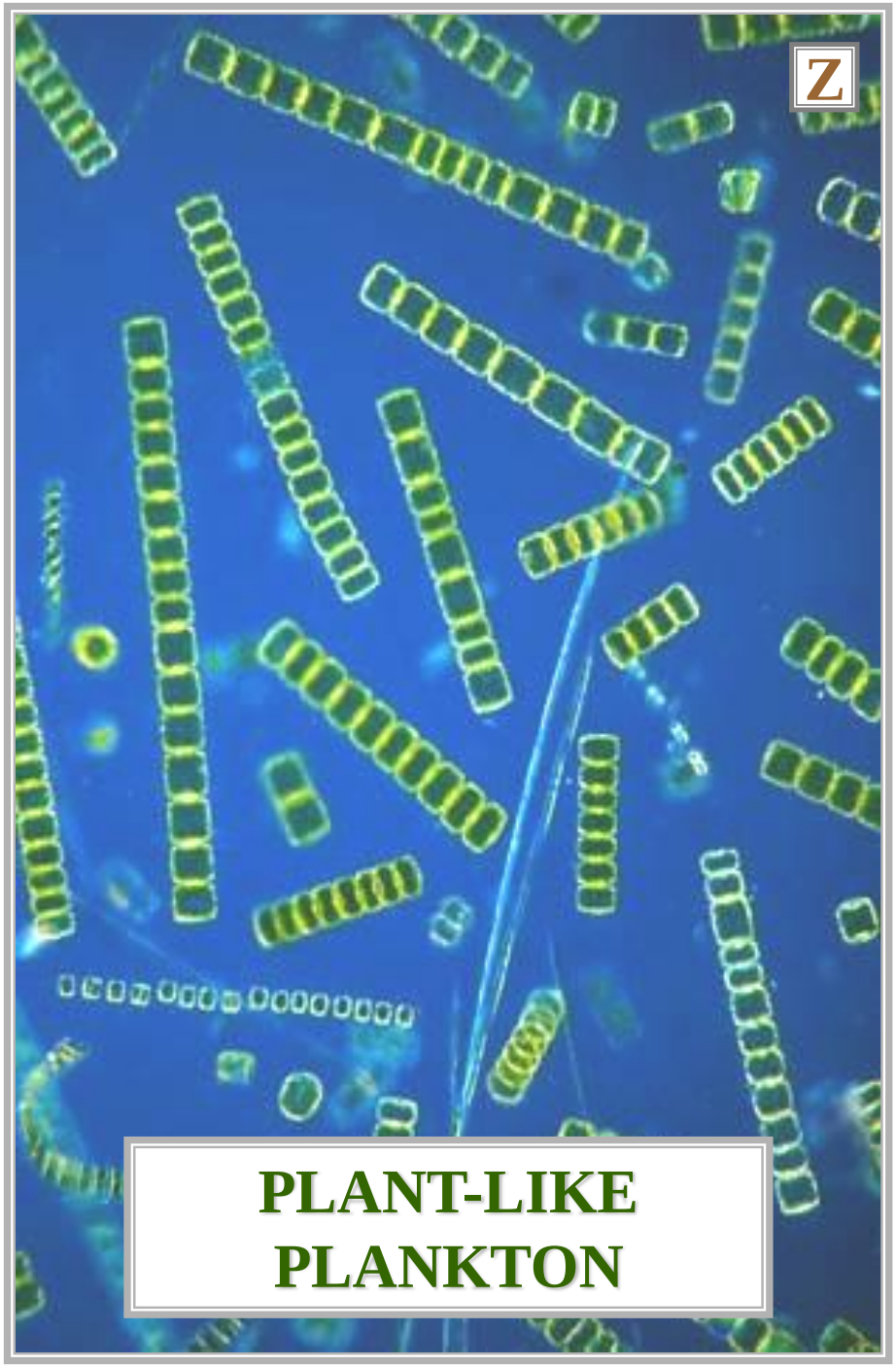
# PLANKTON

# SUSPENDED MICRO AQUATIC ORGANISMS

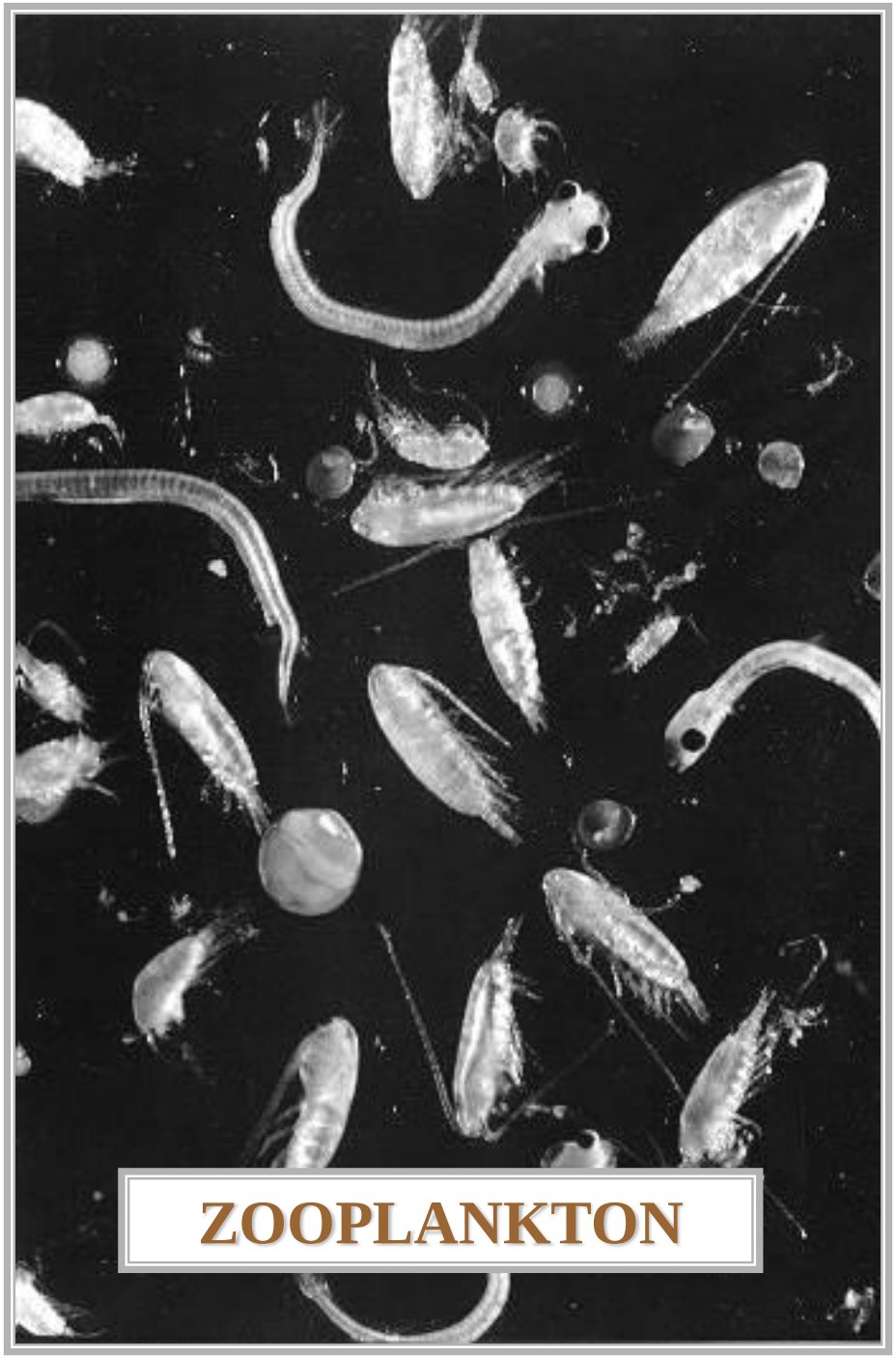
# PLANKTON



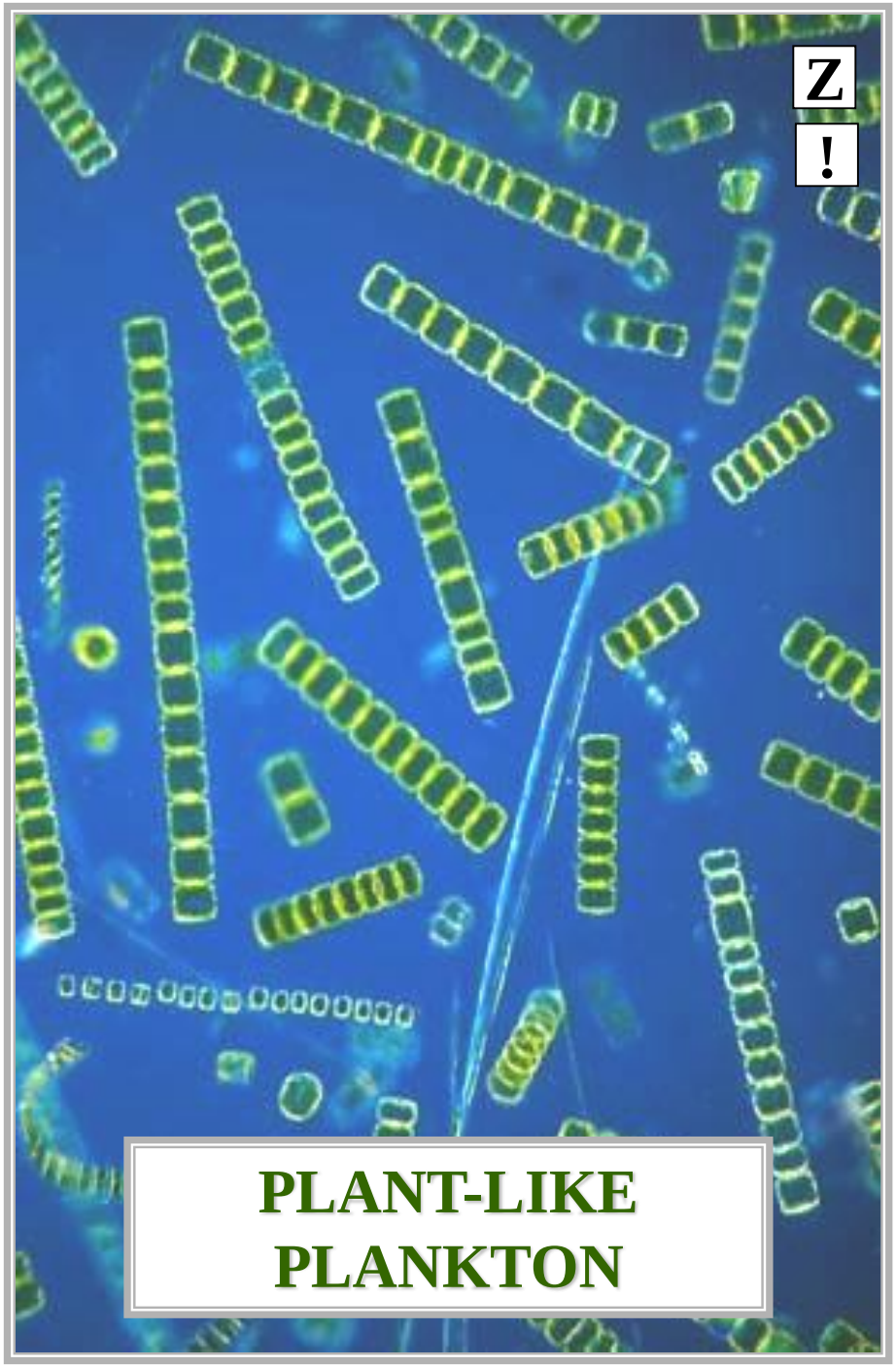
ANIMAL-LIKE PLANKTON




PLANT-LIKE PLANKTON



ZOOPLANKTON




PLANT-LIKE PLANKTON

# ZOOPLANKTON

# ZOOPLANKTON

# ANIMAL-LIKE PLANKTON

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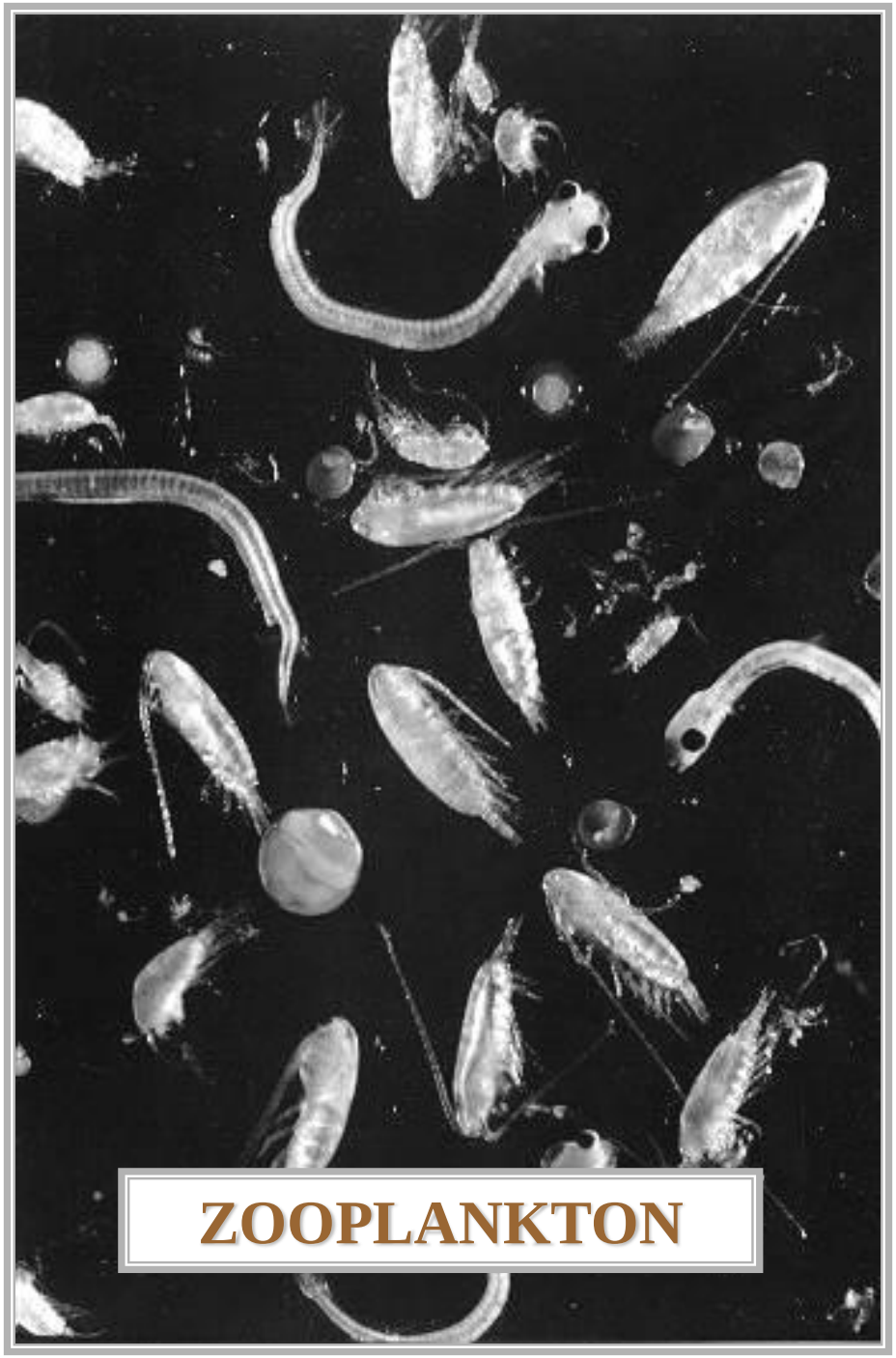
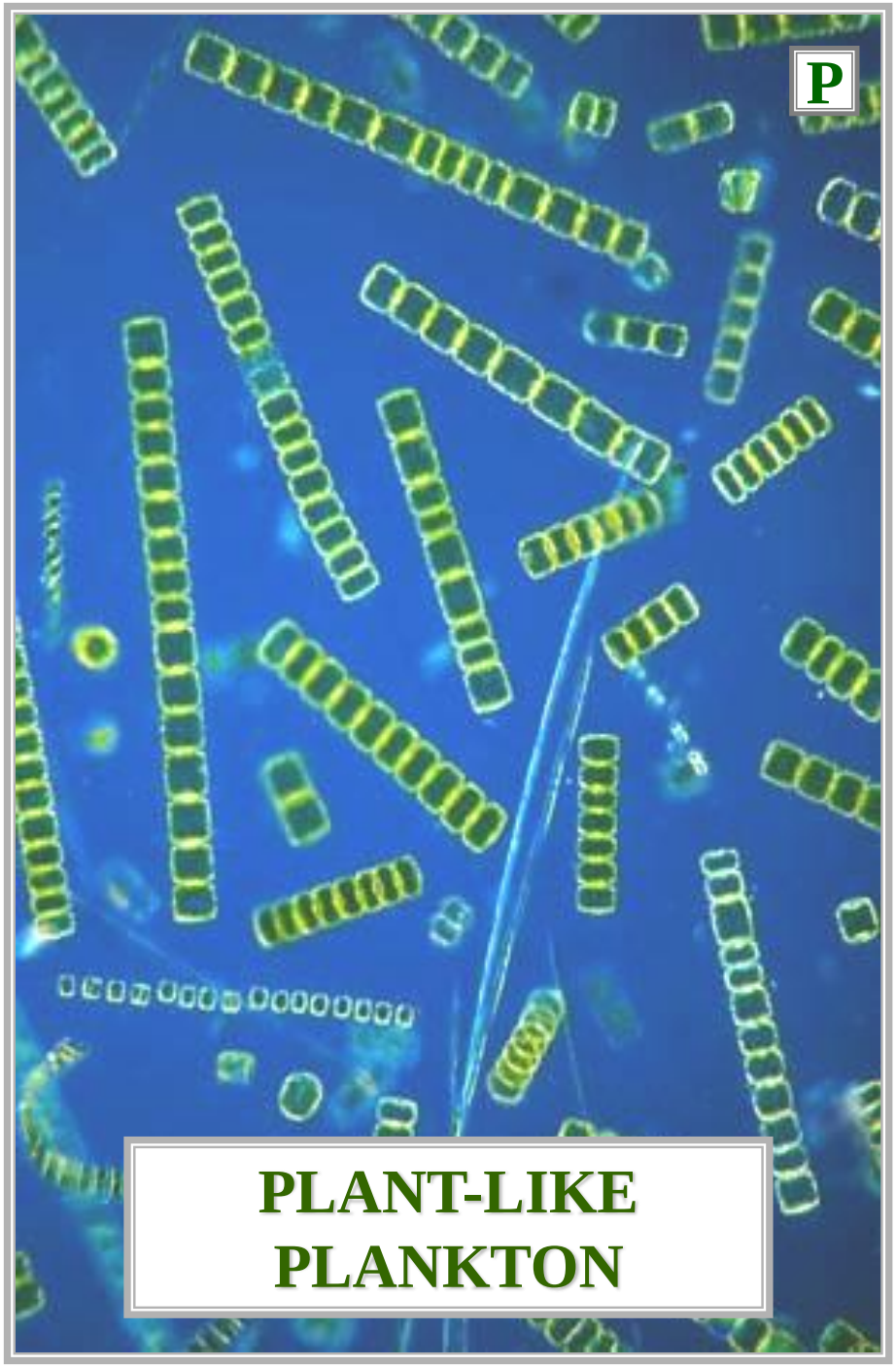
# EXAMPLE PROTOZOANS

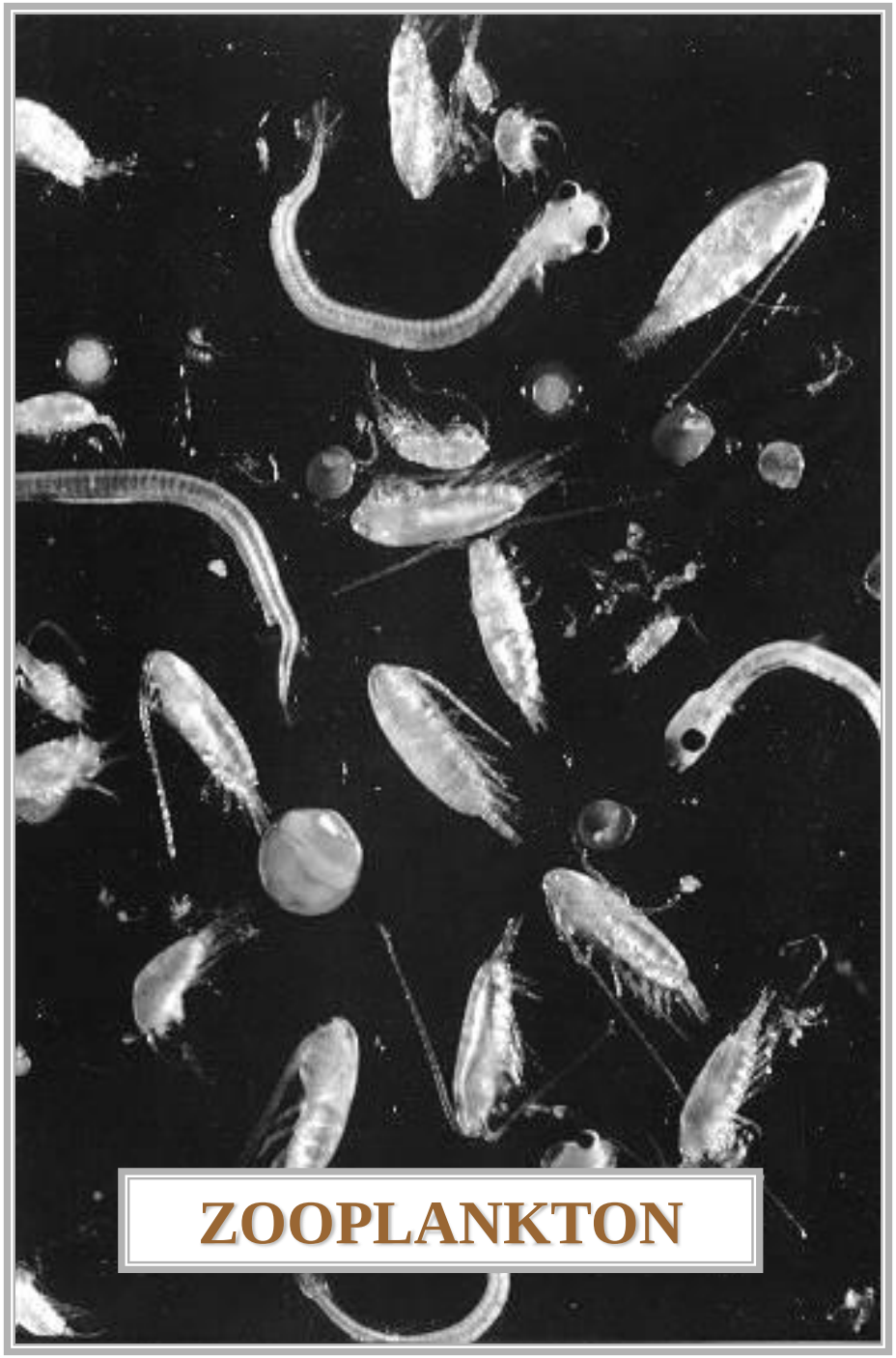
ZOOPLANKTON



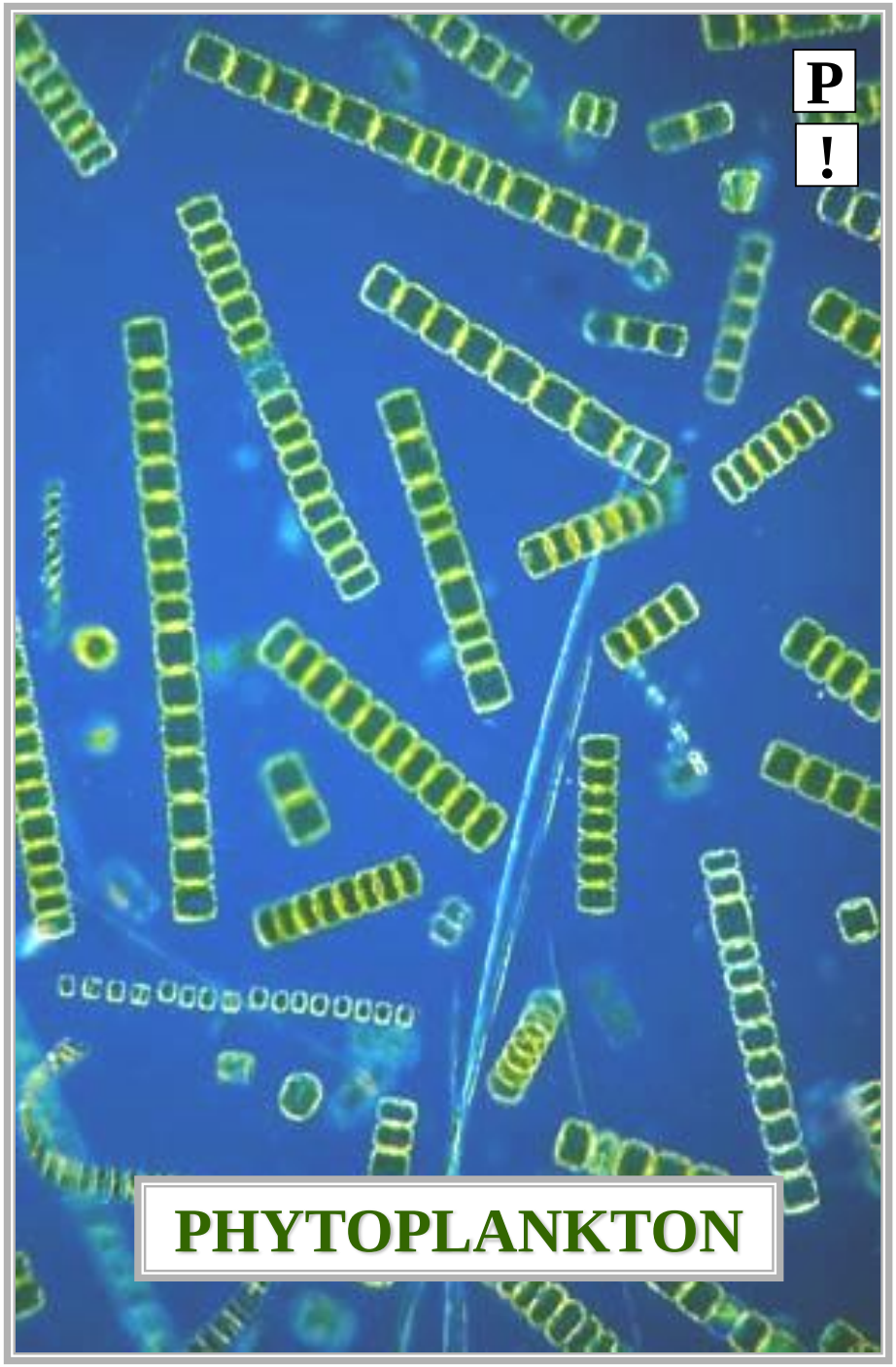
ZOOPLANKTON




PLANT-LIKE PLANKTON



ZOOPLANKTON



PHYTOPLANKTON

# PHYTOPLANKTON

FC

# PHYTOPLANKTON

## PLANT-LIKE PLANKTON

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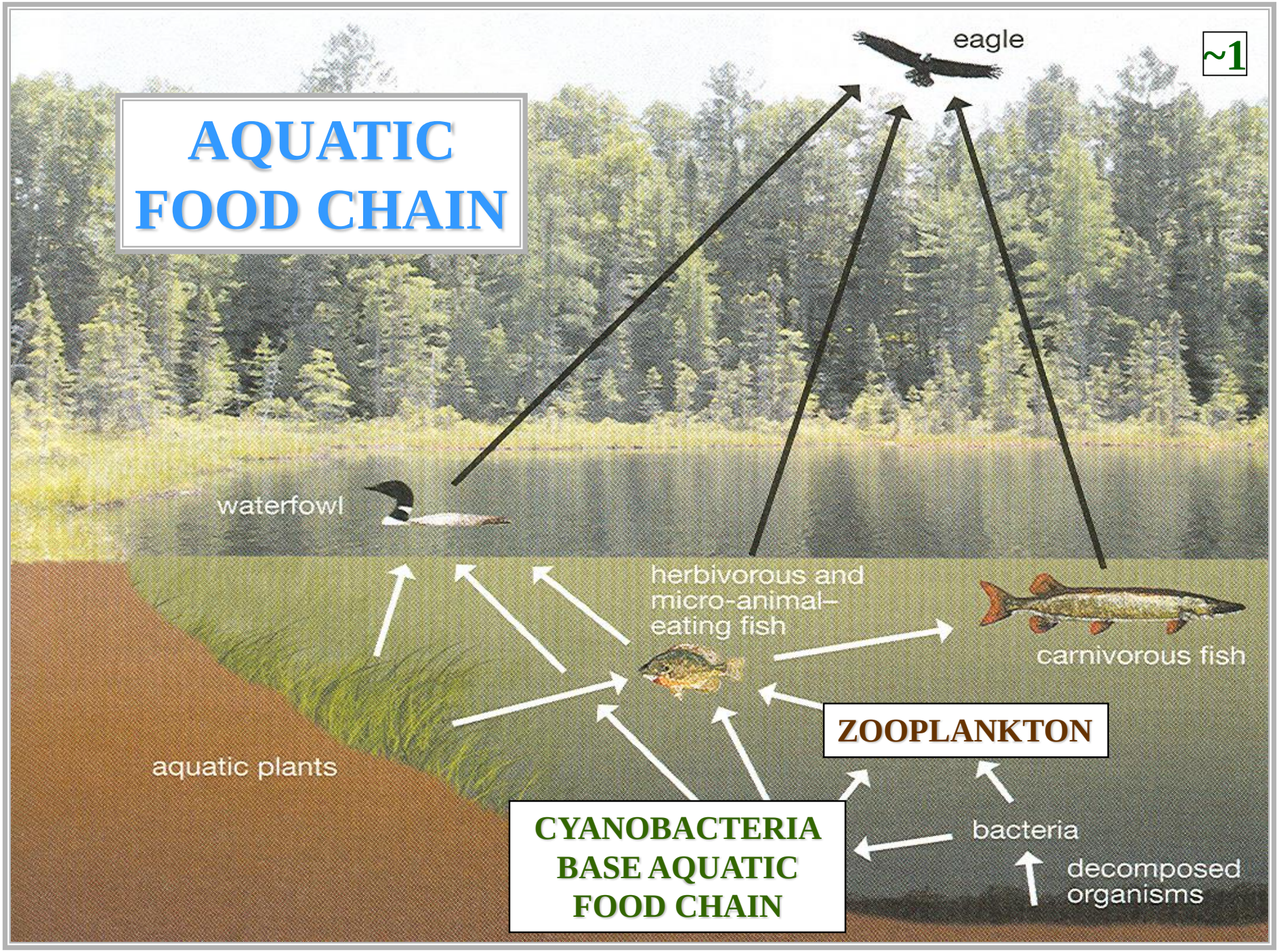
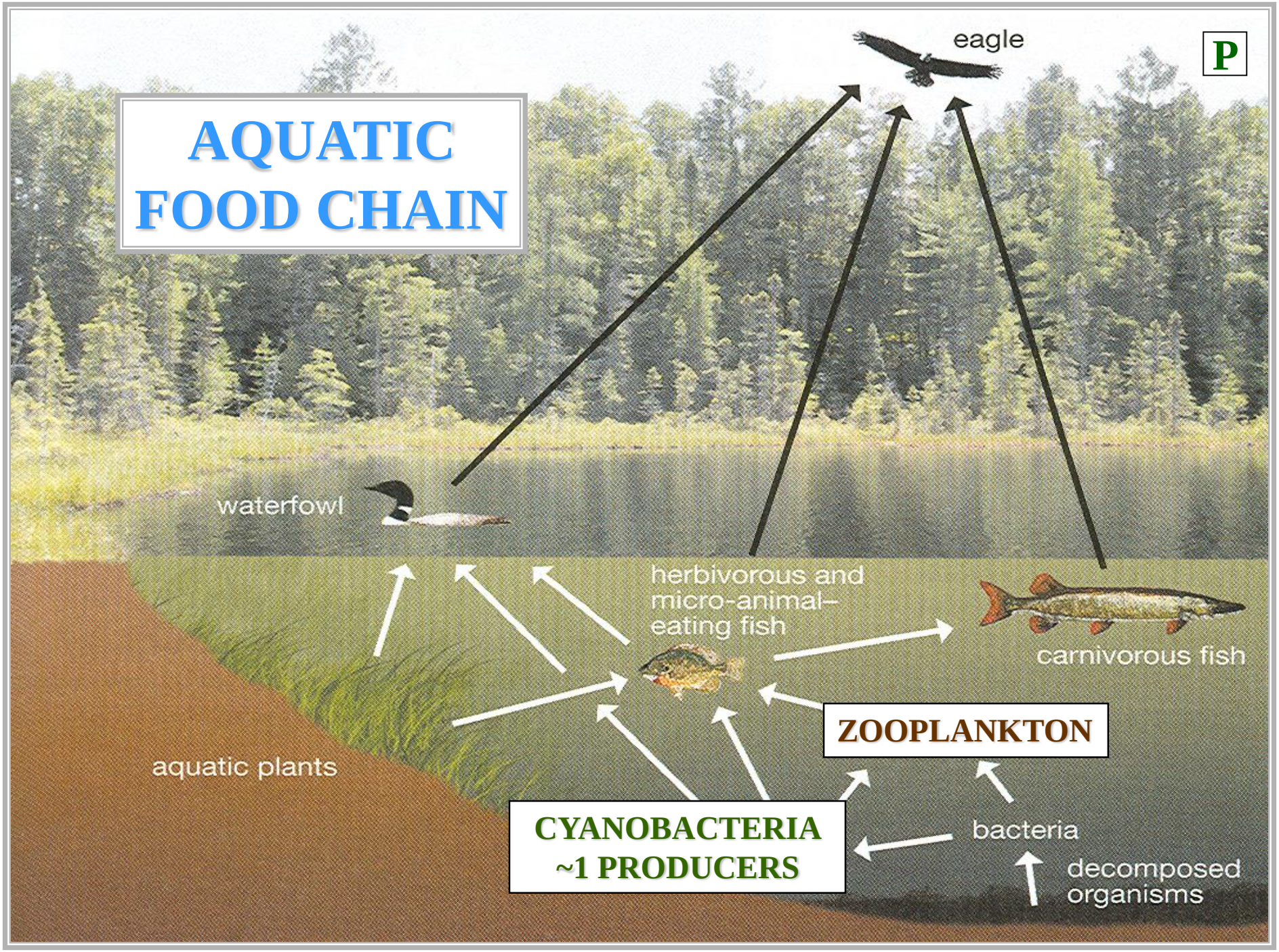
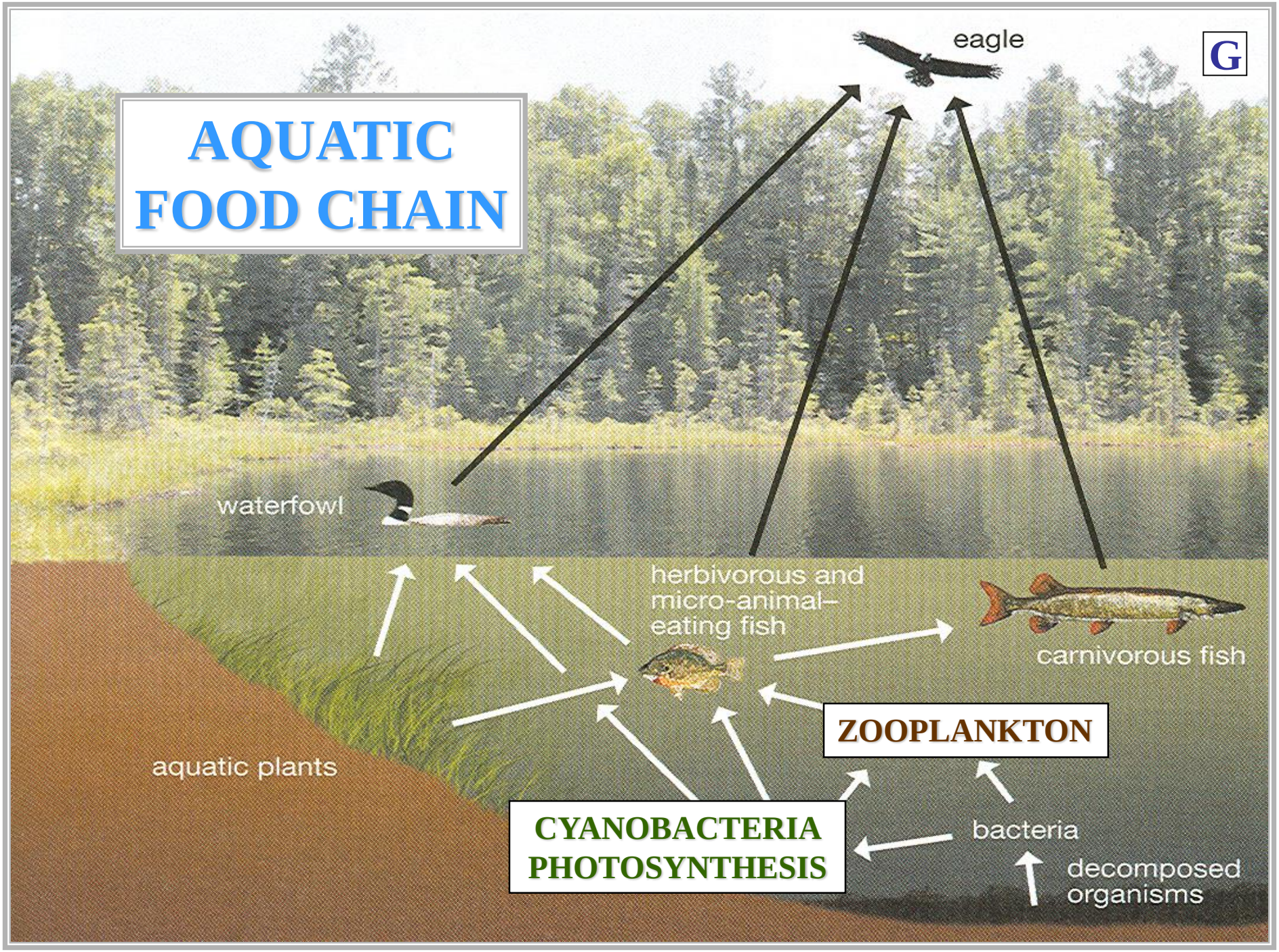
## EXAMPLE CYANOBACTERIA

# PHYTOPLANKTON


~1
AQUATIC FOOD CHAIN
eagle
waterfowl
herbivorous and micro-animal–eating fish
carnivorous fish
ZOOPLANKTON
aquatic plants
CYANOBACTERIA BASE AQUATIC FOOD CHAIN
bacteria
decomposed organisms

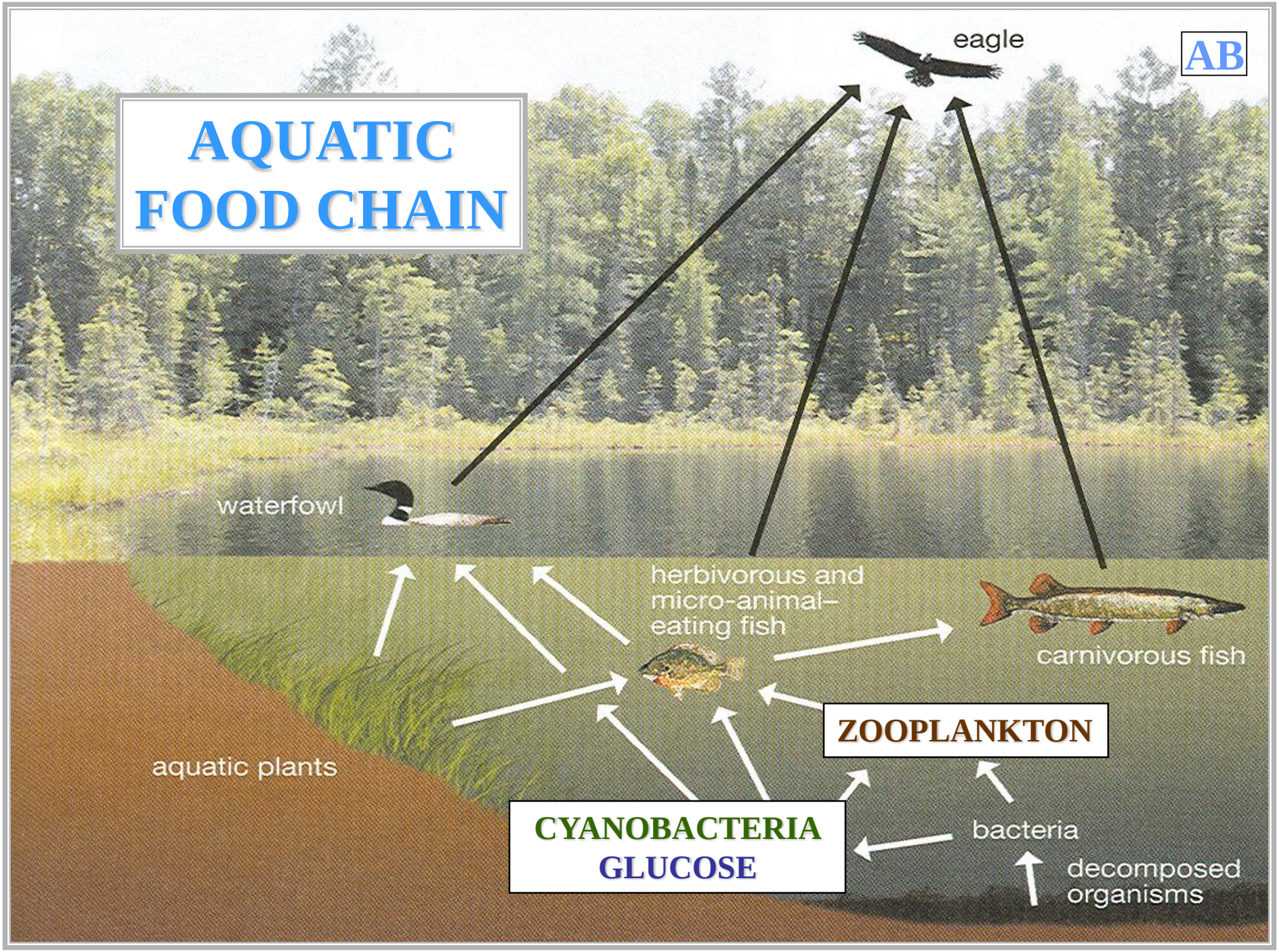

AQUATIC FOOD CHAIN
P
eagle
waterfowl
herbivorous and micro-animal–eating fish
carnivorous fish
ZOOPLANKTON
aquatic plants
CYANOBACTERIA ~1 PRODUCERS
bacteria
decomposed organisms

# AQUATIC FOOD CHAIN

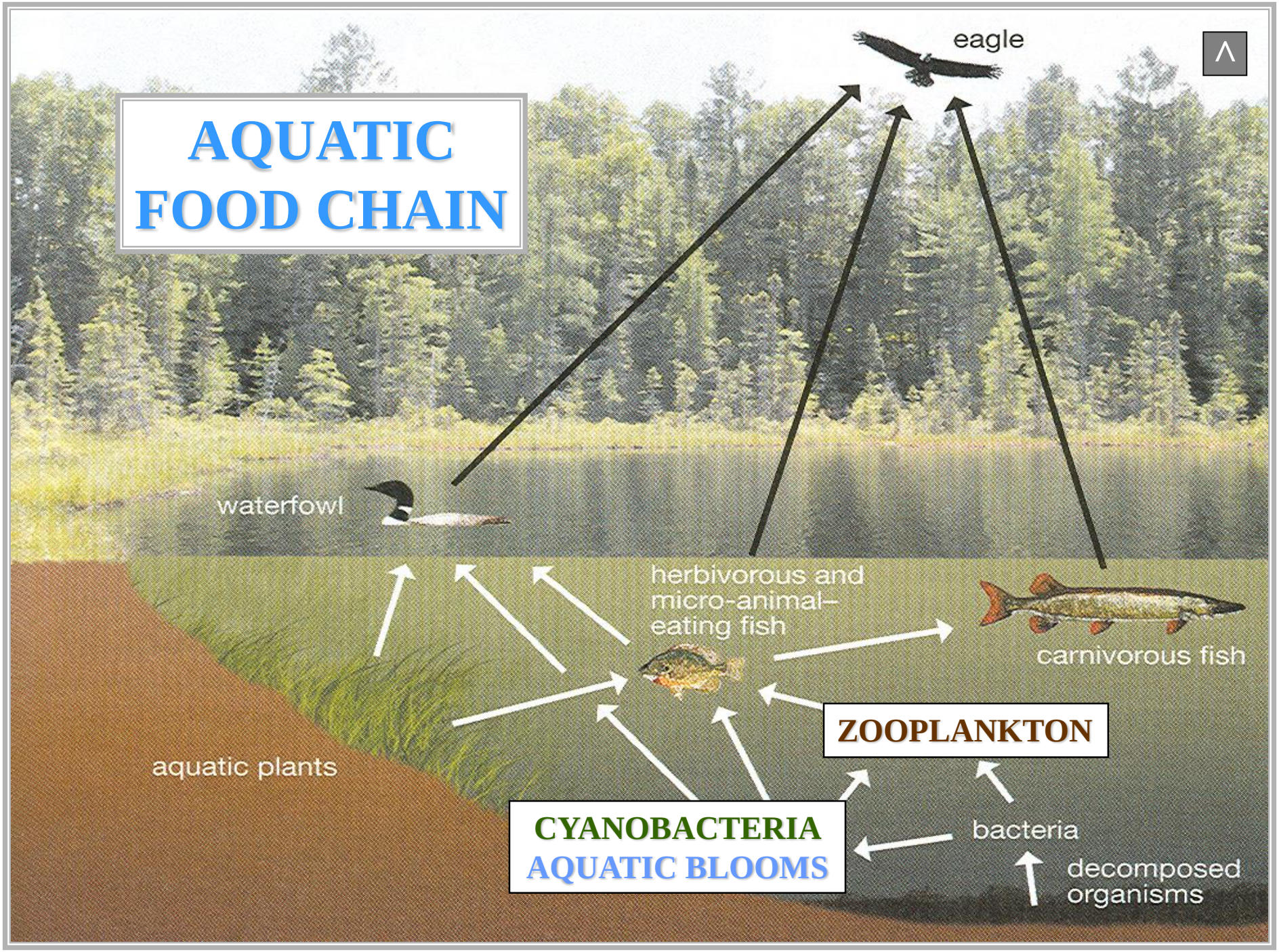


# AQUATIC FOOD CHAIN

AB



# AQUATIC FOOD CHAIN



# AQUATIC BLOOMS

# FRESHWATER AQUATIC HABITATS

# FRESHWATER AQUATIC HABITATS

## LOTIC AQUATIC HABITAT

# FRESHWATER AQUATIC HABITATS

L

# FRESHWATER AQUATIC HABITATS

## LOTIC AQUATIC HABITAT
## LENTIC AQUATIC HABITAT

# FRESHWATER AQUATIC HABITATS

# LOTIC AQUATIC HABITAT

# LOTIC AQUATIC HABITAT

# FLOWING WATER AQUATIC HABITAT

# LOTIC AQUATIC HABITAT

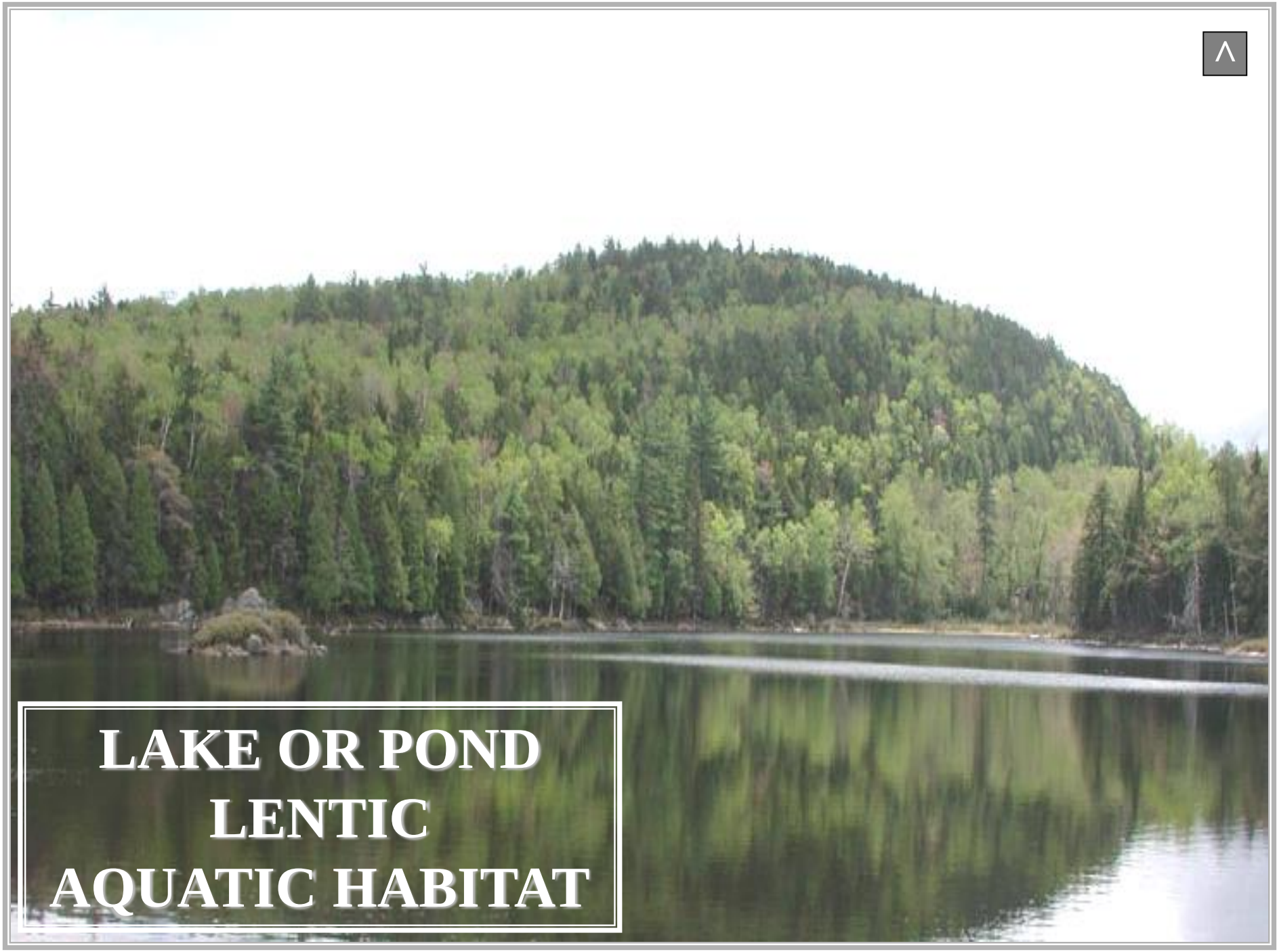
# STREAM
# LOTIC
# AQUATIC HABITAT

# LENTIC AQUATIC HABITAT

# LENTIC AQUATIC HABITAT

# STANDING WATER AQUATIC HABITAT

# LENTIC AQUATIC HABITAT


LAKE OR POND
LENTIC
AQUATIC HABITAT

# LENTIC
# AQUATIC HABITAT
# NUTRIENT CONTENT

# LENTIC
# AQUATIC HABITAT
# NUTRIENT CONTENT

## OLIGOTROPHIC


# LENTIC
# AQUATIC HABITAT
# NUTRIENT CONTENT

**LENTIC**
**AQUATIC HABITAT**
**NUTRIENT CONTENT**

**OLIGOTROPHIC**
**MESOTROPHIC**

**LENTIC**
**AQUATIC HABITAT**
**NUTRIENT CONTENT**

# LENTIC
# AQUATIC HABITAT
# NUTRIENT CONTENT

O

OLIGOTROPHIC
MESOTROPHIC
EUTROPHIC


# LENTIC
# AQUATIC HABITAT
# NUTRIENT CONTENT

# OLIGOTROPHIC LENTIC AQUATIC HABITAT

# OLIGOTROPHIC LENTIC AQUATIC HABITAT

## LOW NUTRIENT CONTENT

OLIGOTROPHIC LENTIC AQUATIC HABITAT

# LENTIC AQUATIC HABITAT

**LOW NUTRIENT CONTENT OLIGOTROPHIC**

# MESOTROPHIC LENTIC AQUATIC HABITAT

# MESOTROPHIC
# LENTIC
# AQUATIC HABITAT

# MODERATE
# NUTRIENT CONTENT


# MESOTROPHIC
# LENTIC
# AQUATIC HABITAT

# LENTIC AQUATIC HABITAT

^
E

**MODERATE NUTRIENT CONTENT MESOTROPHIC**

# EUTROPHIC LENTIC AQUATIC HABITAT