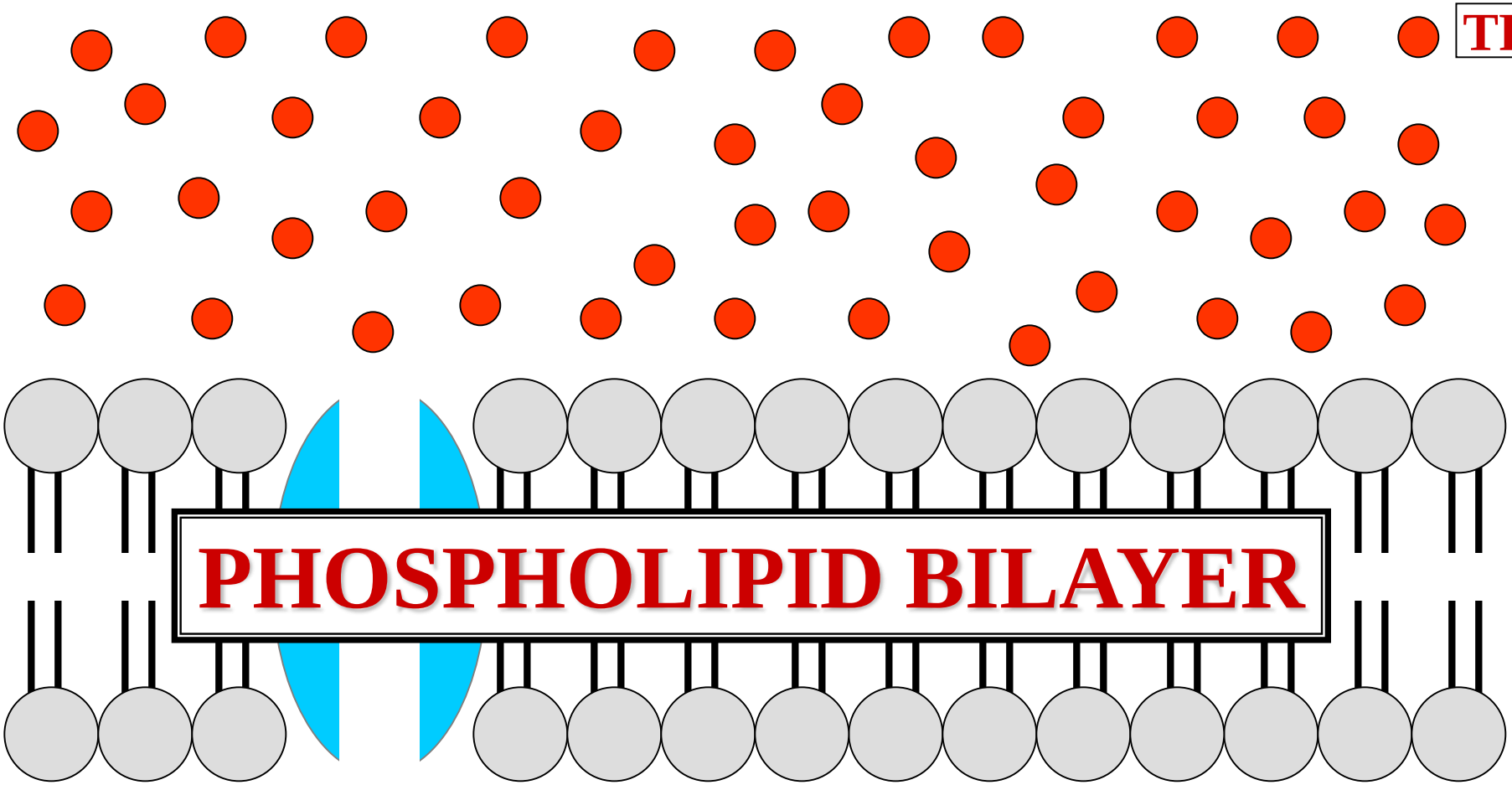
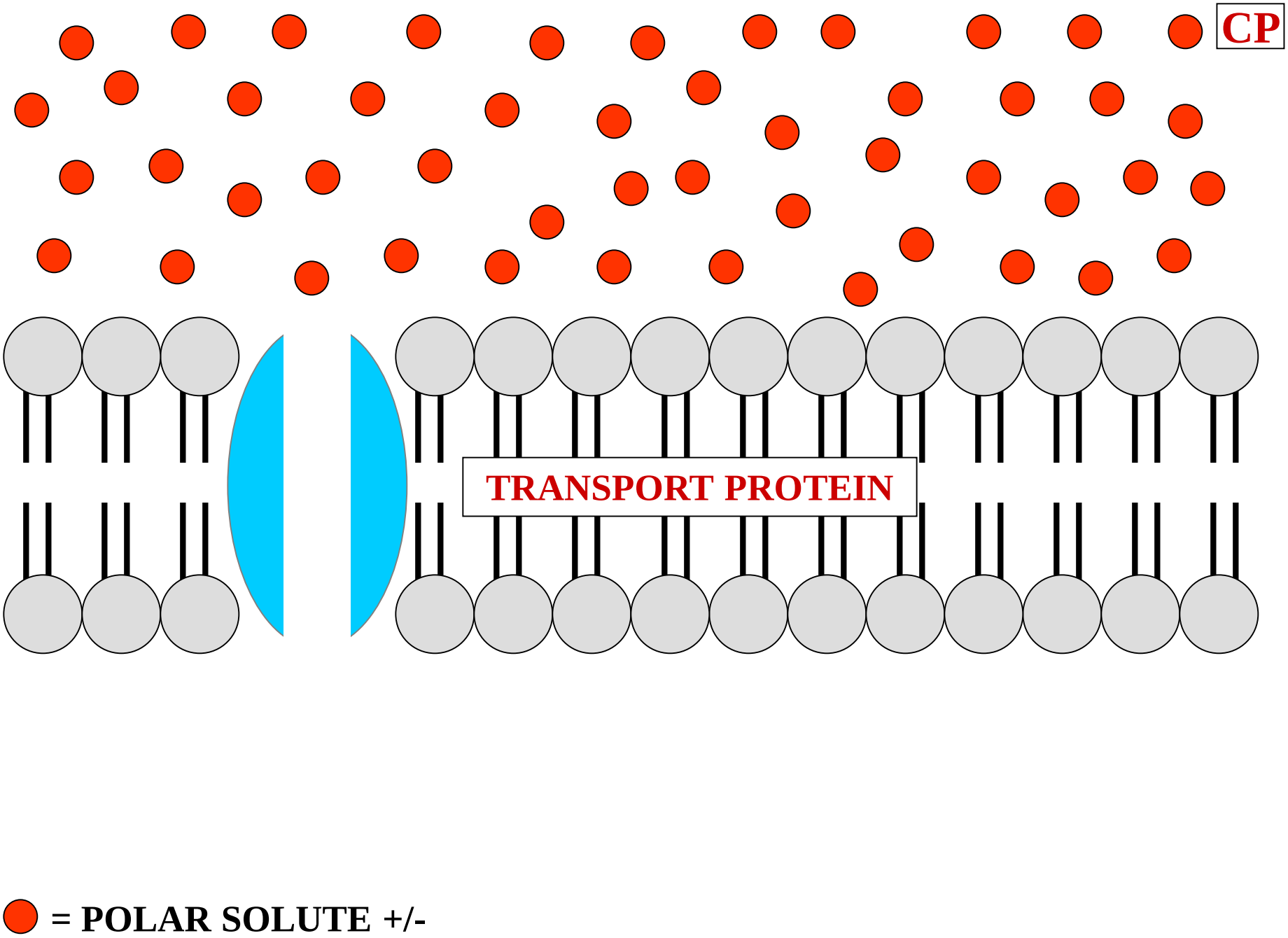
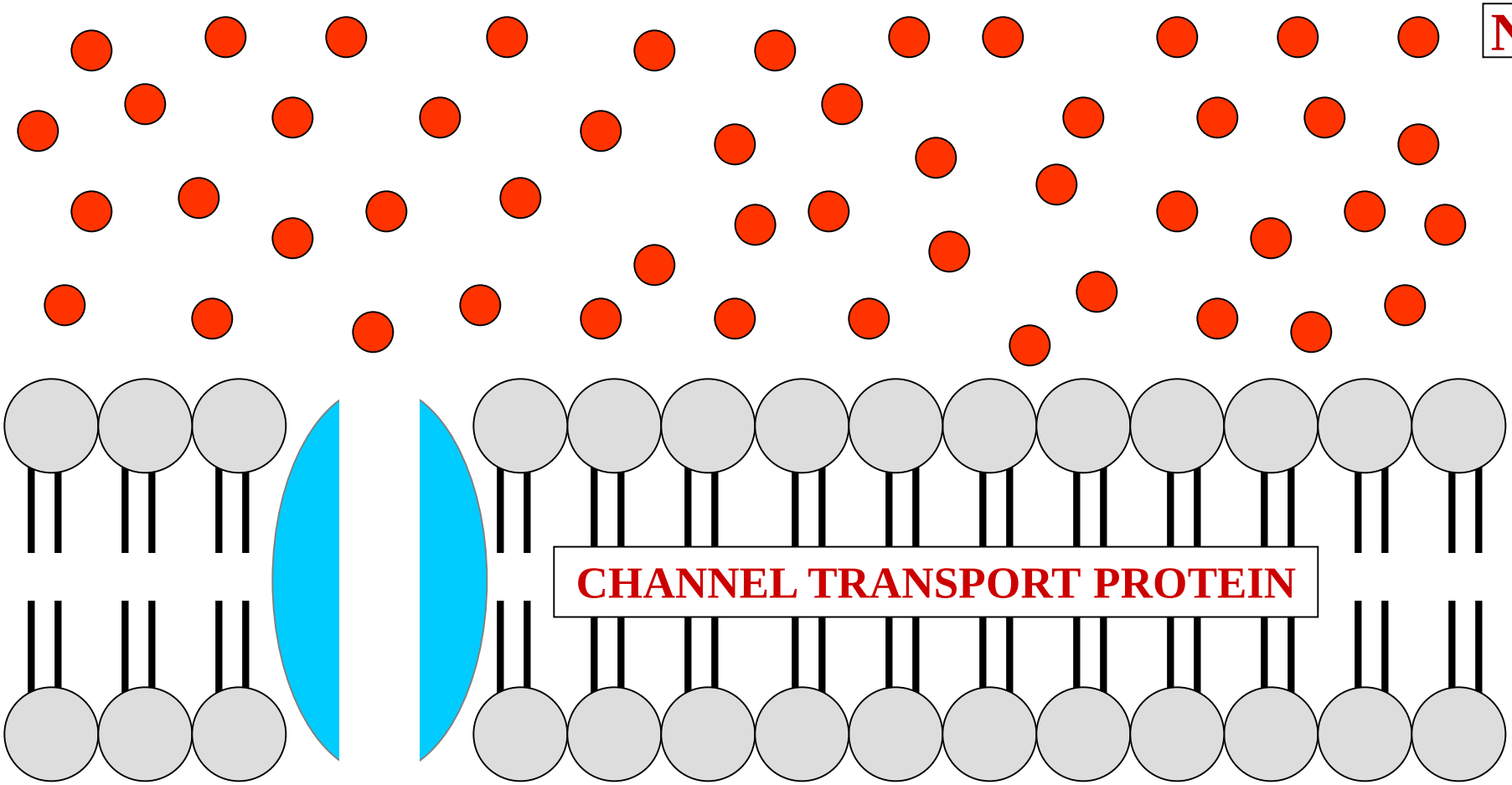
TP



= POLAR SOLUTE +/-

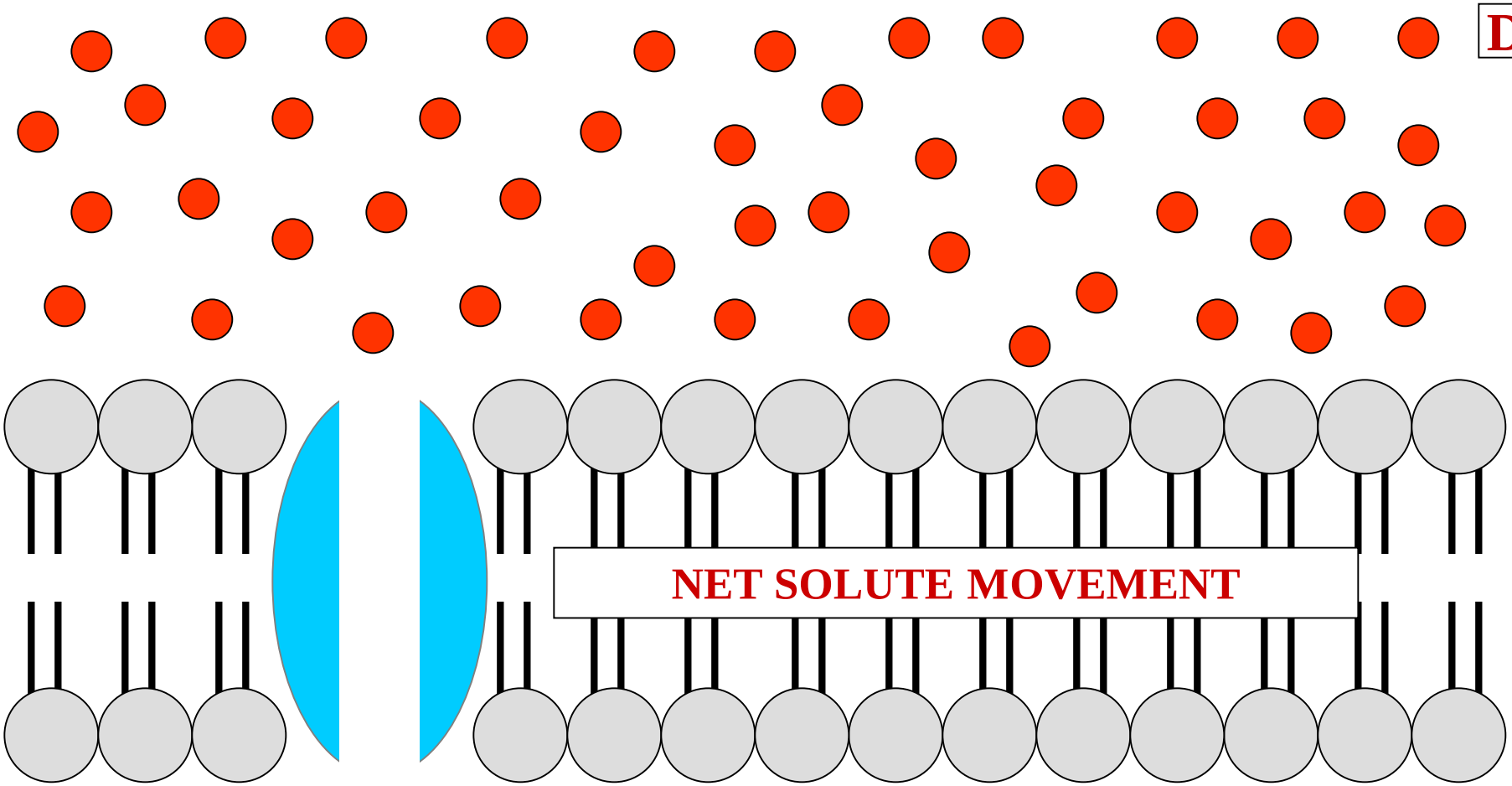


= POLAR SOLUTE +/-



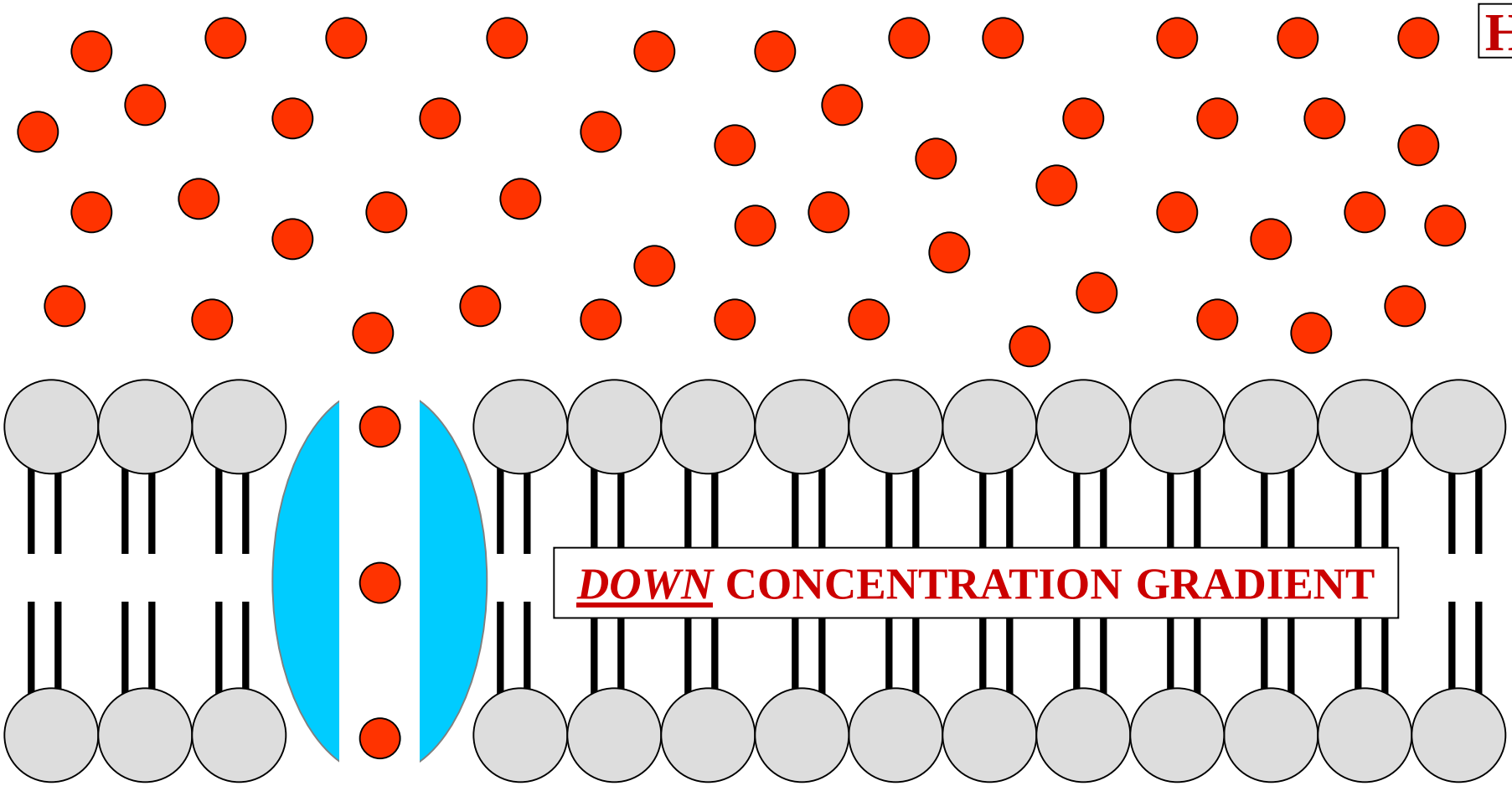
= POLAR SOLUTE +/-

D



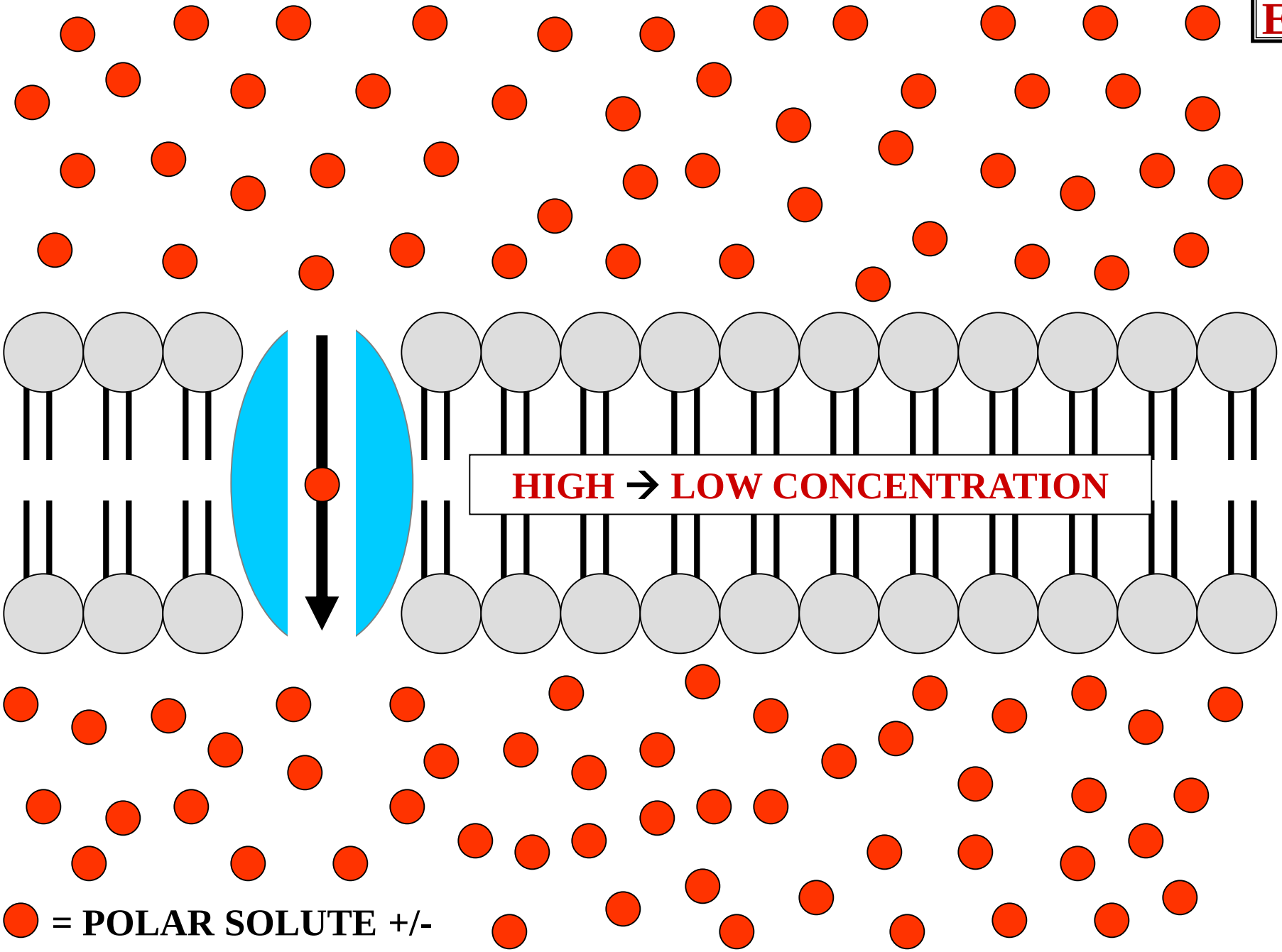
= POLAR SOLUTE +/-

H



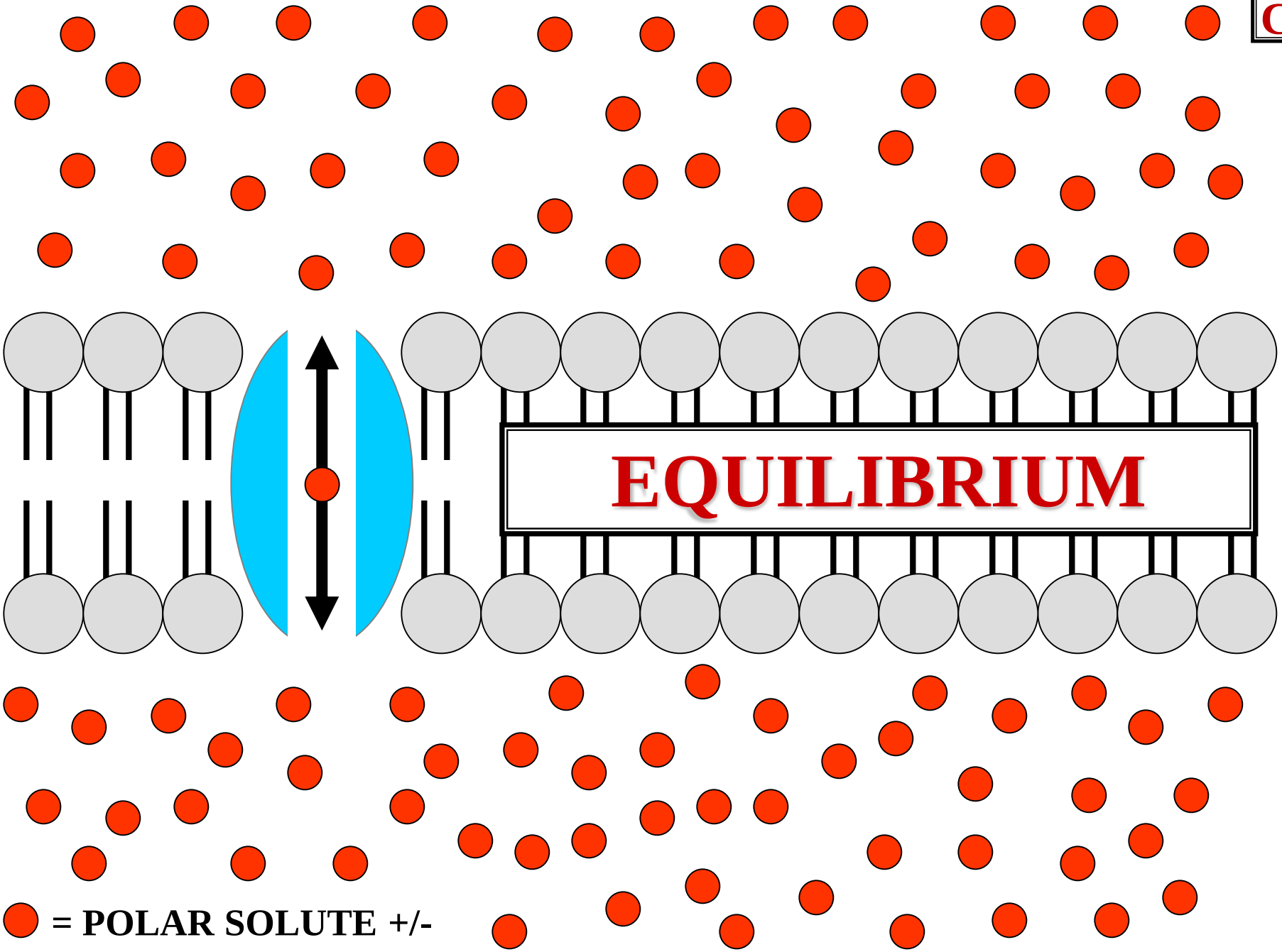
= POLAR SOLUTE +/-

E

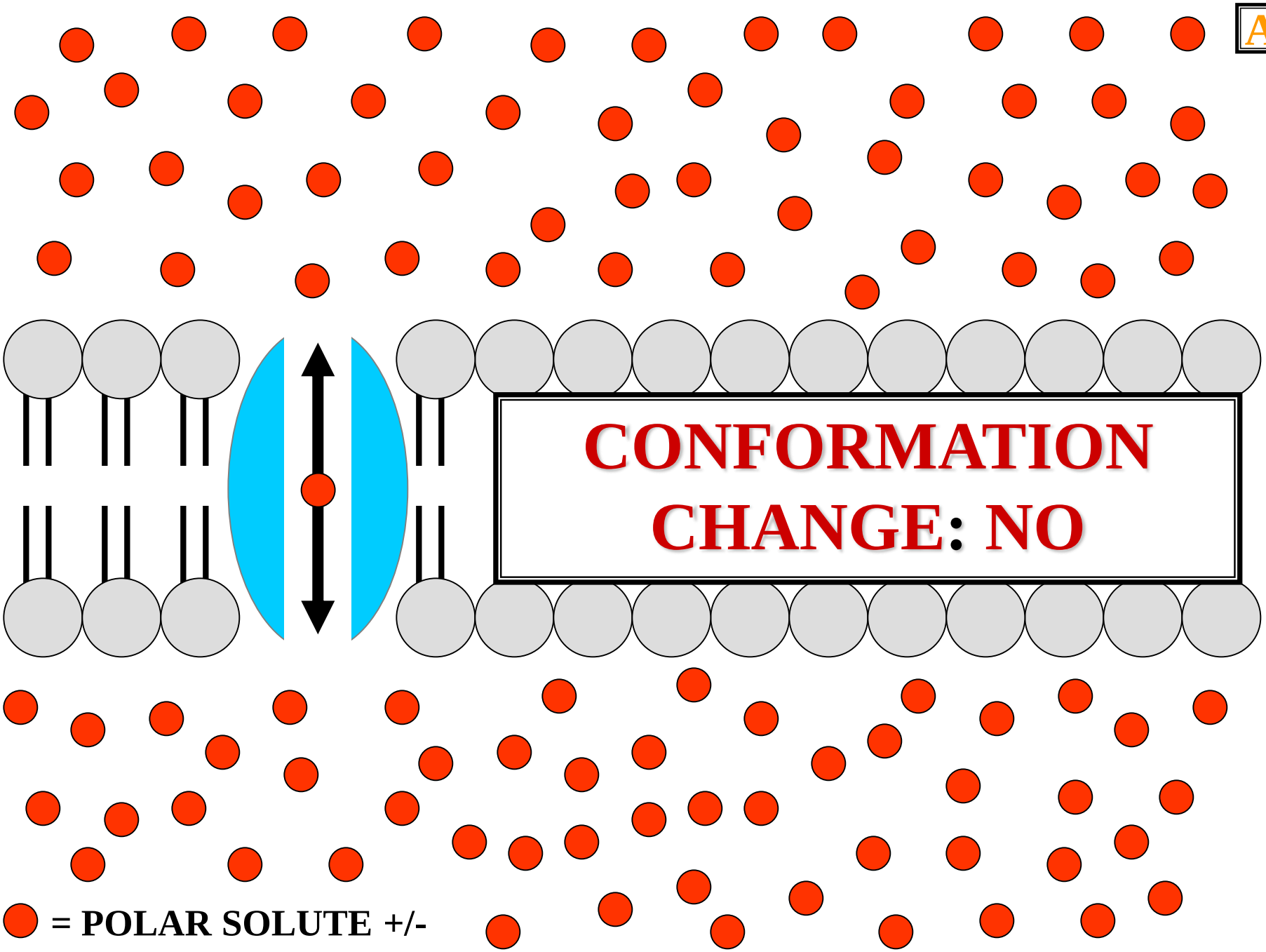


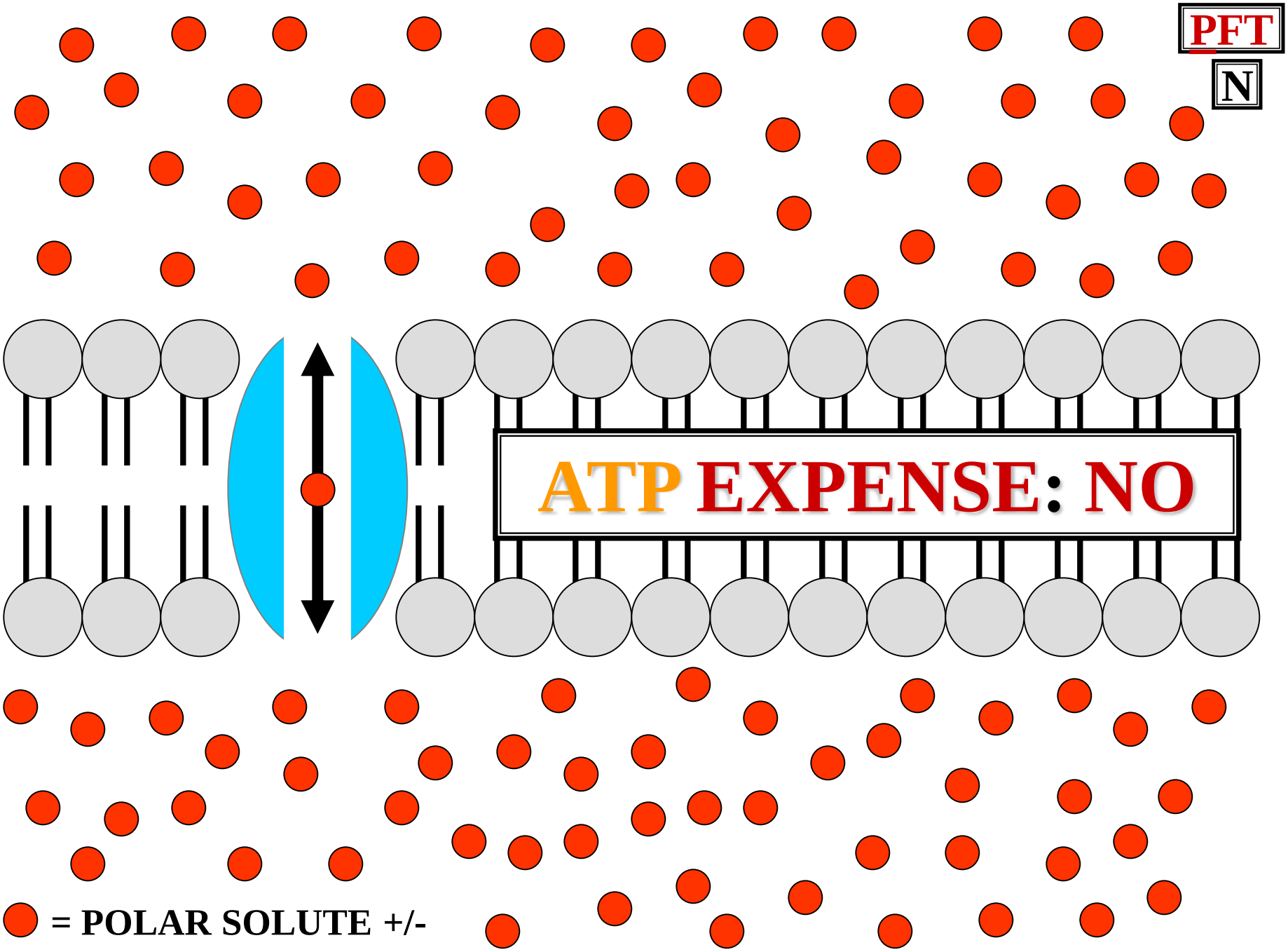
= POLAR SOLUTE +/-

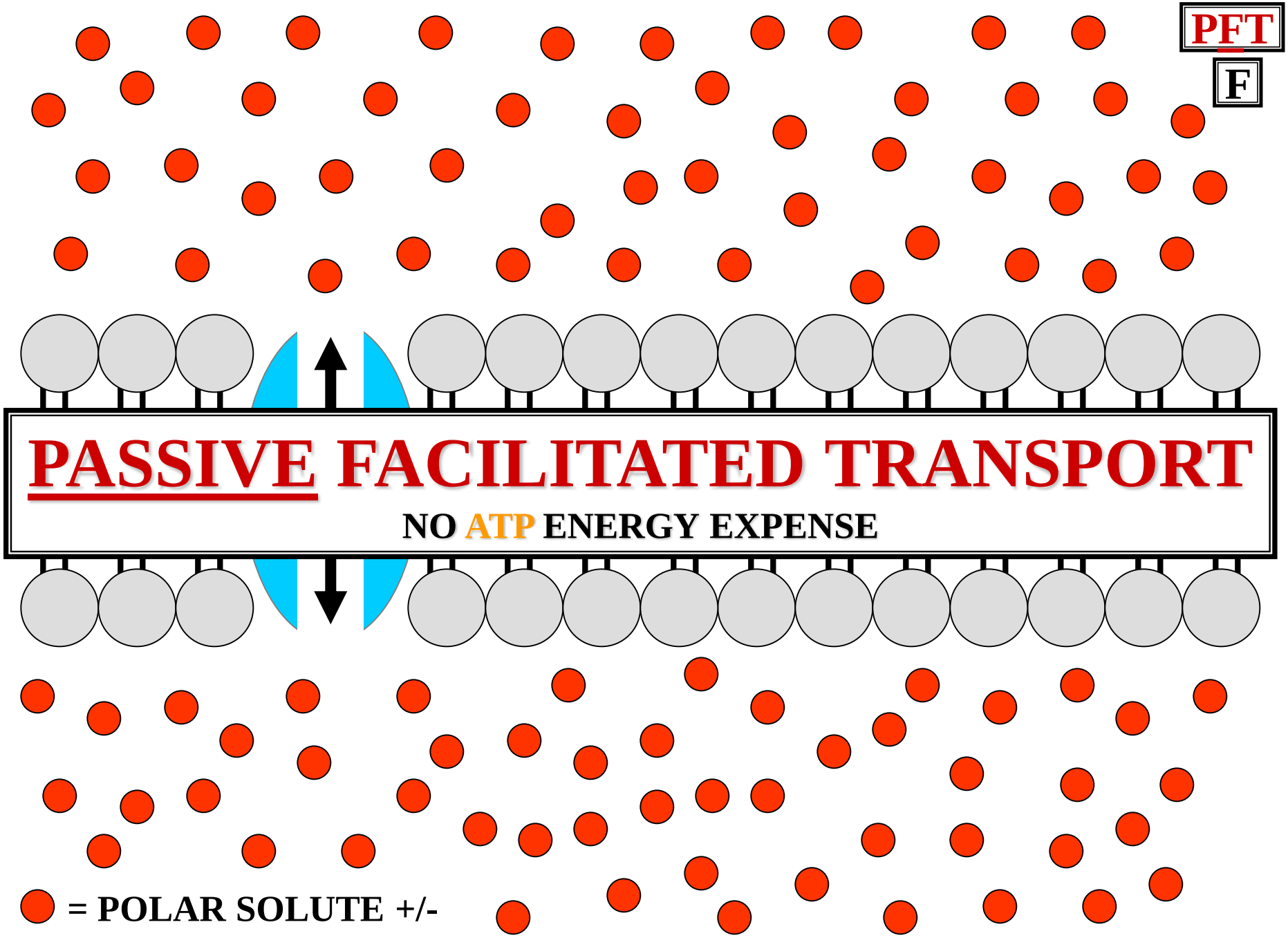
C

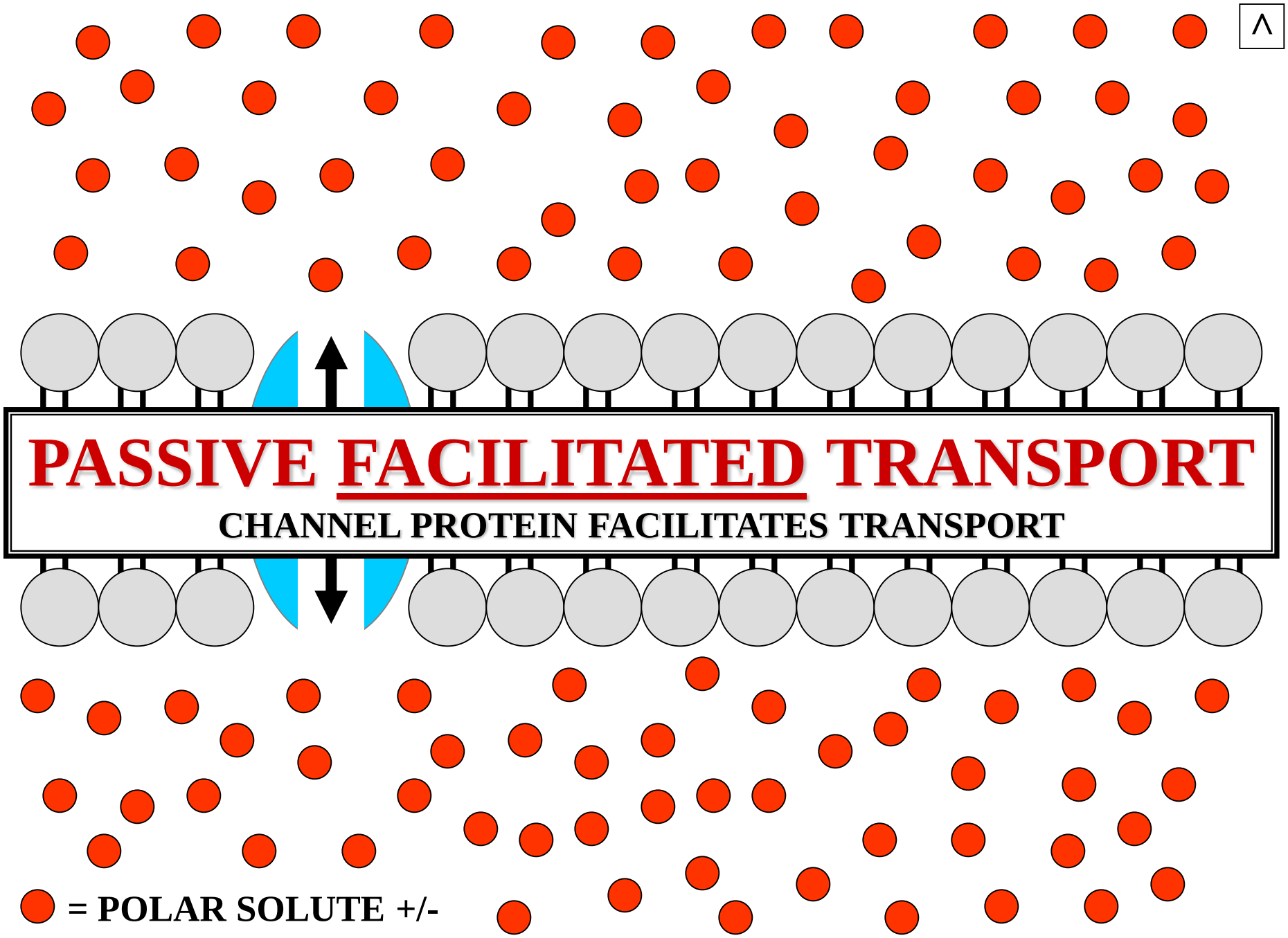


= POLAR SOLUTE +/-


A
CONFORMATION CHANGE: NO
= POLAR SOLUTE +/-

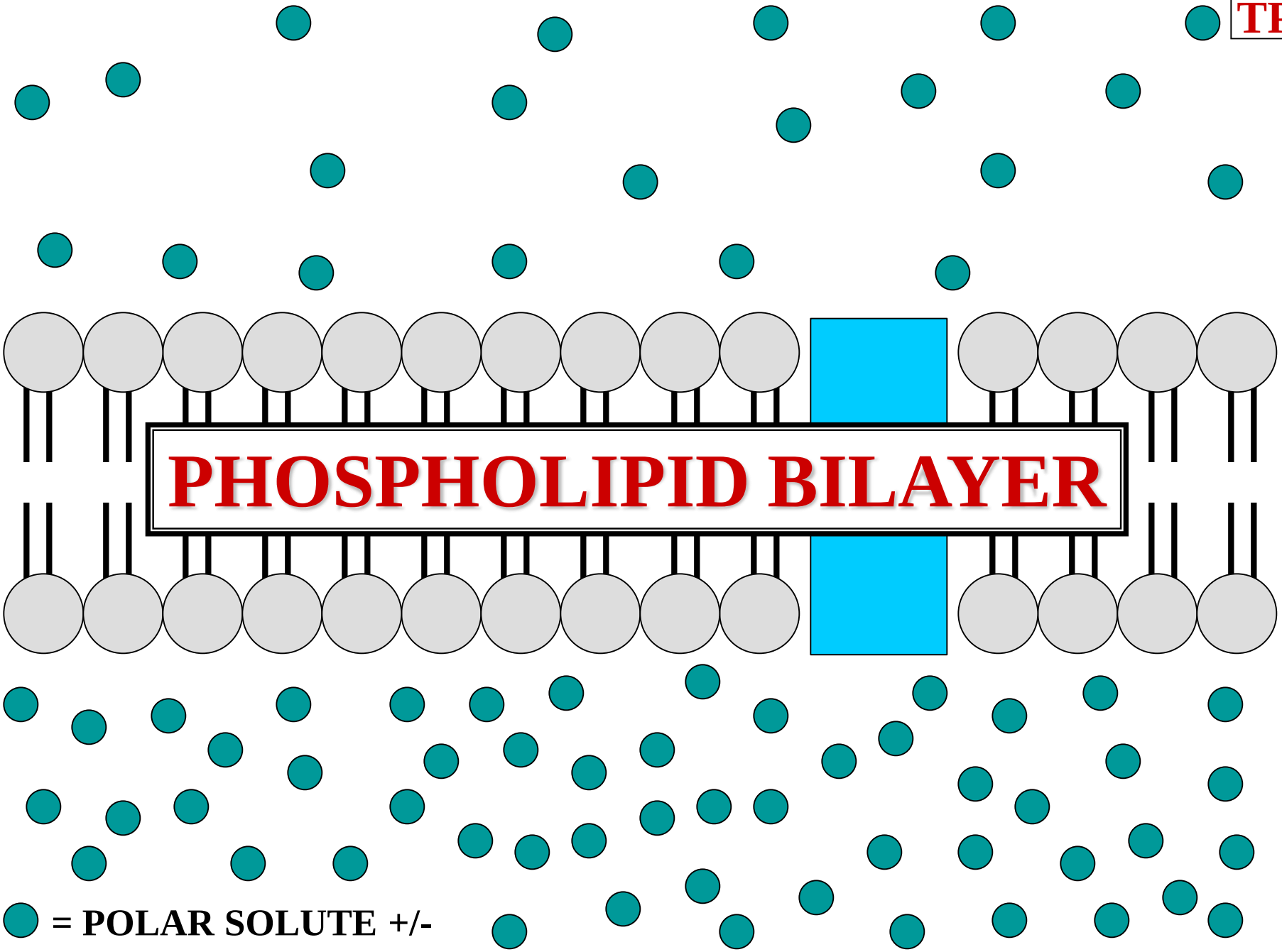

PFT
N
ATP EXPENSE: NO
= POLAR SOLUTE +/-


PFT
F
PASSIVE FACILITATED TRANSPORT
NO ATP ENERGY EXPENSE
= POLAR SOLUTE +/-

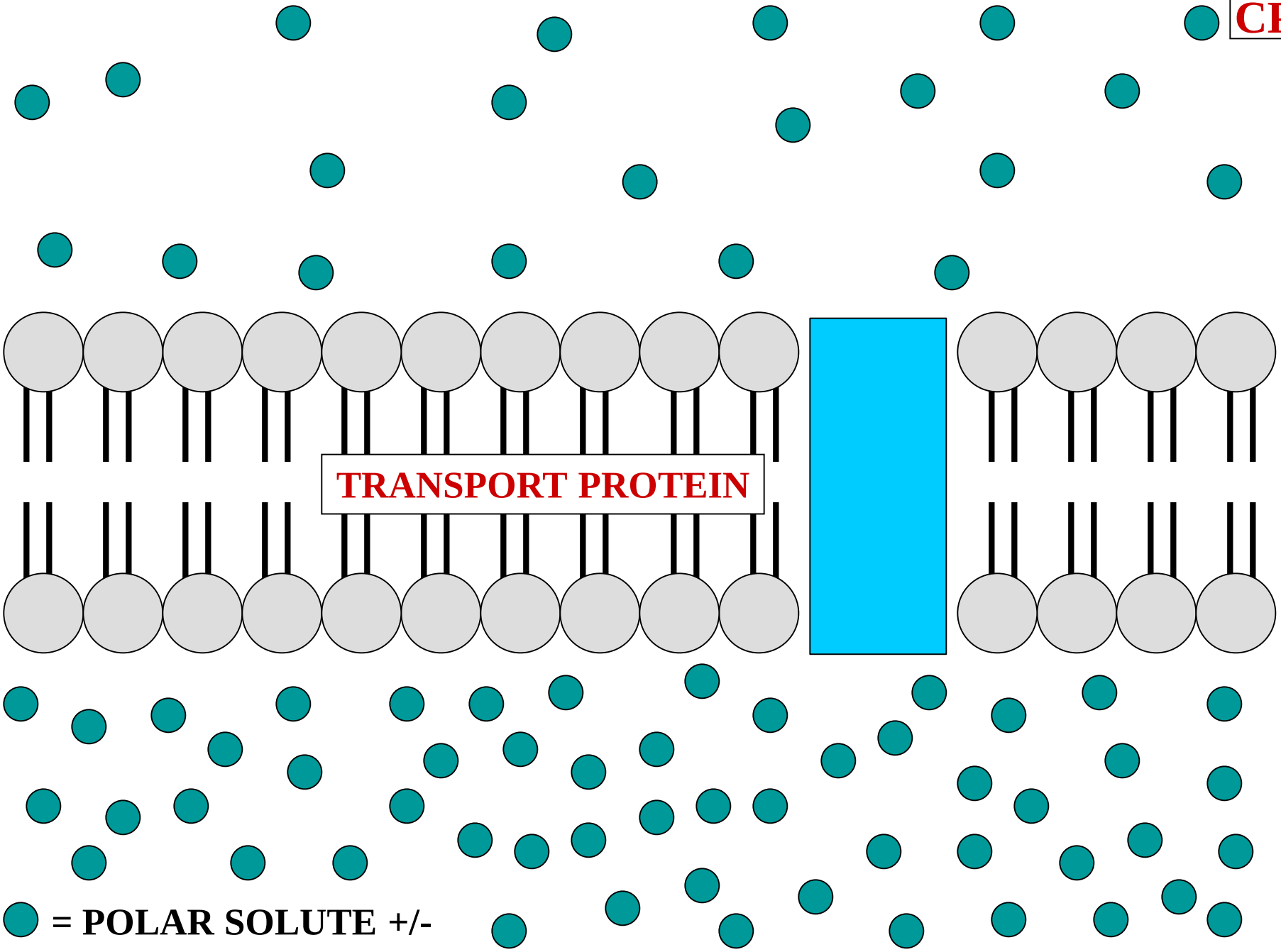

PASSIVE FACILITATED TRANSPORT
CHANNEL PROTEIN FACILITATES TRANSPORT
= POLAR SOLUTE +/-

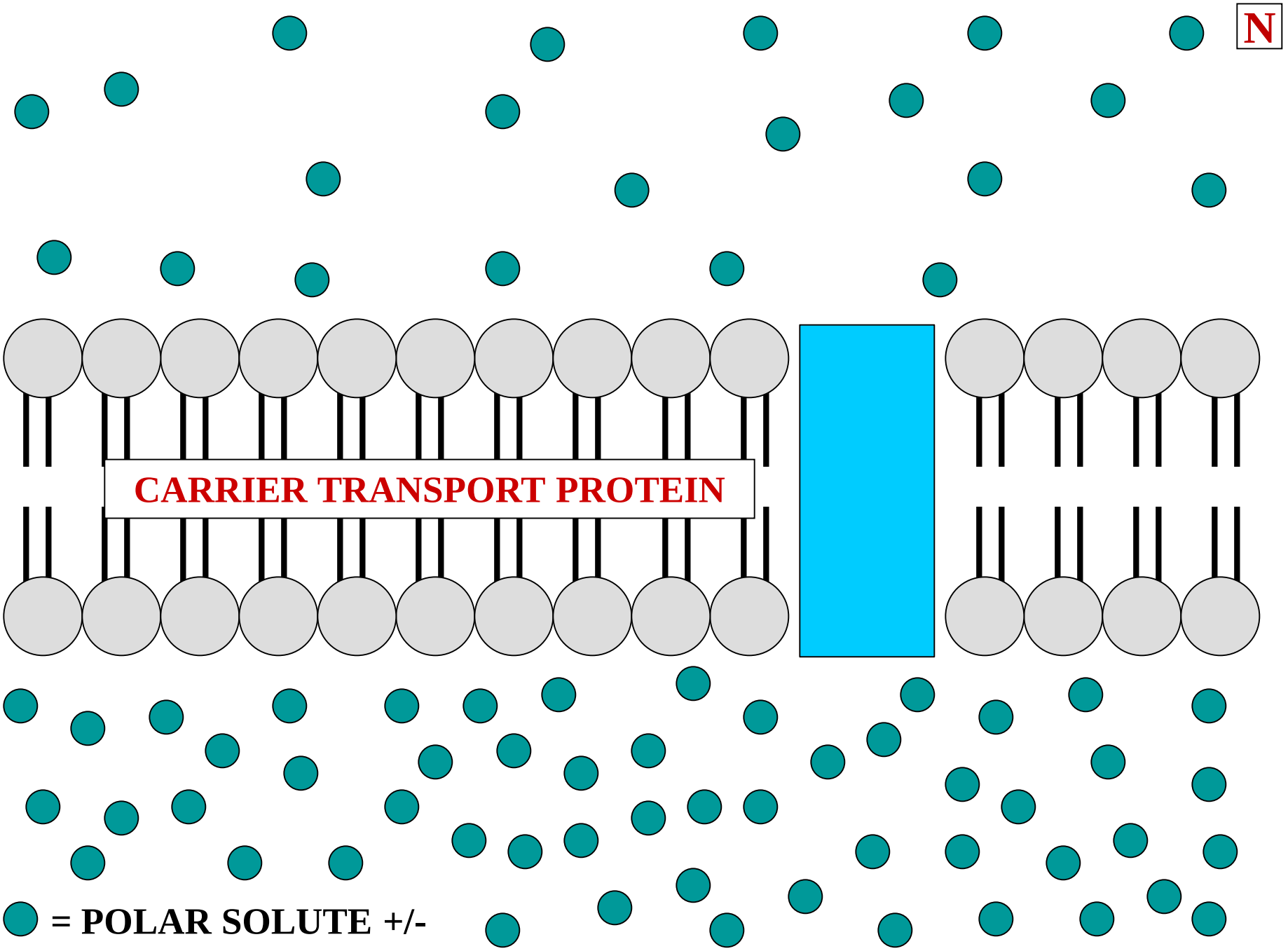
ACTIVE TRANSPORT

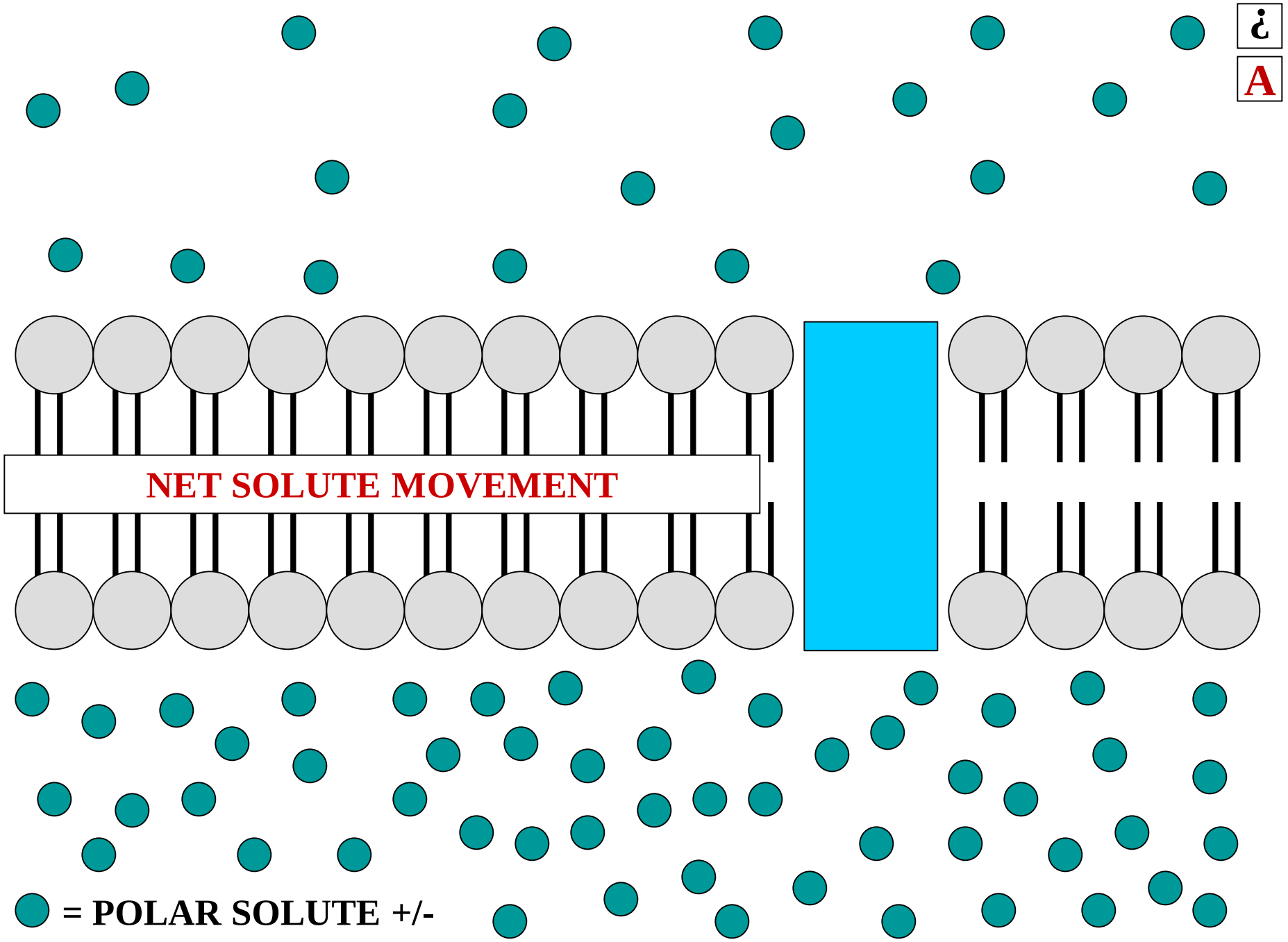
TP

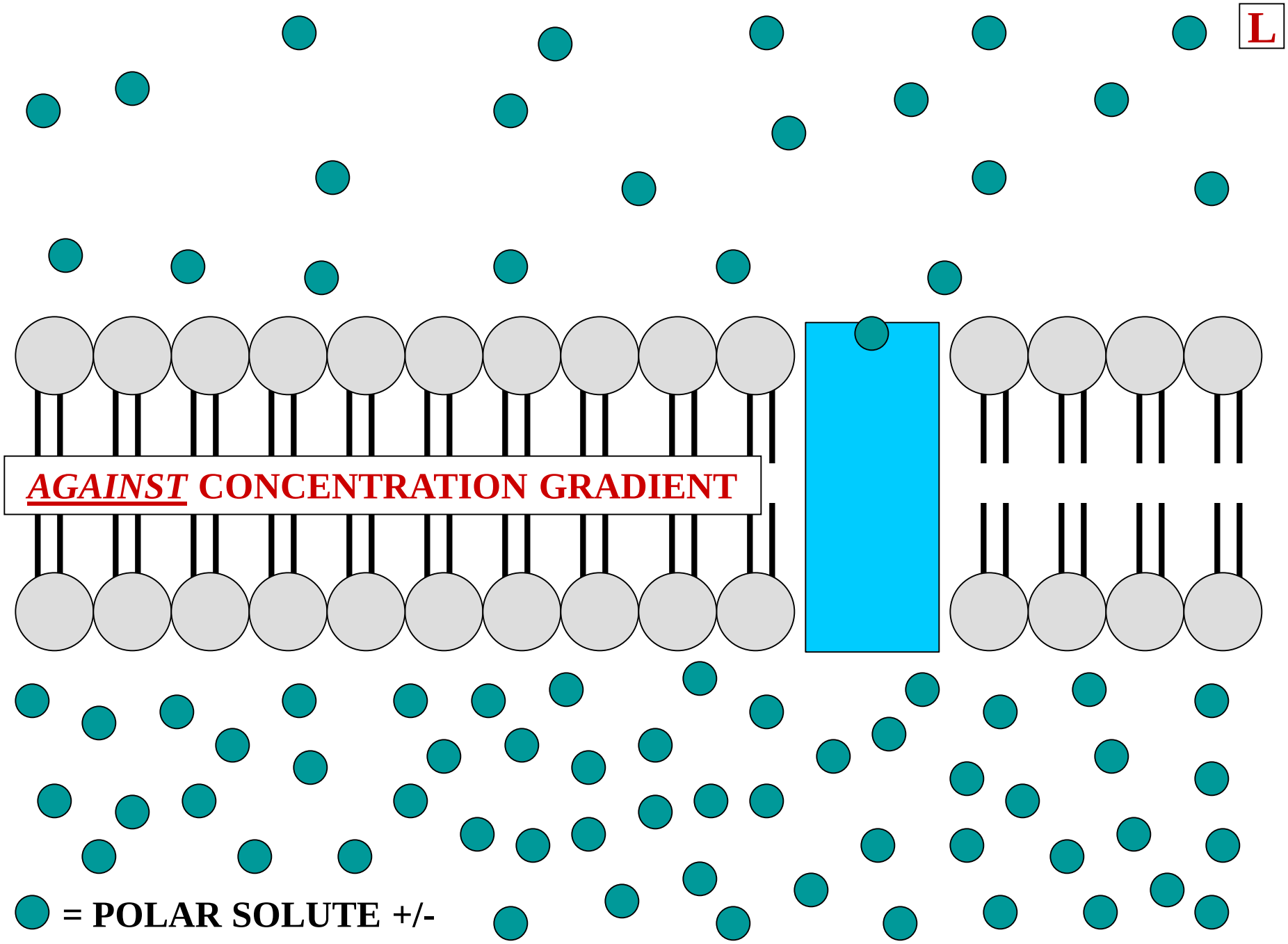


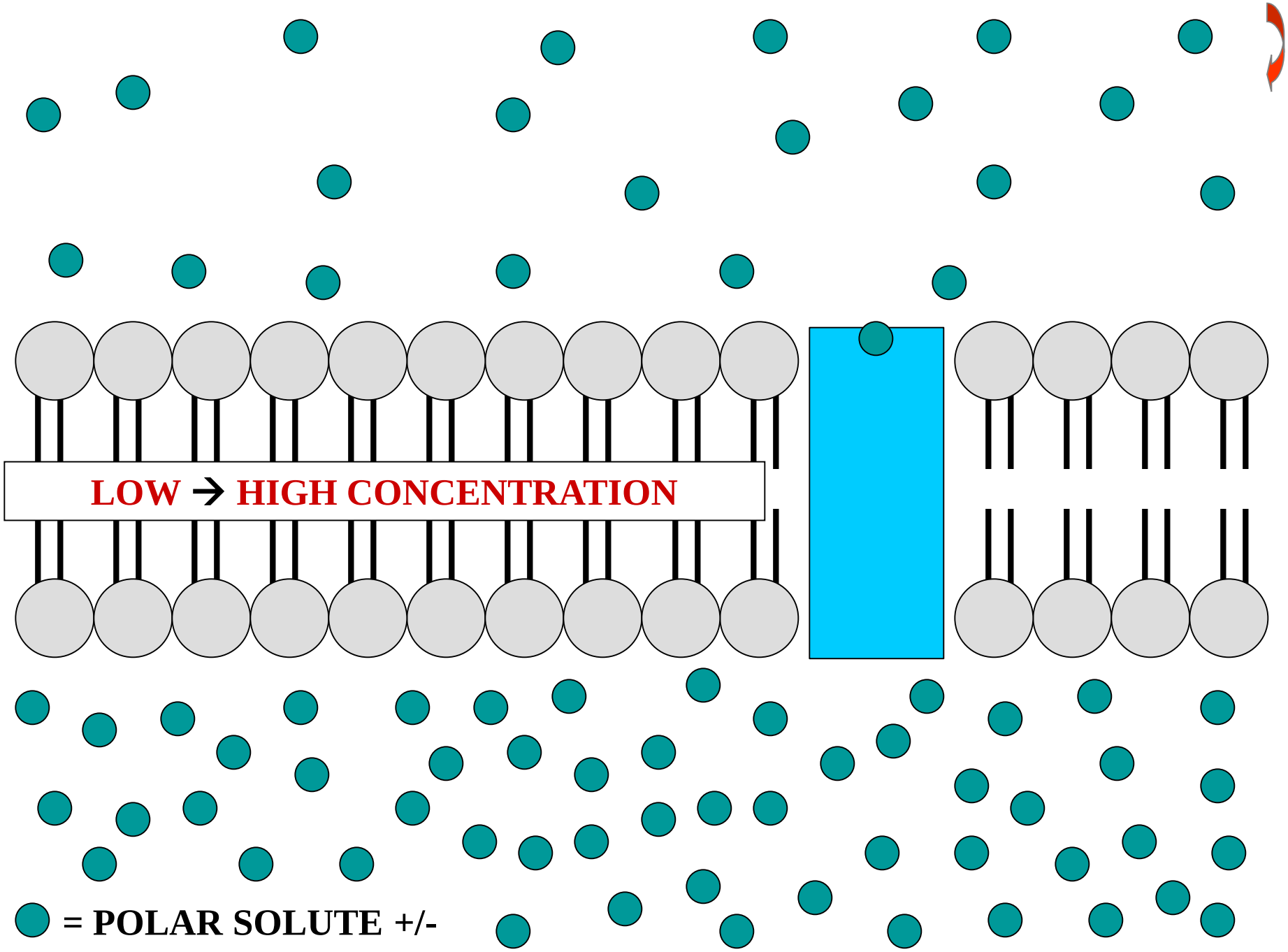
CP

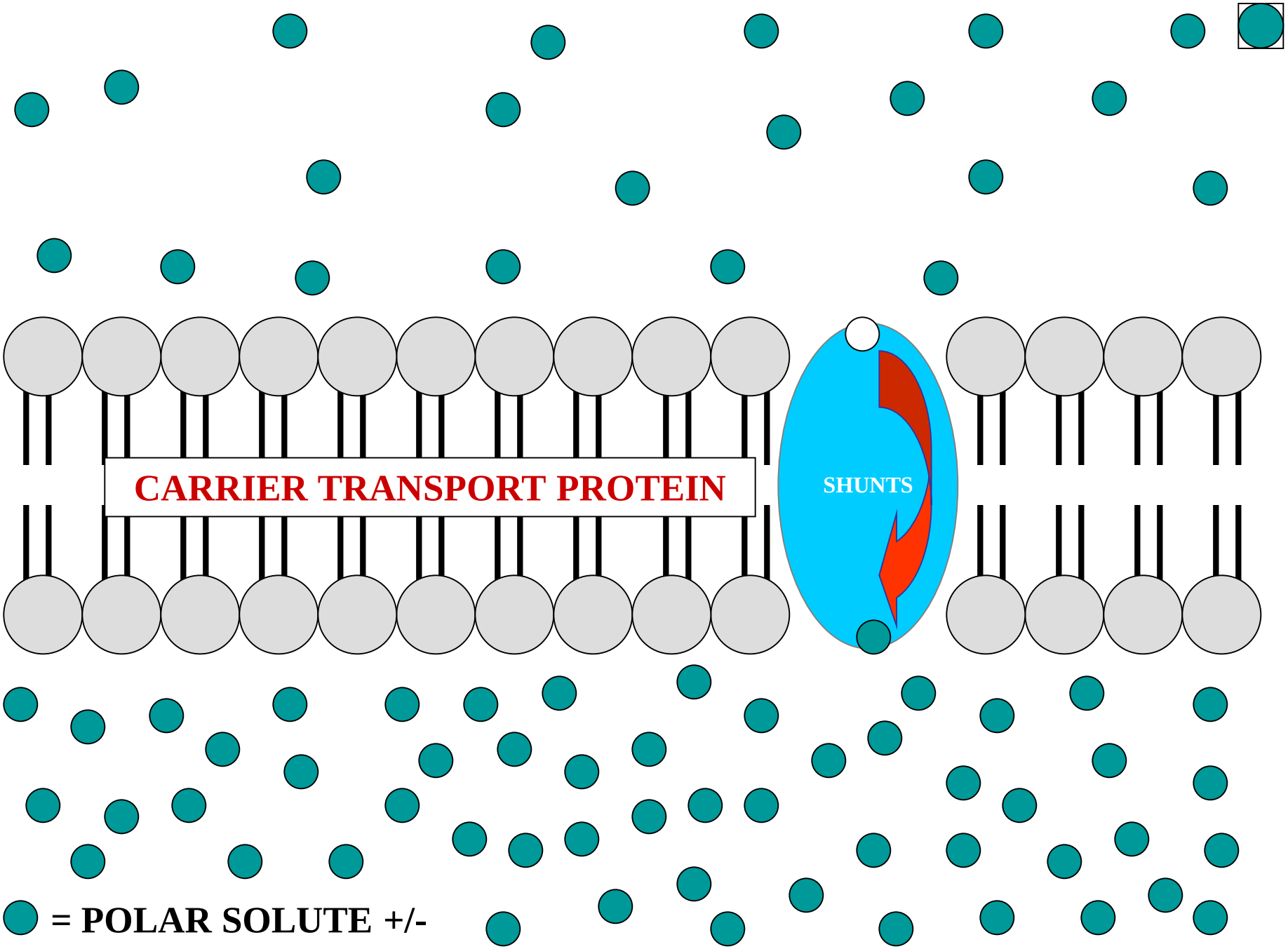


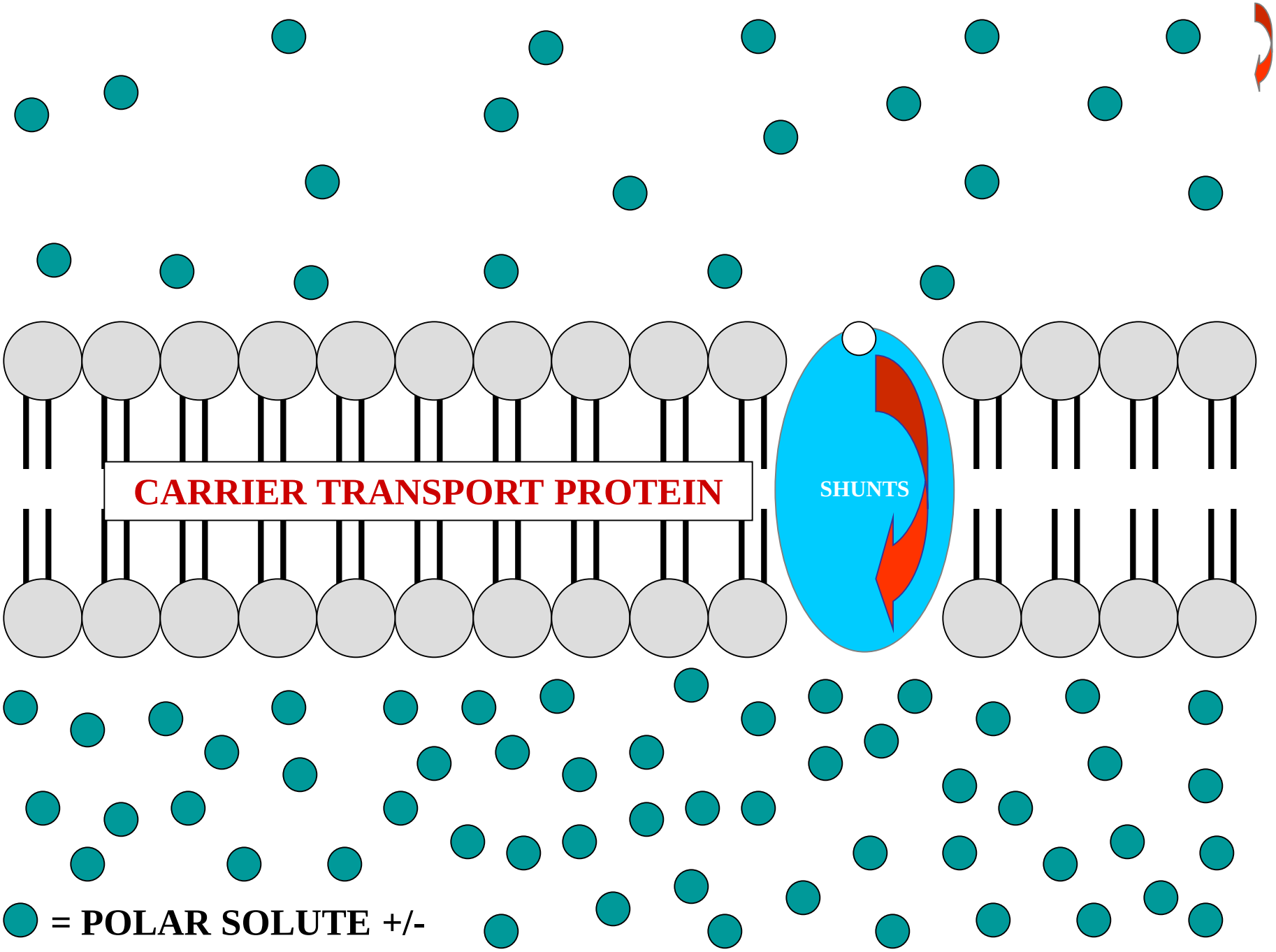

N
CARRIER TRANSPORT PROTEIN
= POLAR SOLUTE +/-

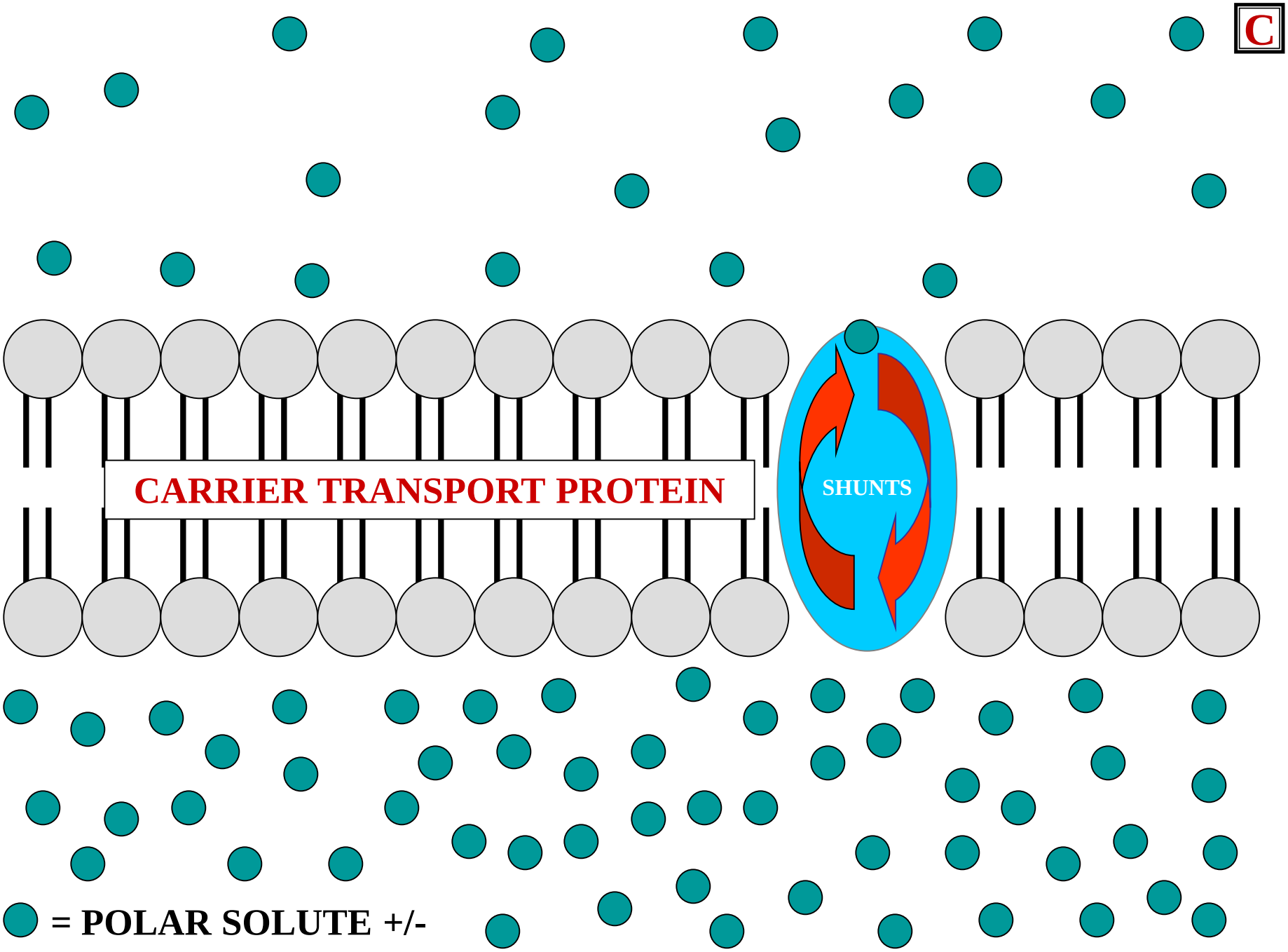

¿
A
NET SOLUTE MOVEMENT
= POLAR SOLUTE +/-

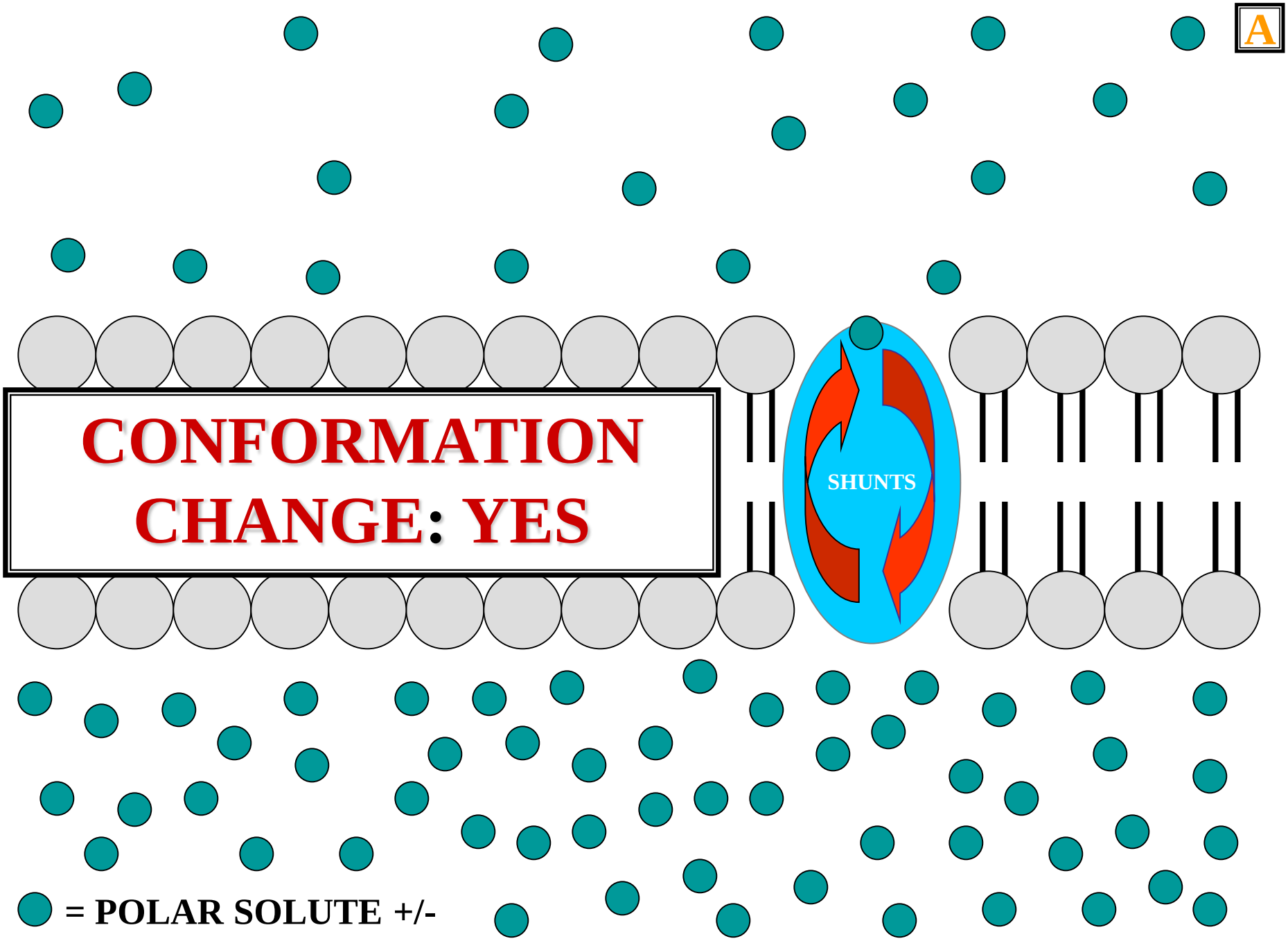

L
AGAINST CONCENTRATION GRADIENT
= POLAR SOLUTE +/-

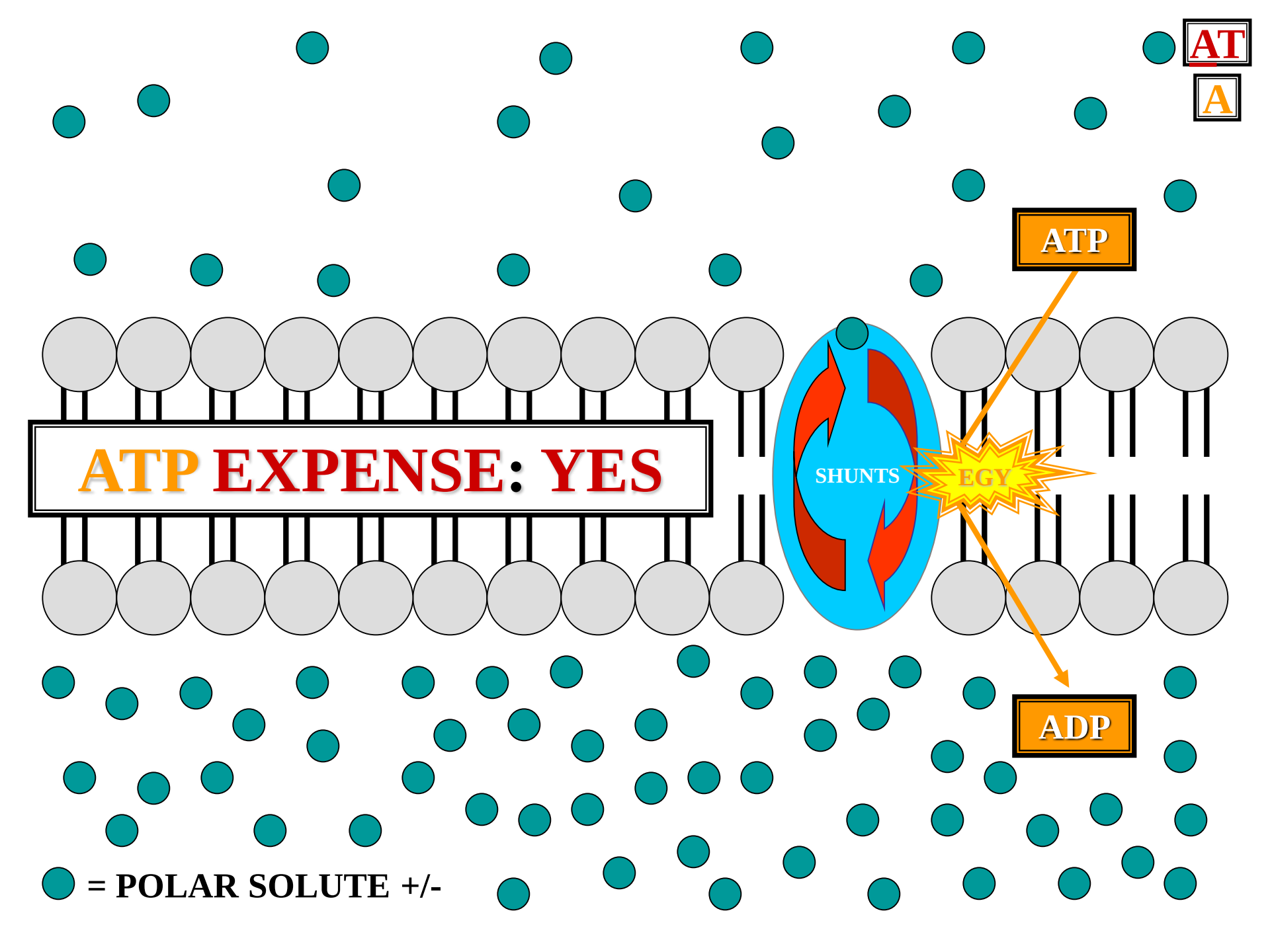

LOW → HIGH CONCENTRATION
= POLAR SOLUTE +/-

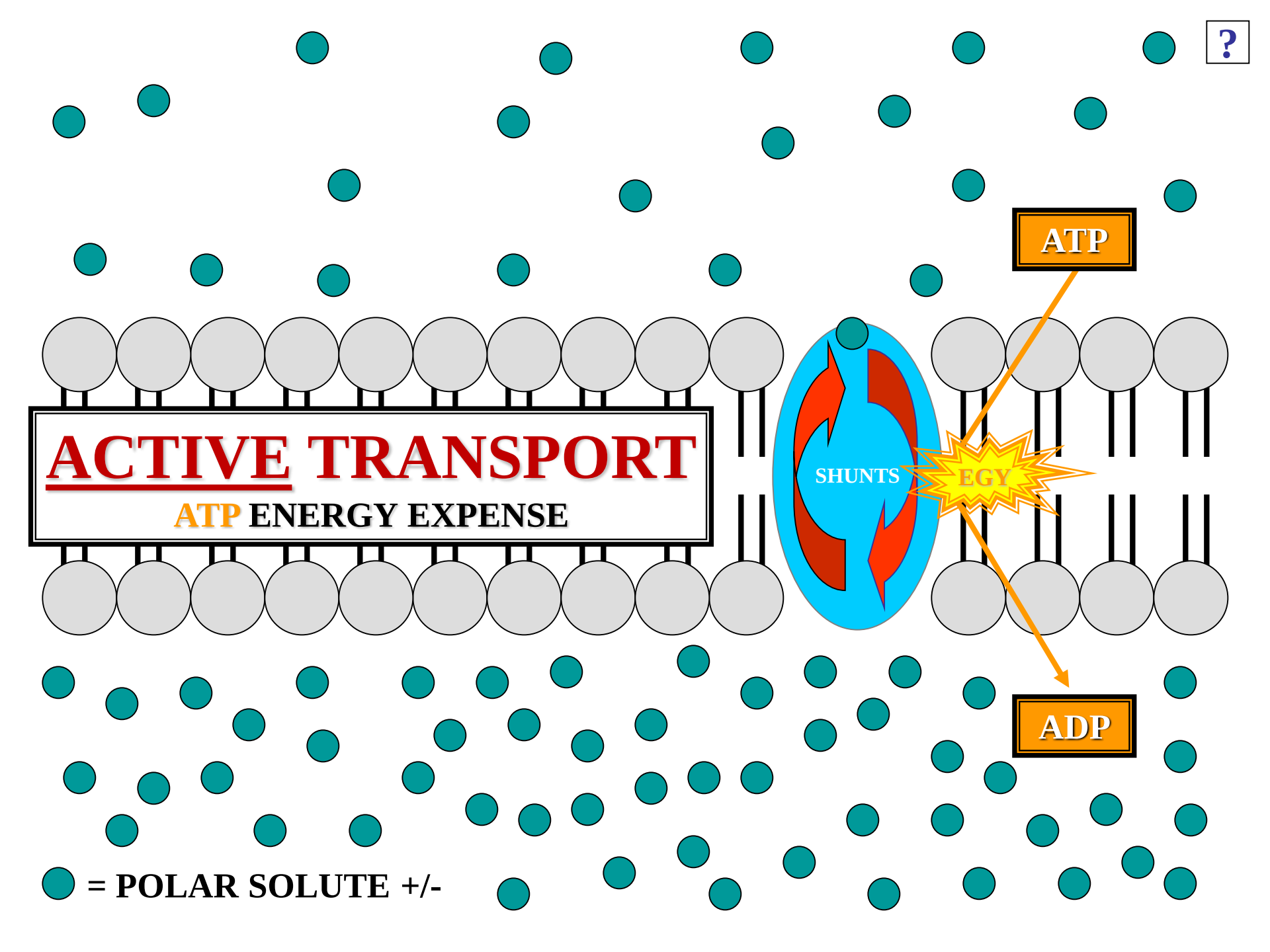

CARRIER TRANSPORT PROTEIN
SHUNTS
= POLAR SOLUTE +/-


CARRIER TRANSPORT PROTEIN
SHUNTS
= POLAR SOLUTE +/-


C
CARRIER TRANSPORT PROTEIN
SHUNTS
= POLAR SOLUTE +/-


CONFORMATION CHANGE: YES
SHUNTS
= POLAR SOLUTE +/-


AT
A
ATP
ATP EXPENSE: YES
SHUNTS
EGY
ADP
= POLAR SOLUTE +/-


?
ATP
ACTIVE TRANSPORT
ATP ENERGY EXPENSE
SHUNTS
EGY
ADP
= POLAR SOLUTE +/-

QUESTION

A

WHAT HAS CROSSED THE BIO-MEMBRANE SOLUTE OR SOLVENT?

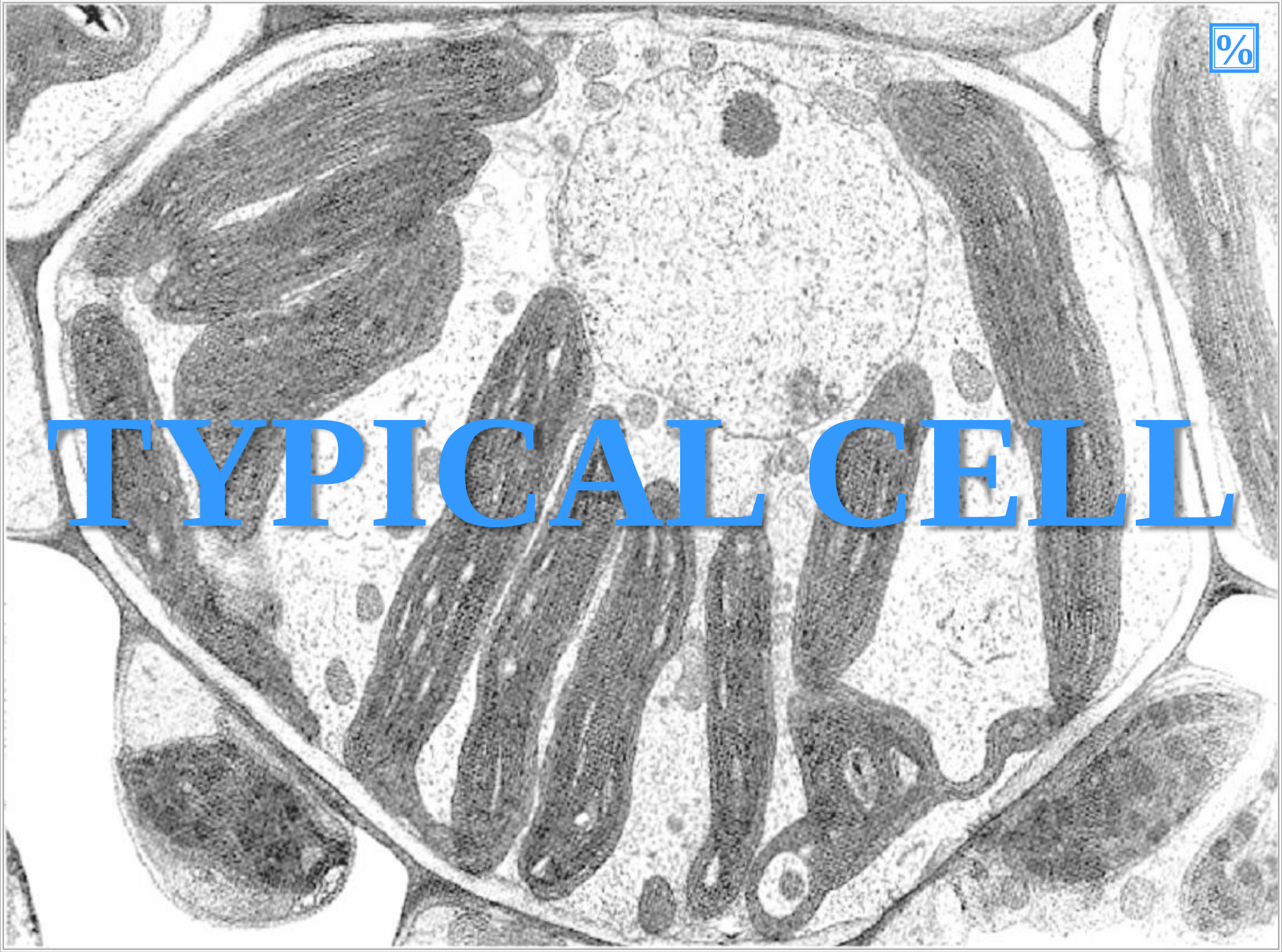
QUESTION

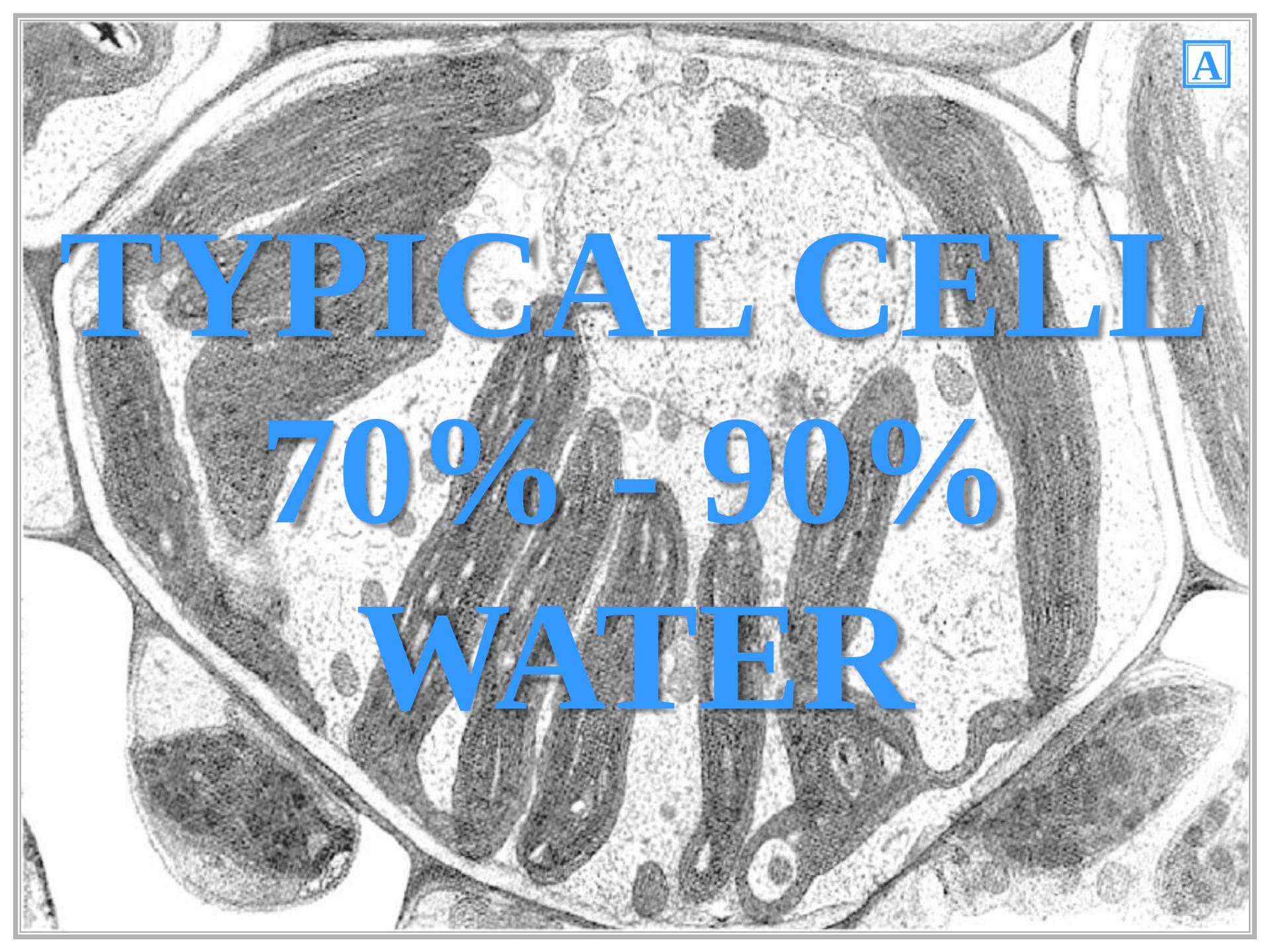
ANSWER

SOLUTE

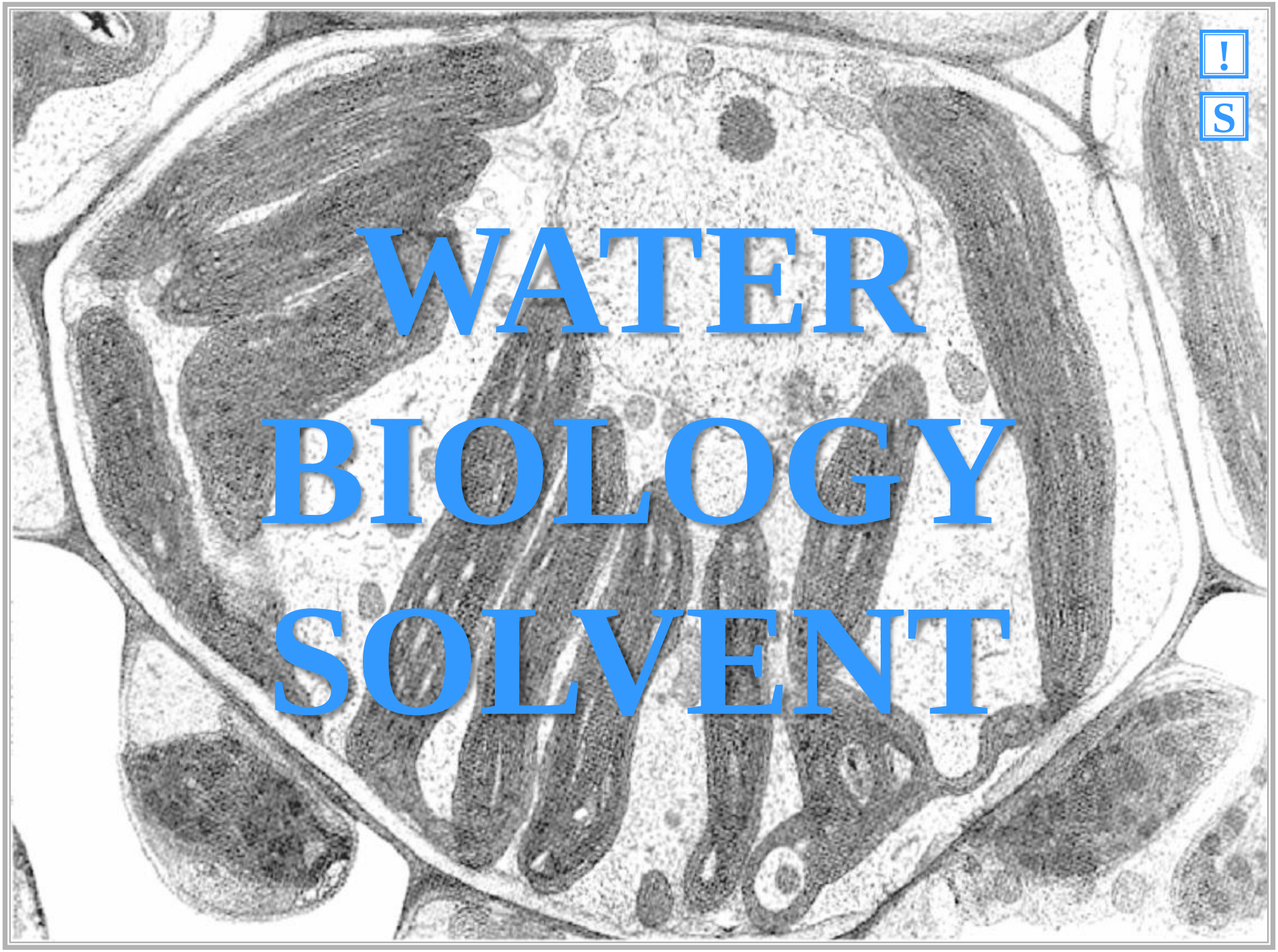
ANSWER

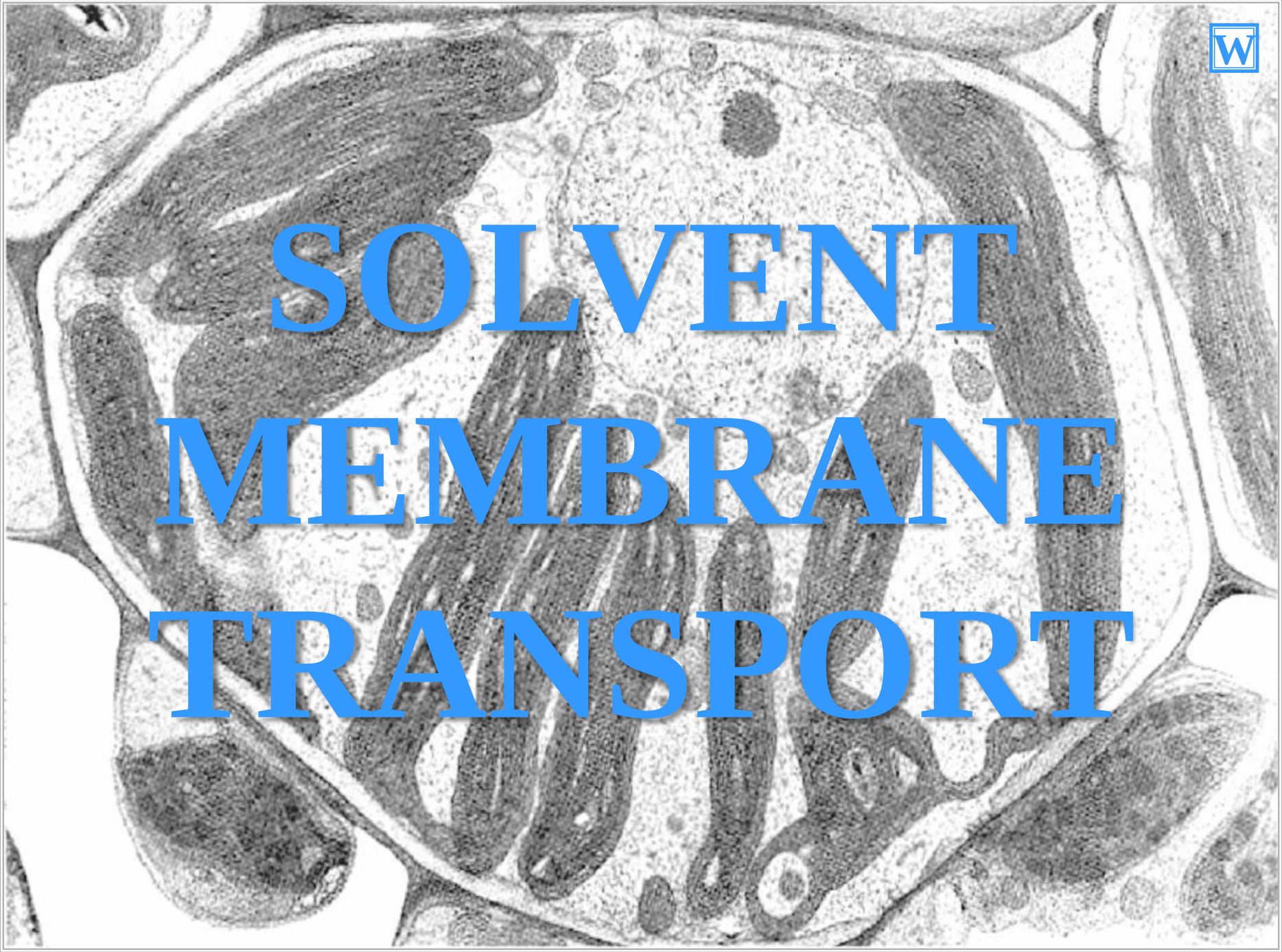
SOLVENT MEMBRANE TRANSPORT


%
TYPICAL CELL


A
TYPICAL CELL
70% - 90%
WATER


TYPICAL CELL
AQUEOUS
SOLUTION


WATER
BIOLOGY
SOLVENT

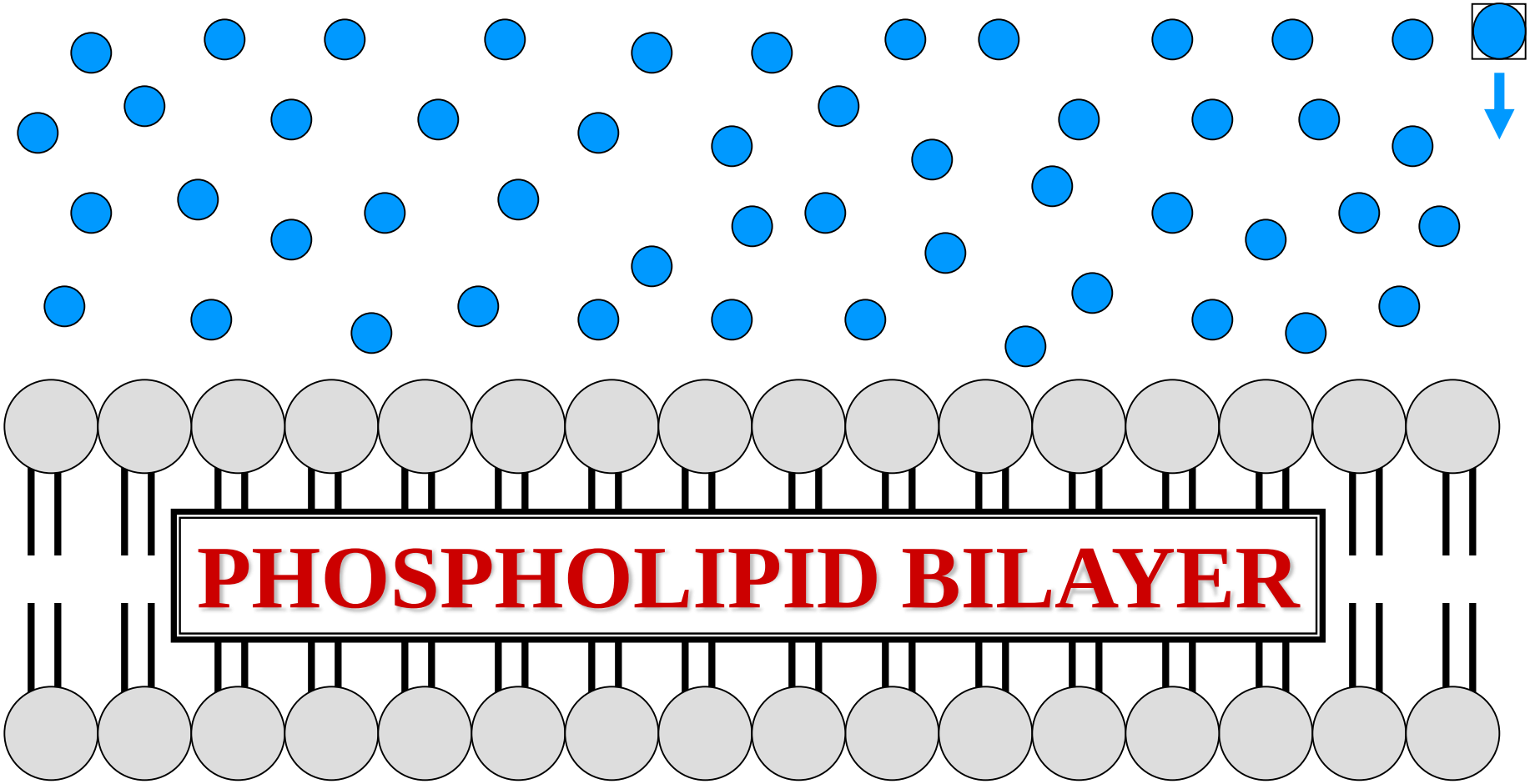


SOLVENT MEMBRANE TRANSPORT

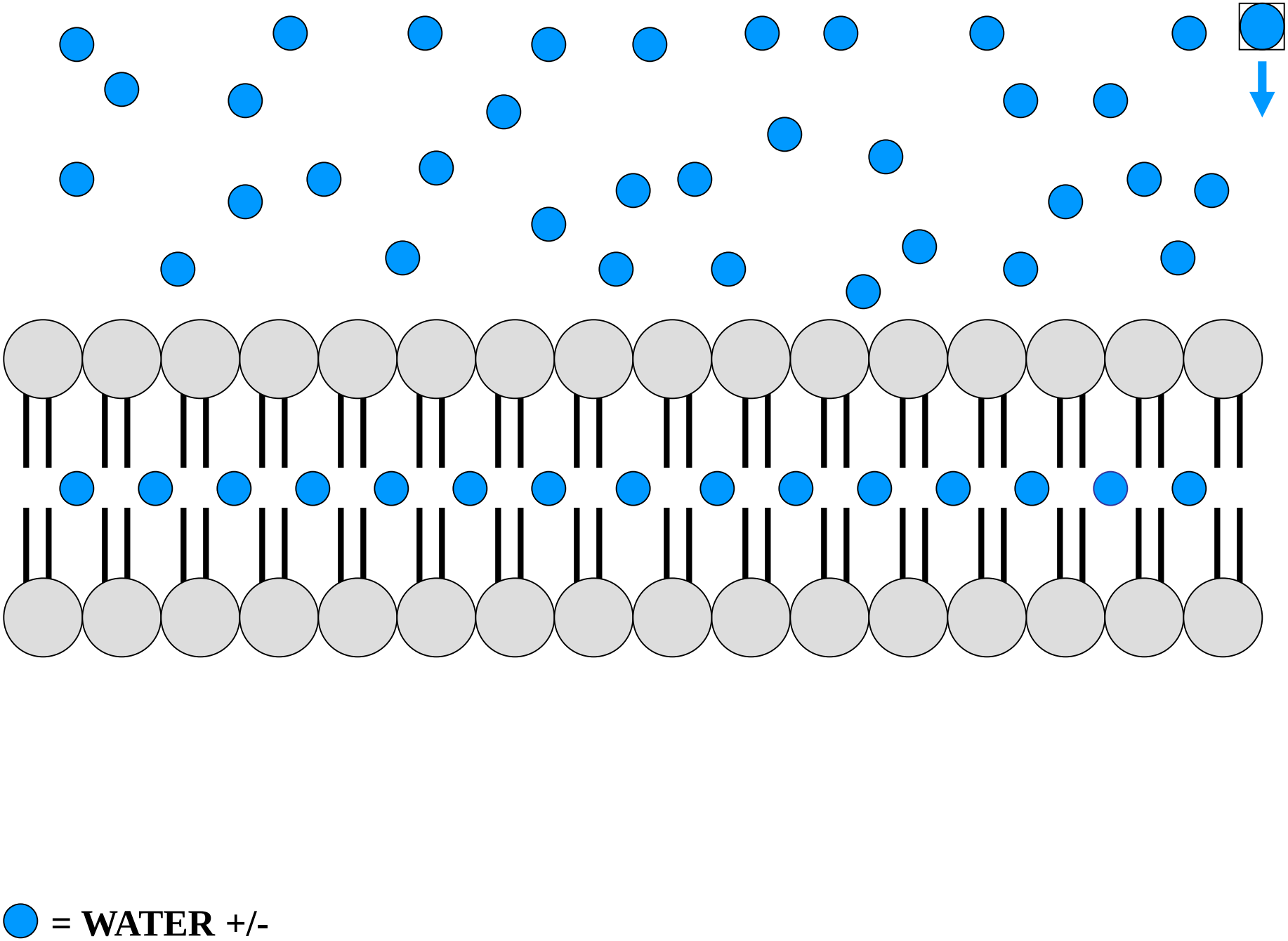
WATER MEMBRANE TRANSPORT

WATER MEMBRANE TRANSPORT

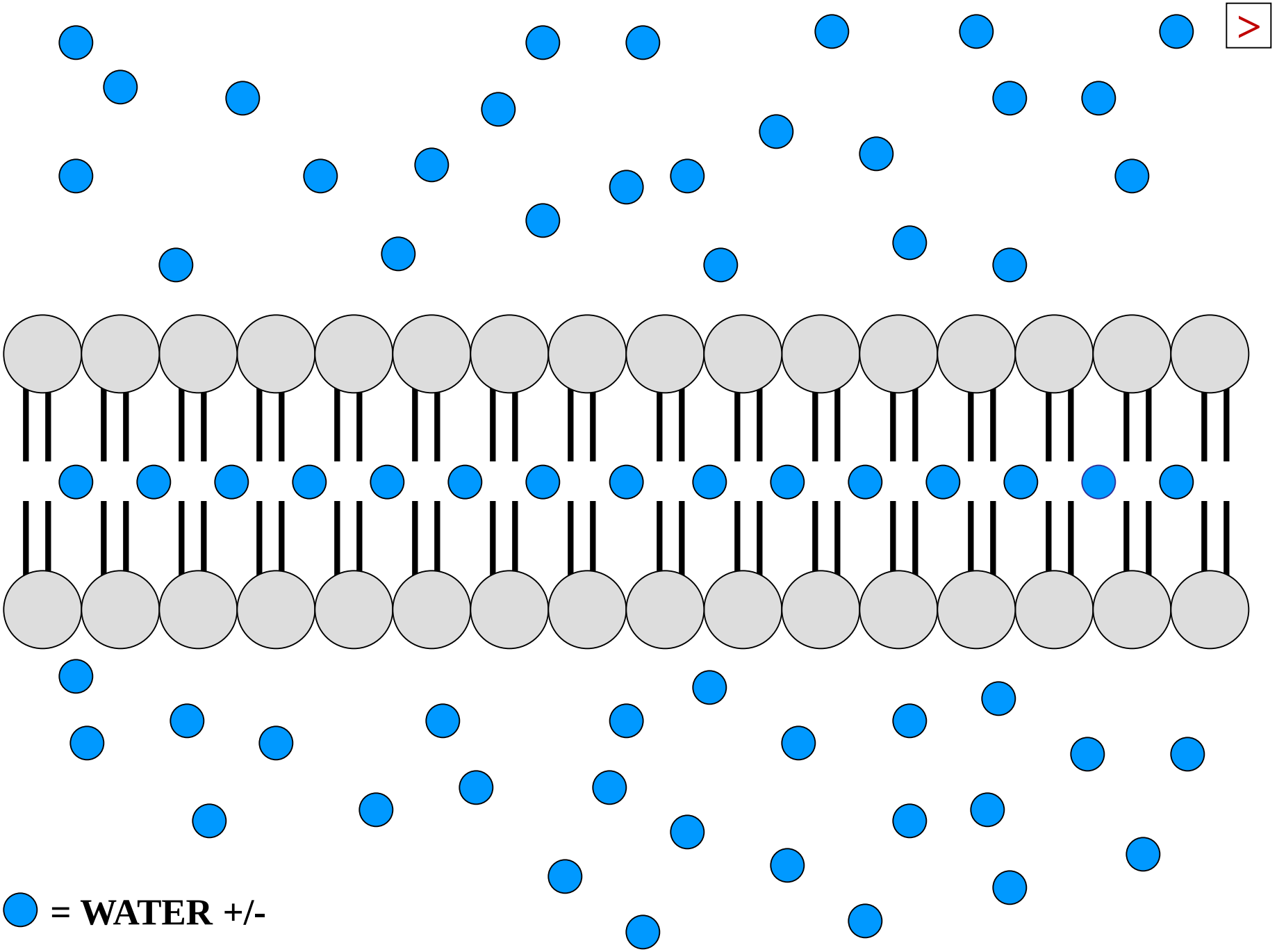
PHOSPHOLIPID BILAYER



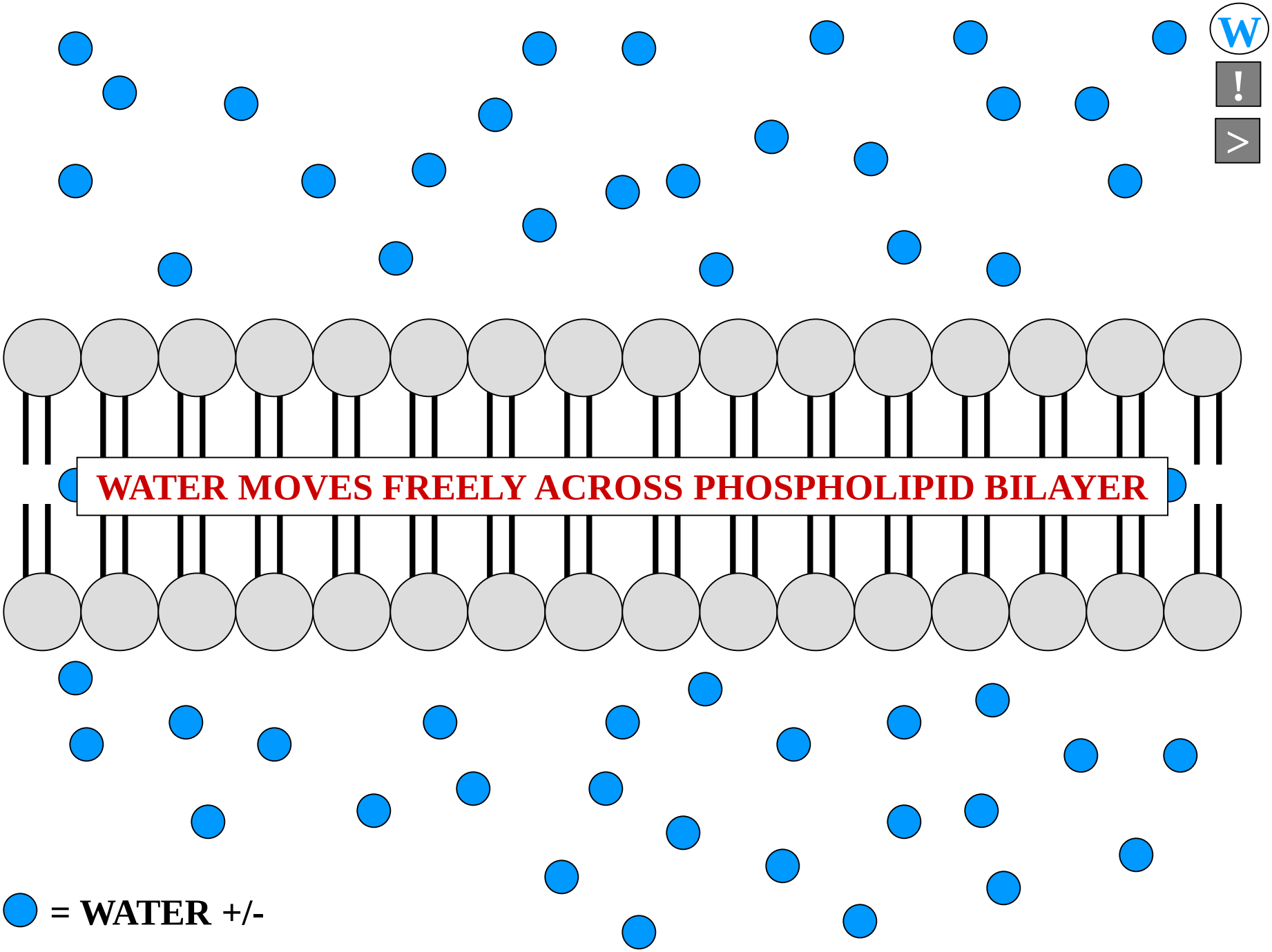
= WATER +/-



= WATER +/-



= WATER +/-

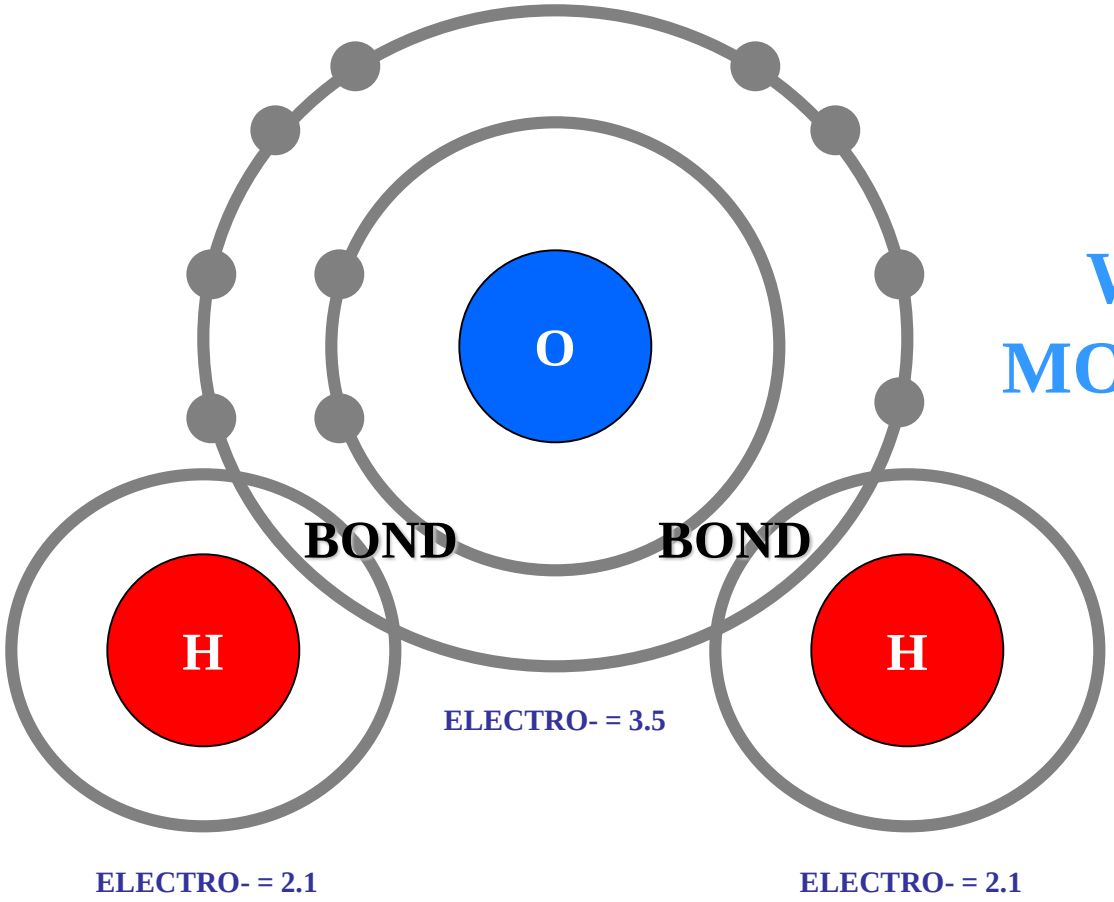

W
!
>
WATER MOVES FREELY ACROSS PHOSPHOLIPID BILAYER
= WATER +/-

CB

WATER MOLECULE

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

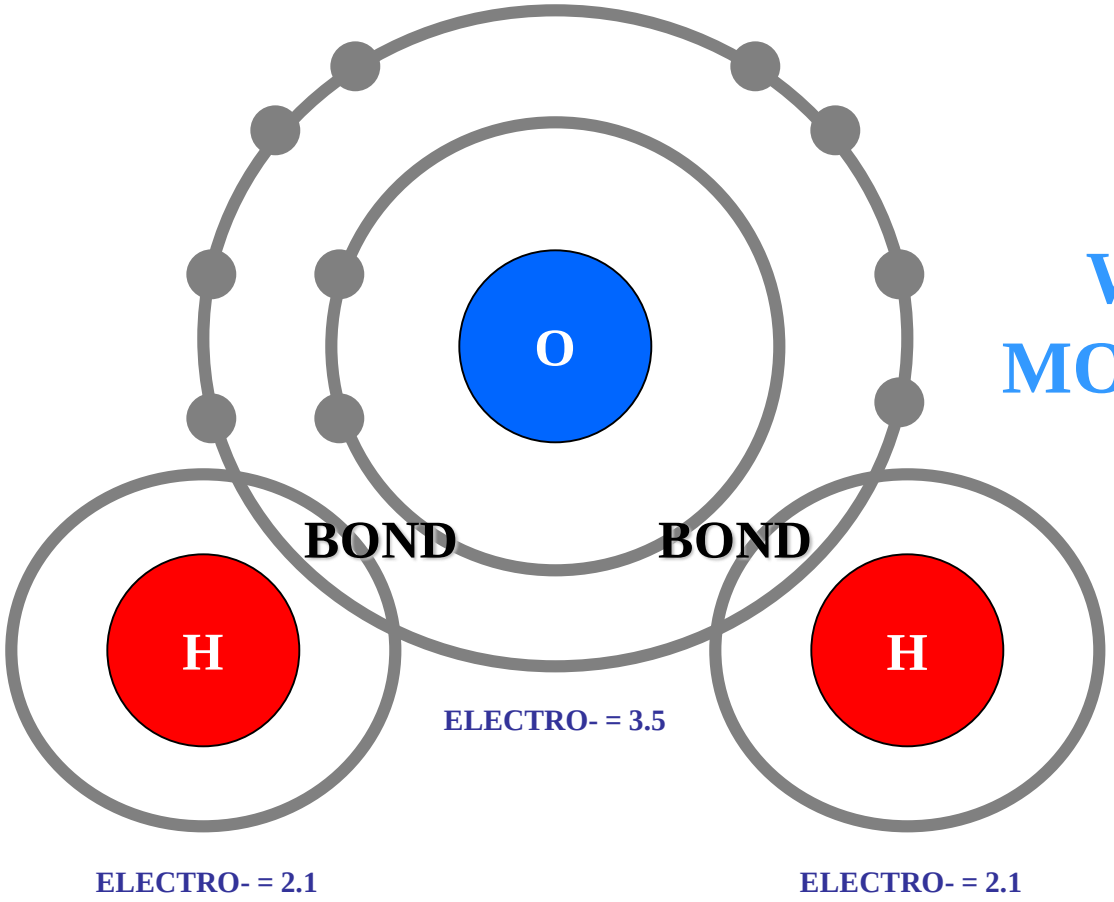
● = E-

PCB

COVALENT BOND

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



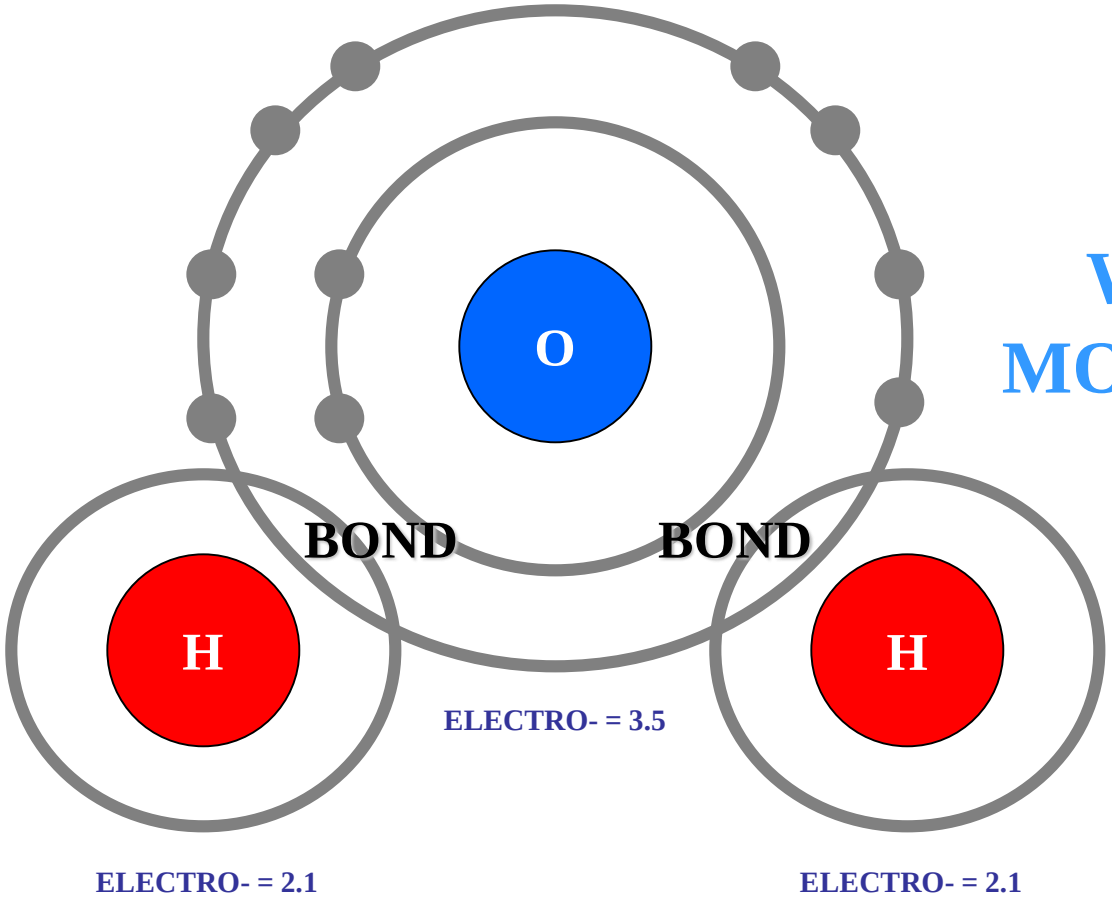
WATER MOLECULE

= E-

POLAR COVALENT BOND

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

● = E-

POLAR COVALENT BOND

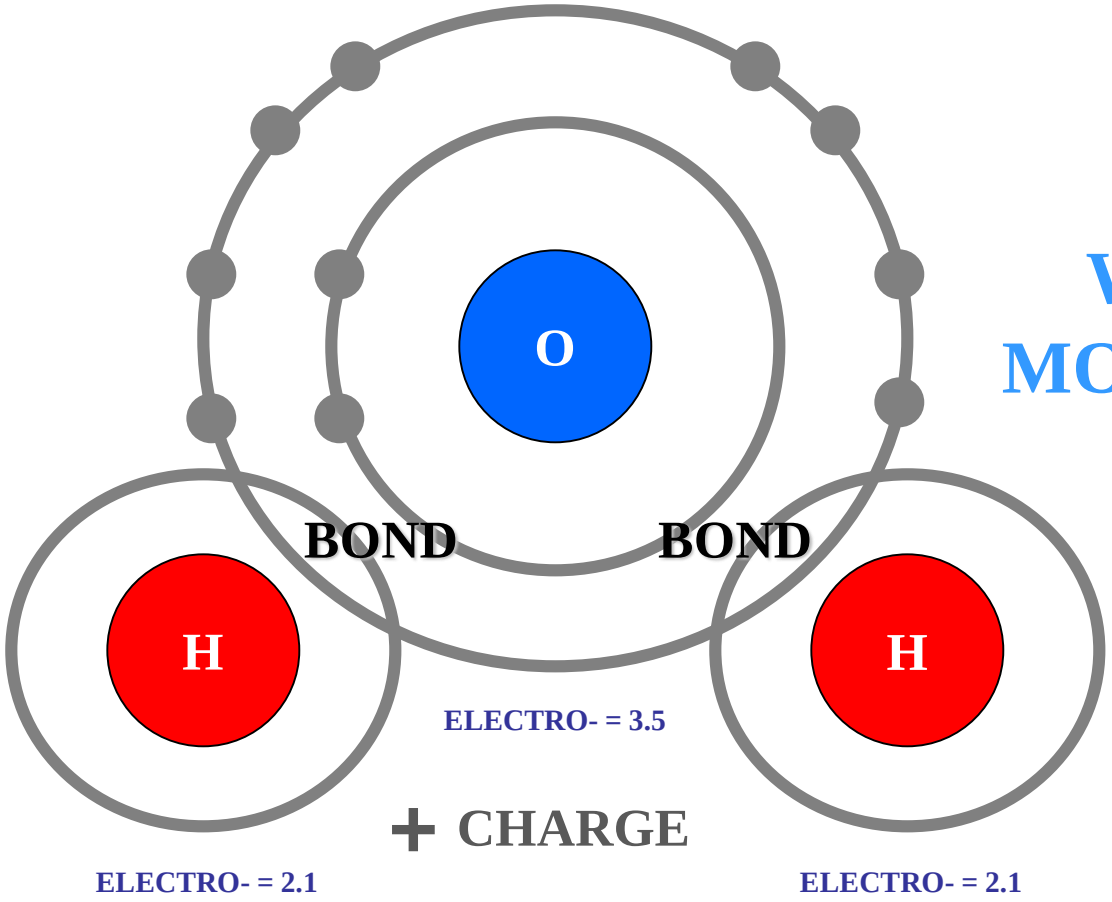
+/-

¿

- CHARGE

OXYGEN
HIGHER
ELECTRO-

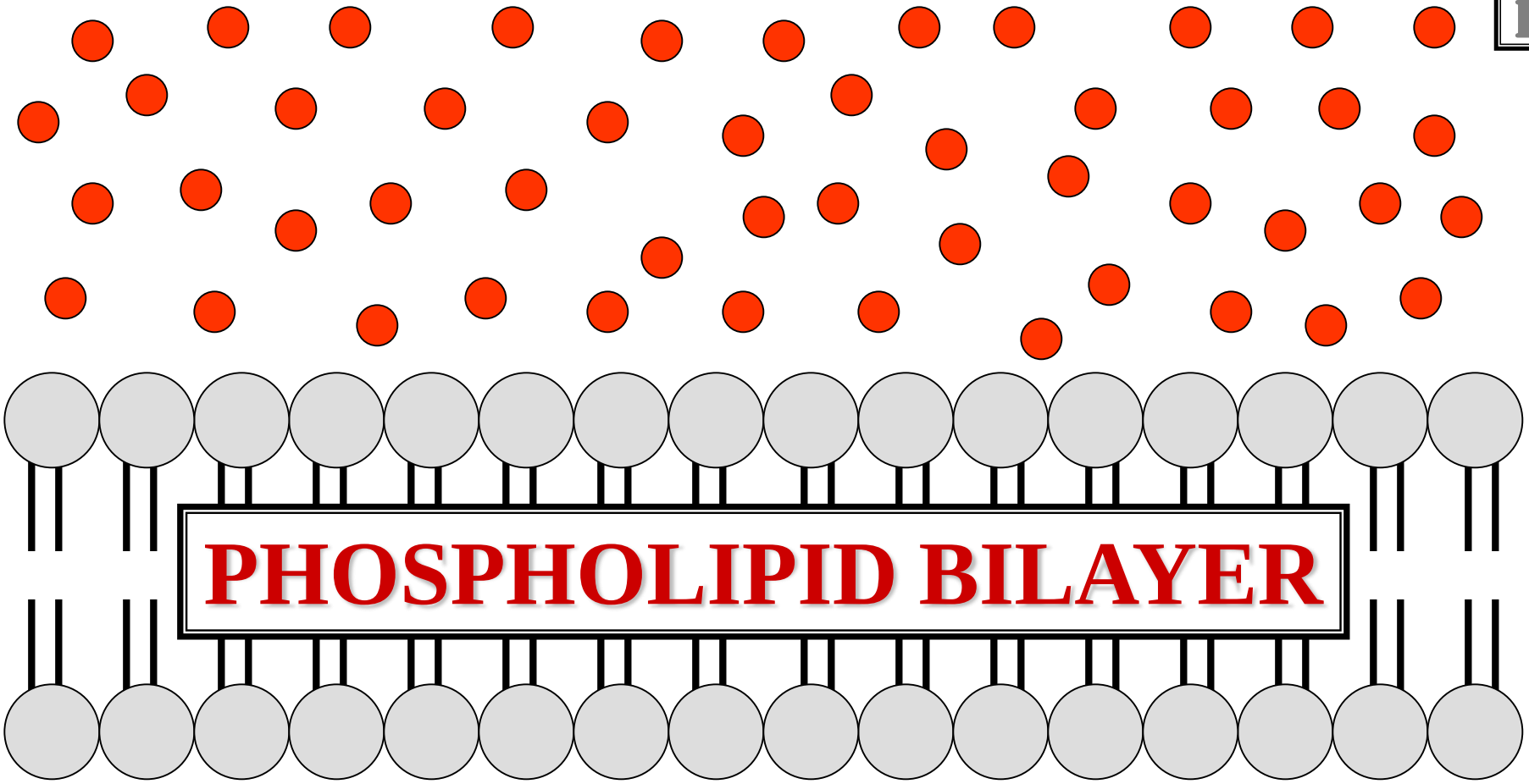
HYDROGEN
LOWER
ELECTRO-



WATER MOLECULE

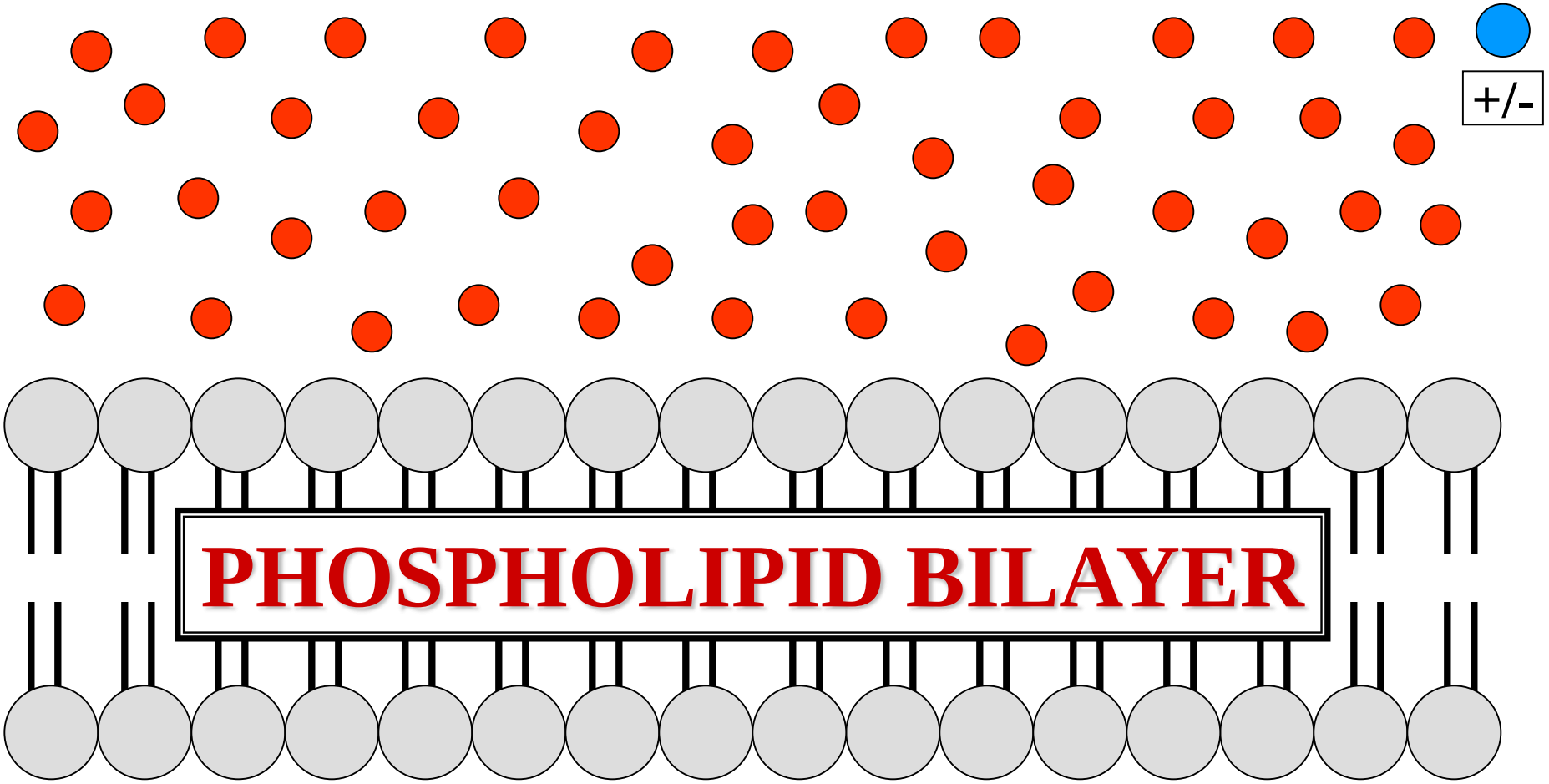
= E-

HIGHLY POLAR



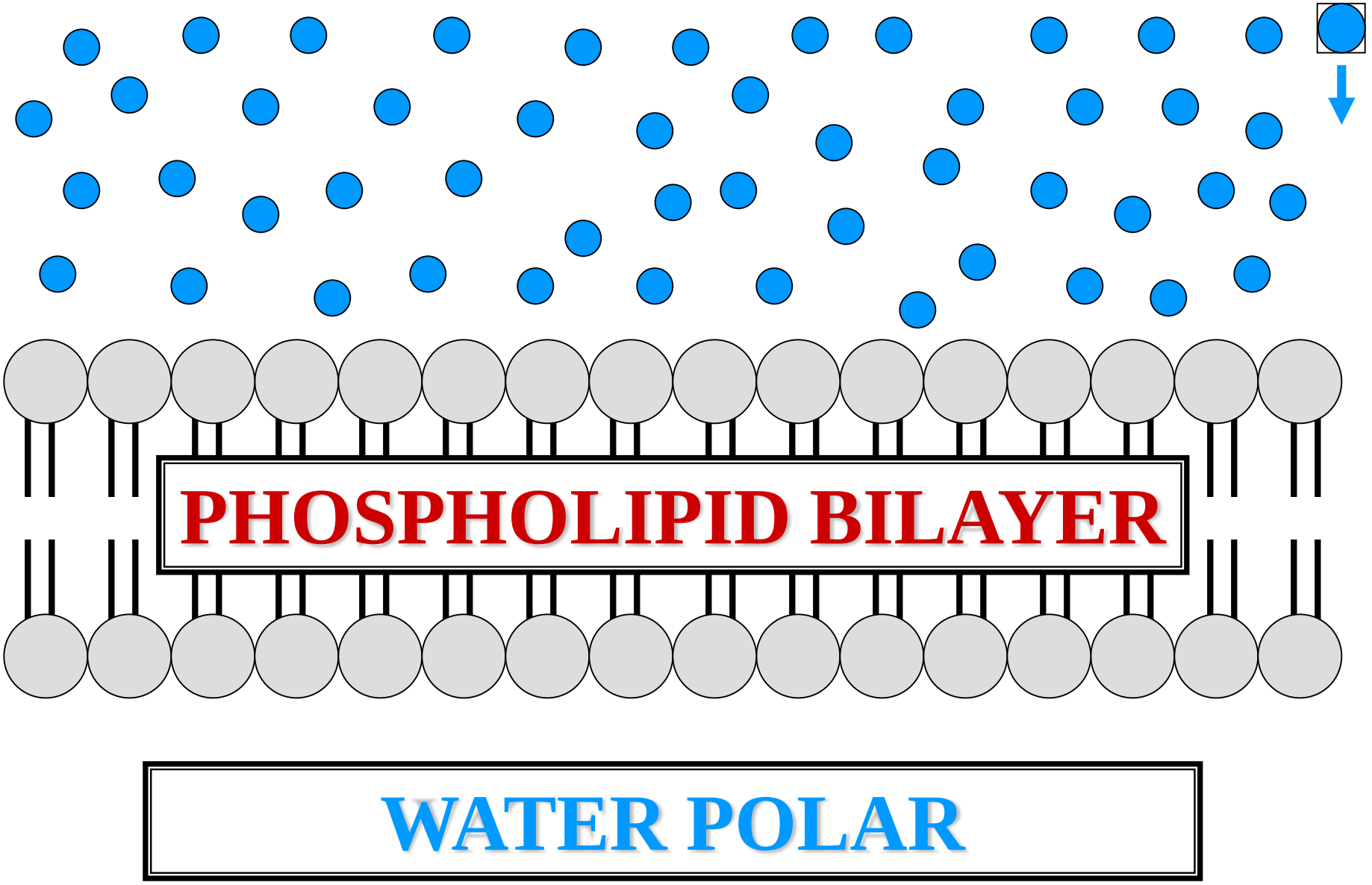
POLAR SOLUTE

= POLAR SOLUTE +/-

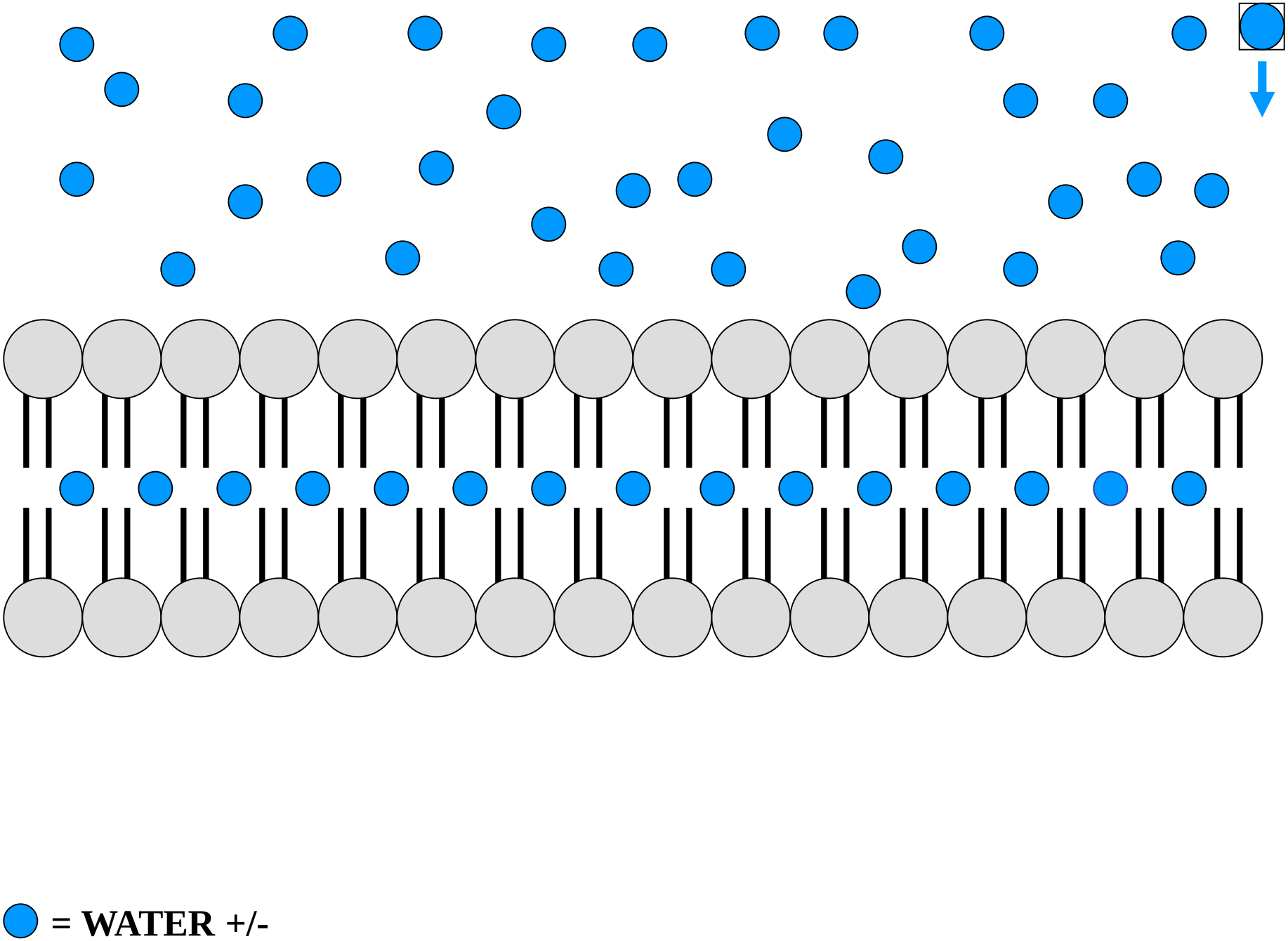


BILAYER INHIBITS PASSAGE
POLAR SOLUTES

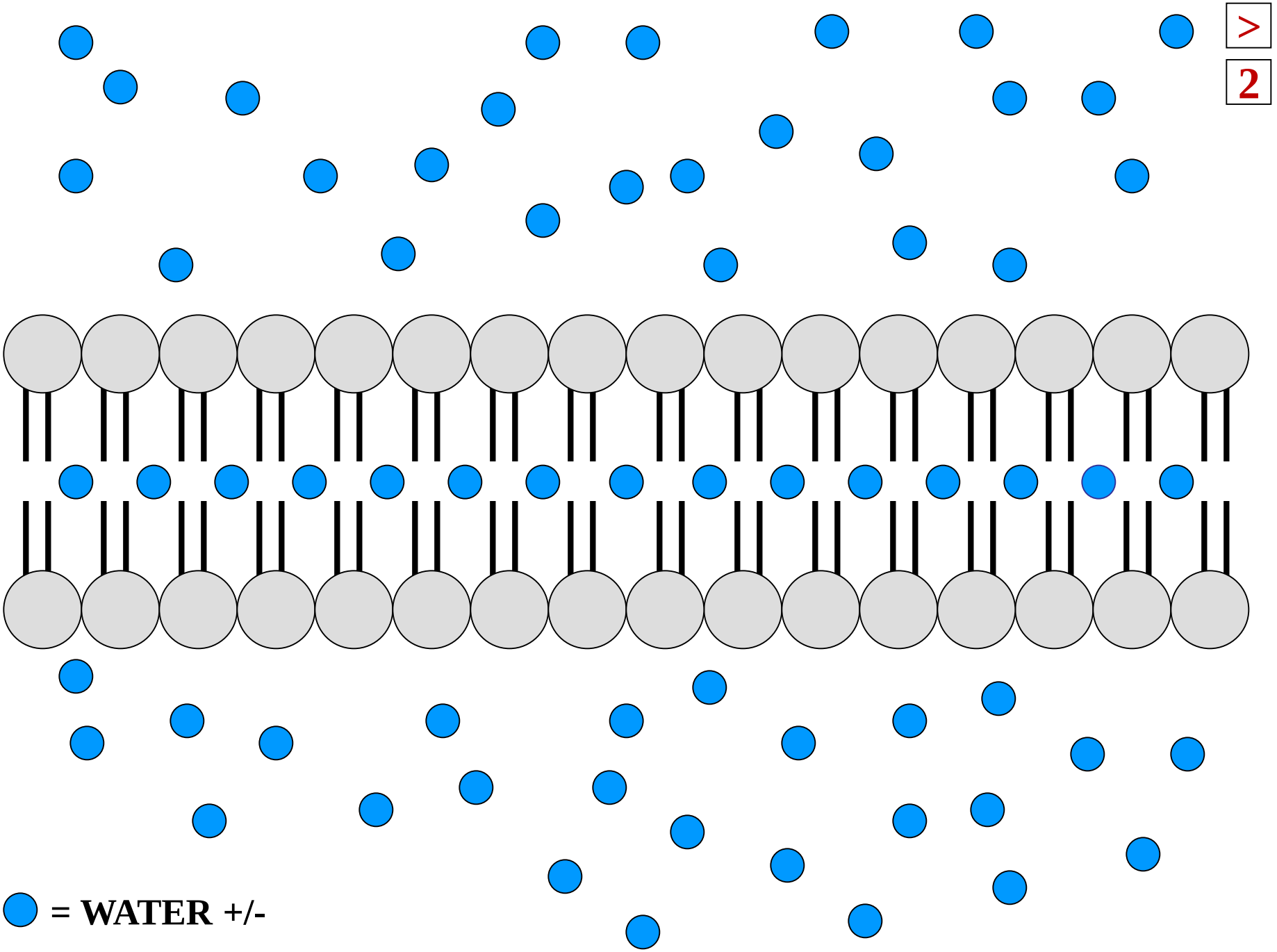
= POLAR SOLUTE +/-



= WATER +/-

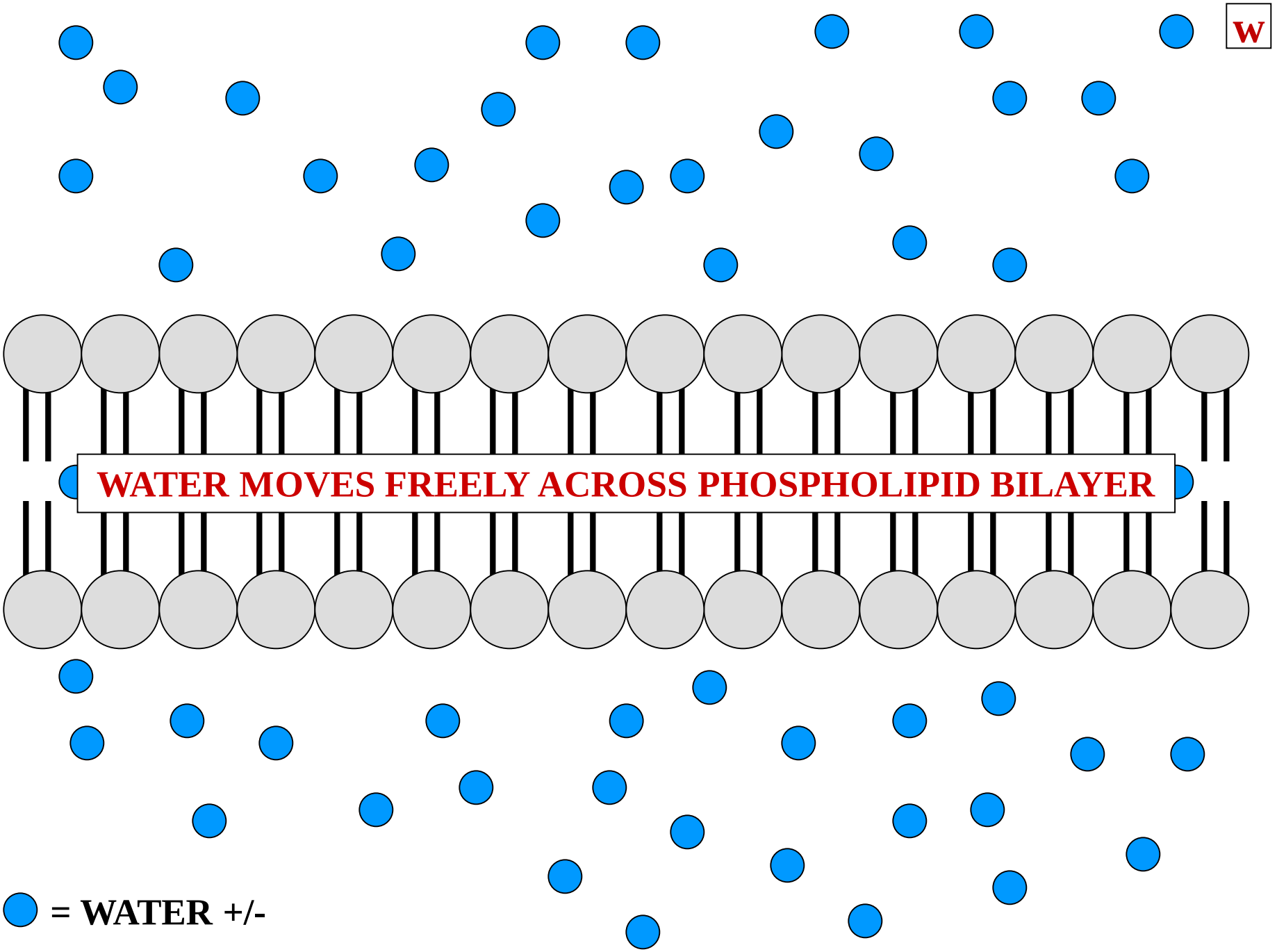


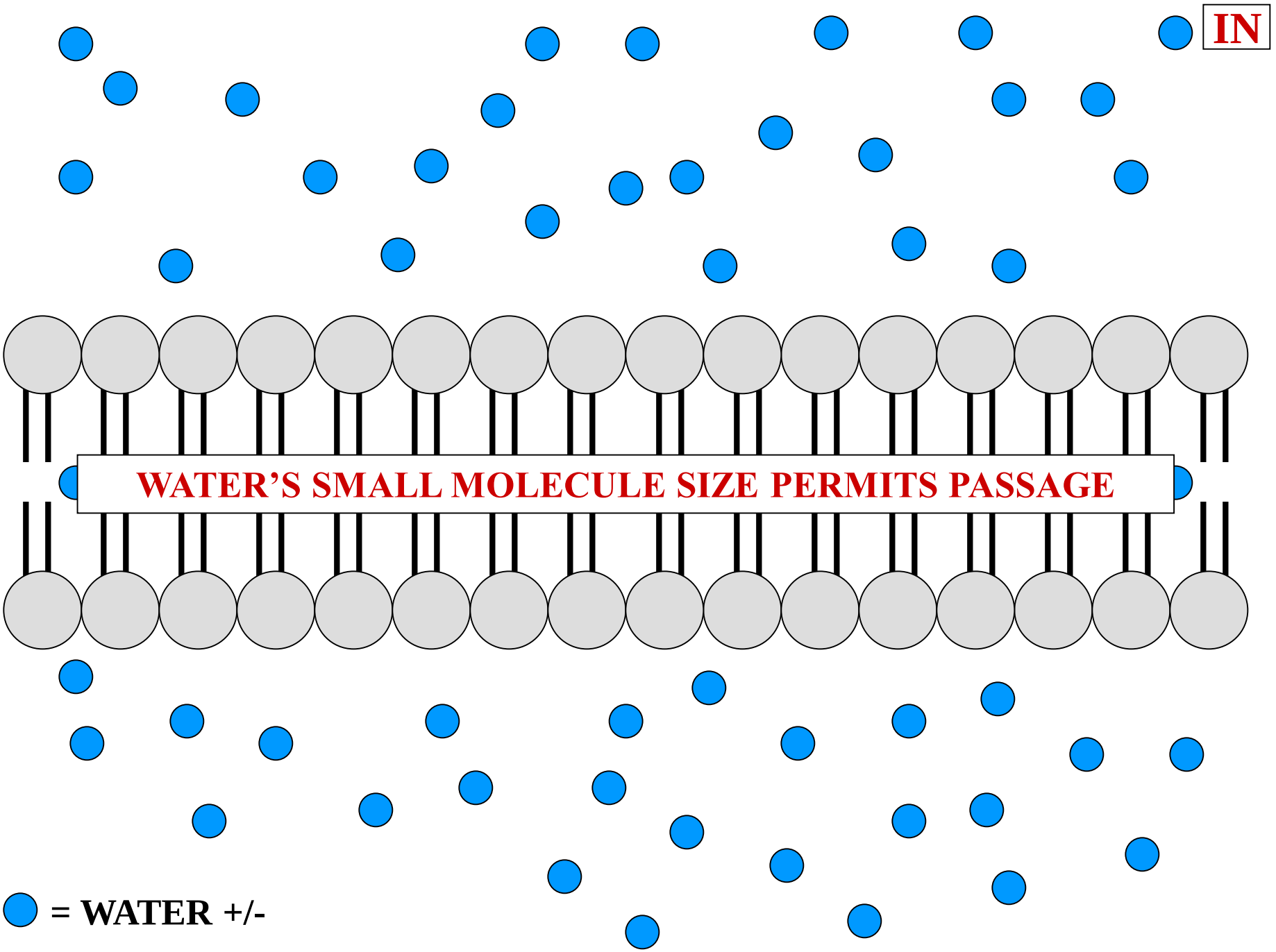
= WATER +/-

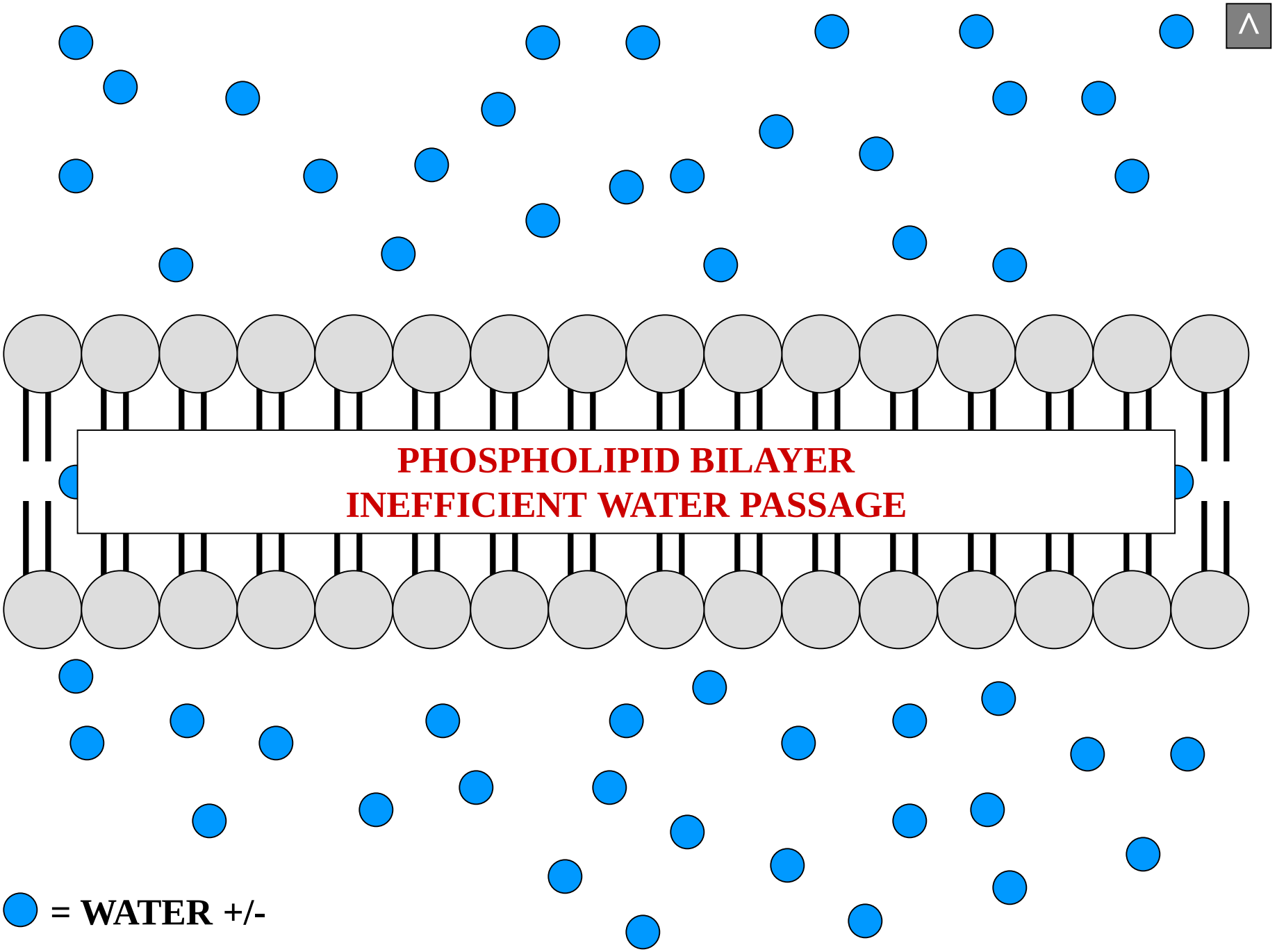


2

= WATER +/-

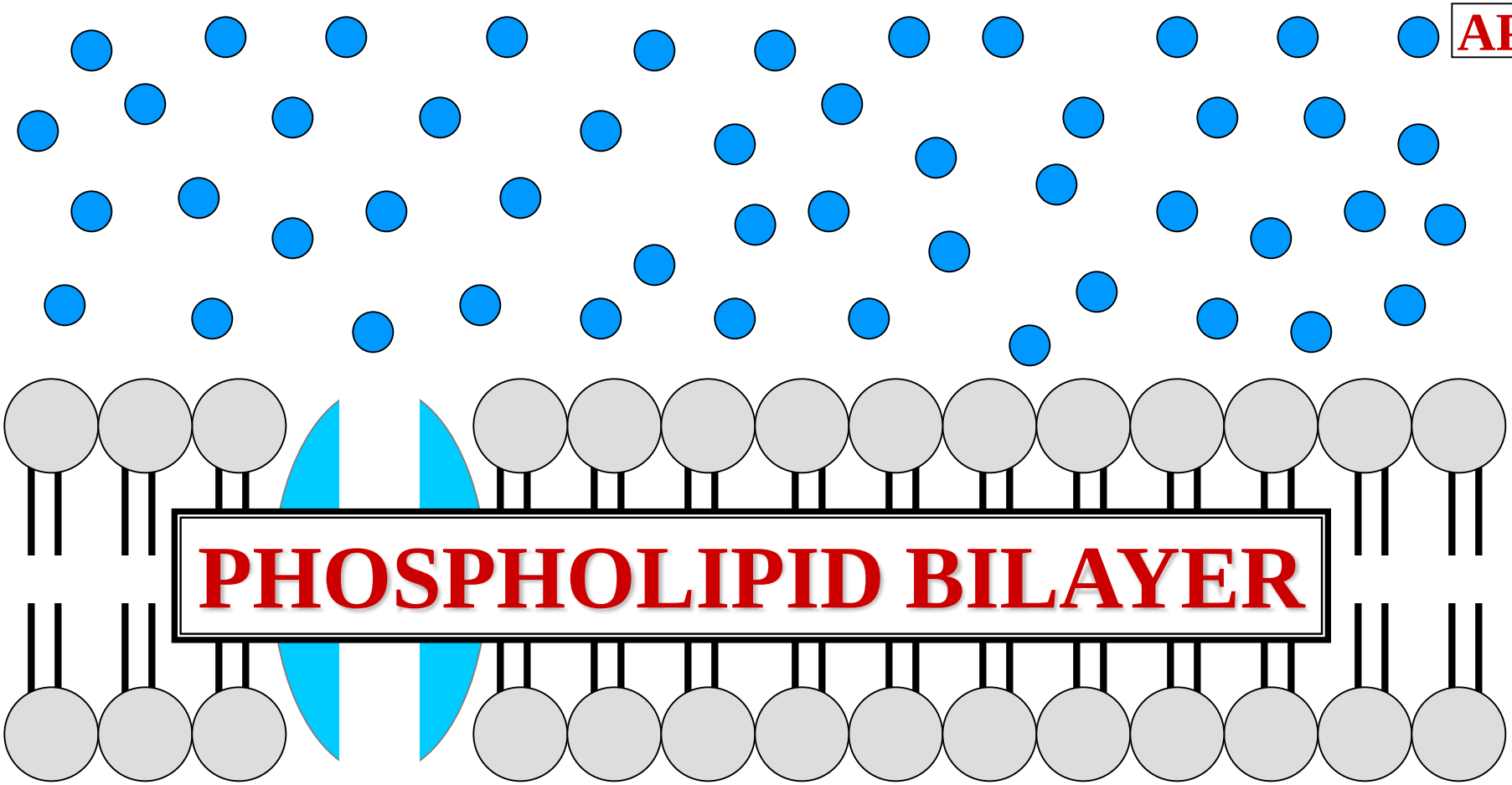

W
WATER MOVES FREELY ACROSS PHOSPHOLIPID BILAYER
= WATER +/-


IN
WATER'S SMALL MOLECULE SIZE PERMITS PASSAGE
= WATER +/-

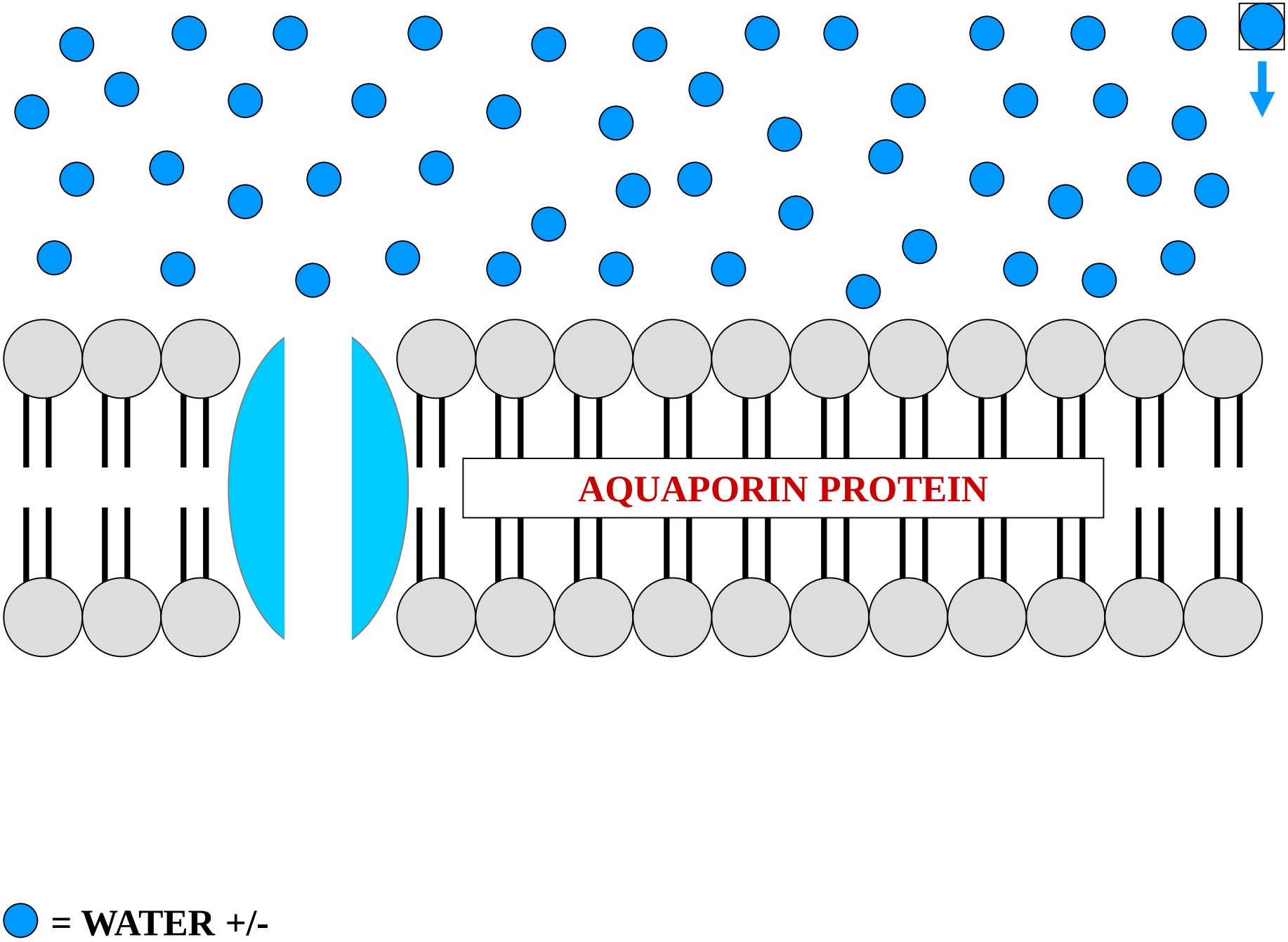

PHOSPHOLIPID BILAYER
INEFFICIENT WATER PASSAGE
= WATER +/-

AQUAPORIN PROTEINS

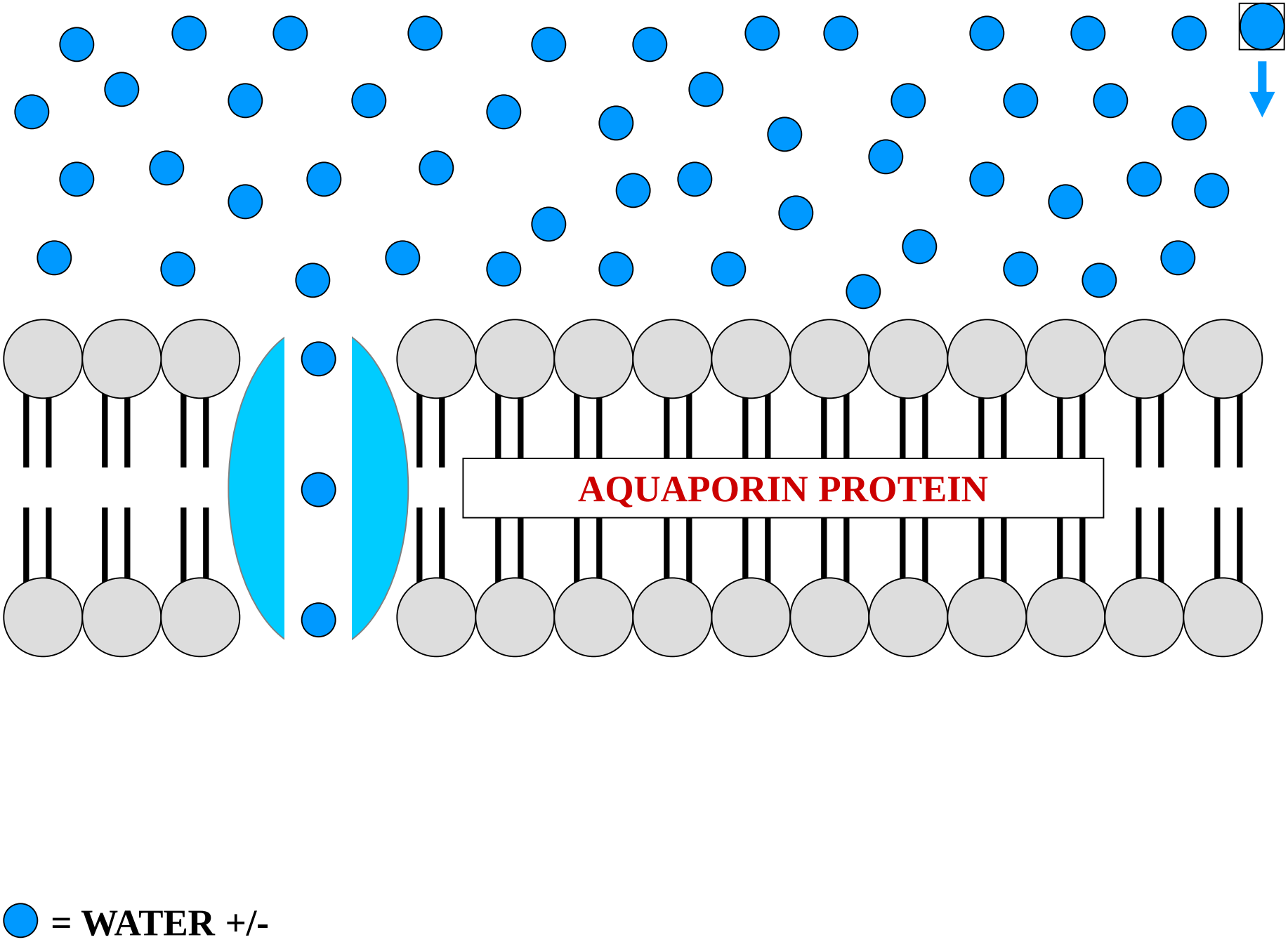
AP



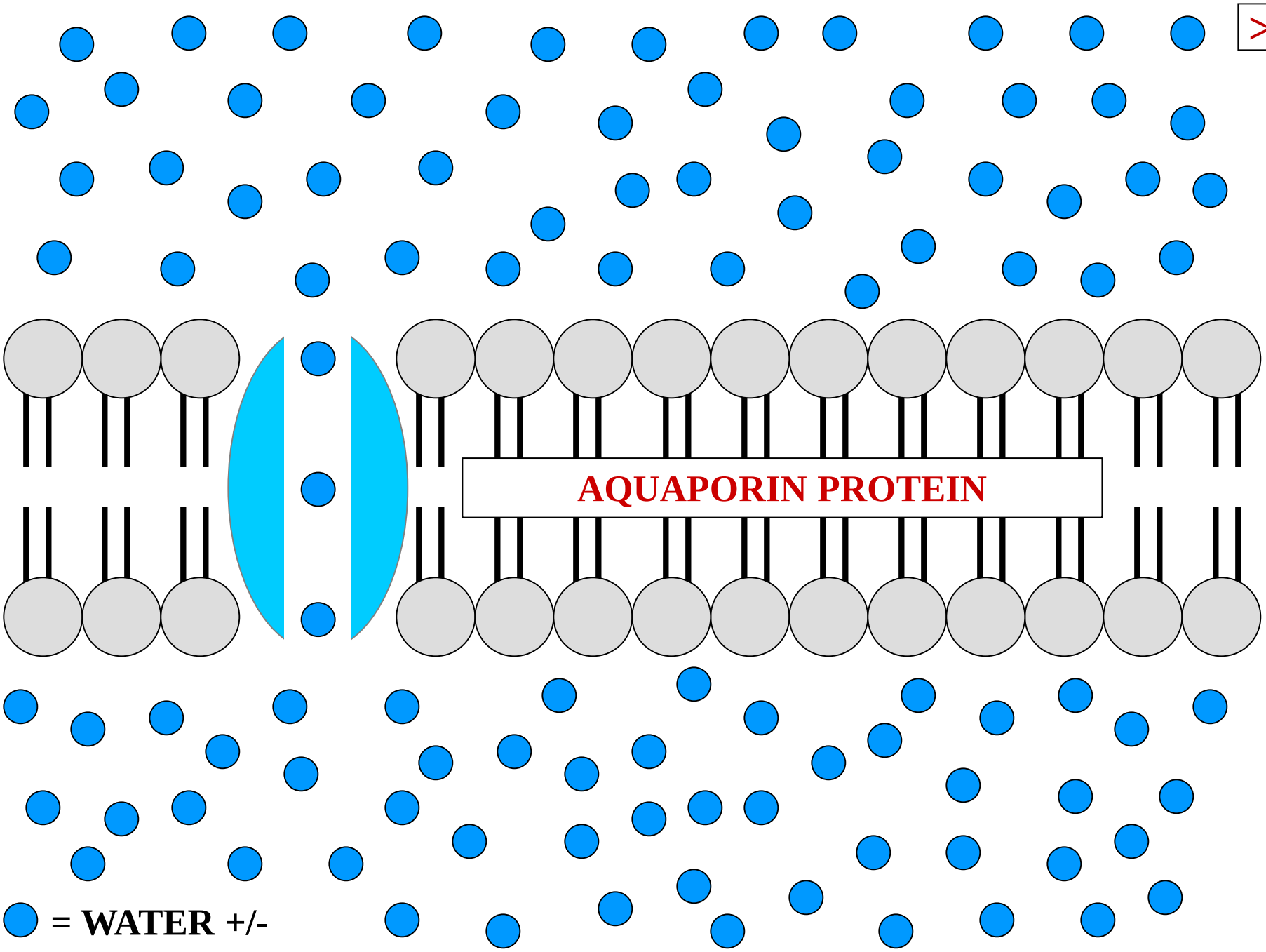
= WATER +/-

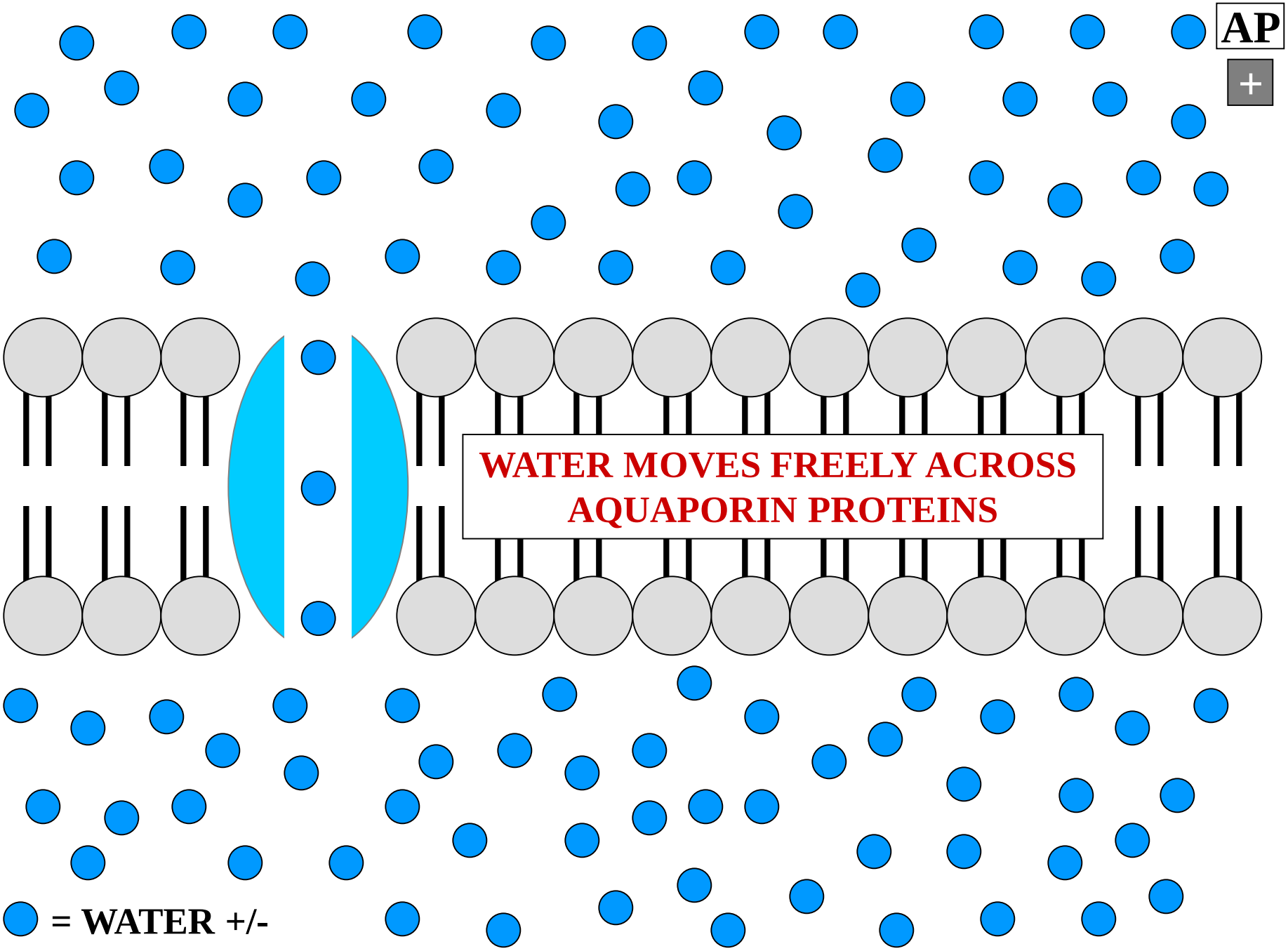


= WATER +/-



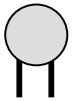
= WATER +/-


AQUAPORIN PROTEIN
= WATER +/-


AP
+
WATER MOVES FREELY ACROSS AQUAPORIN PROTEINS
= WATER +/-

AQUAPORIN PROTEIN

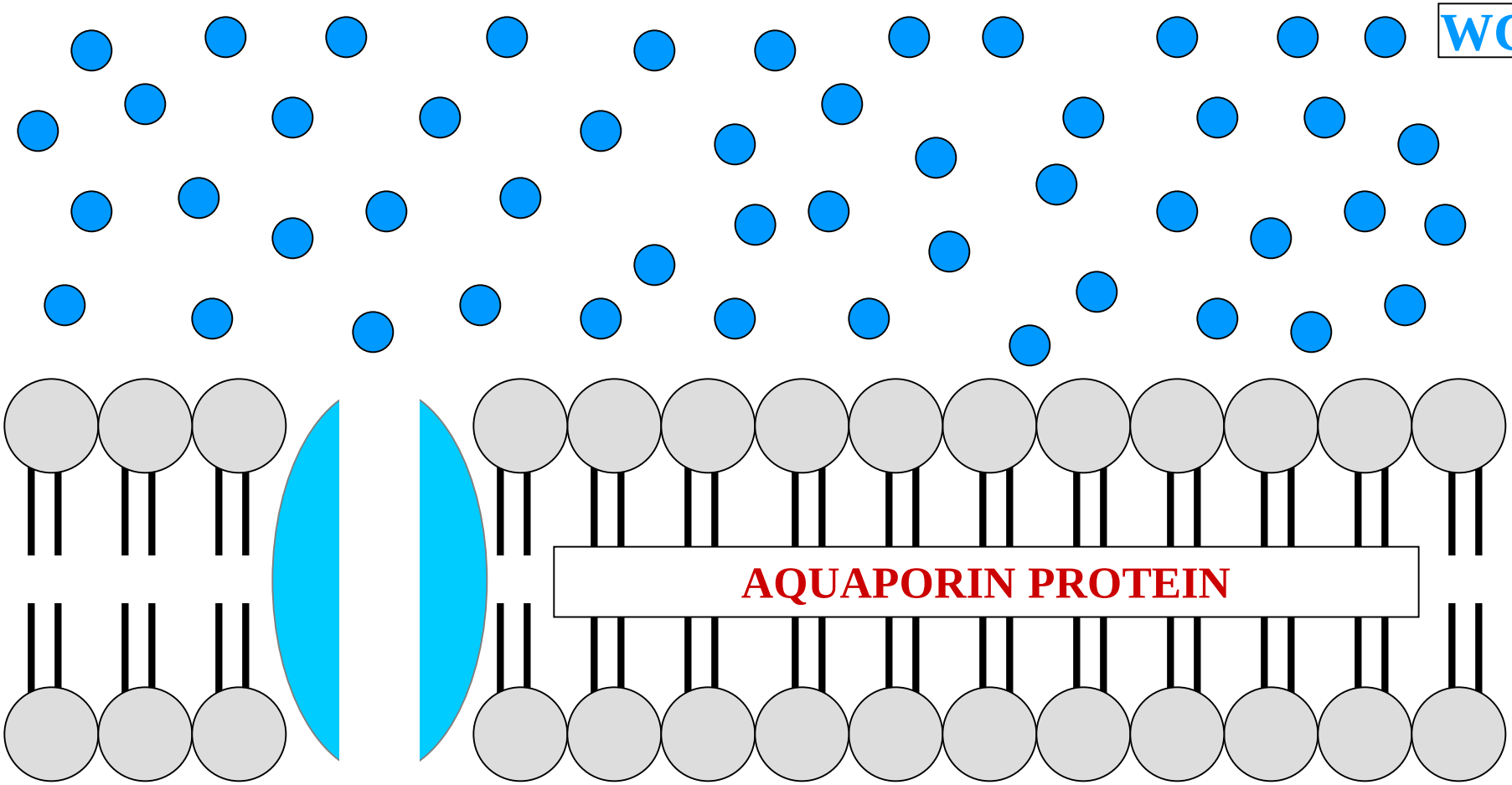
AQUAPORIN PROTEIN



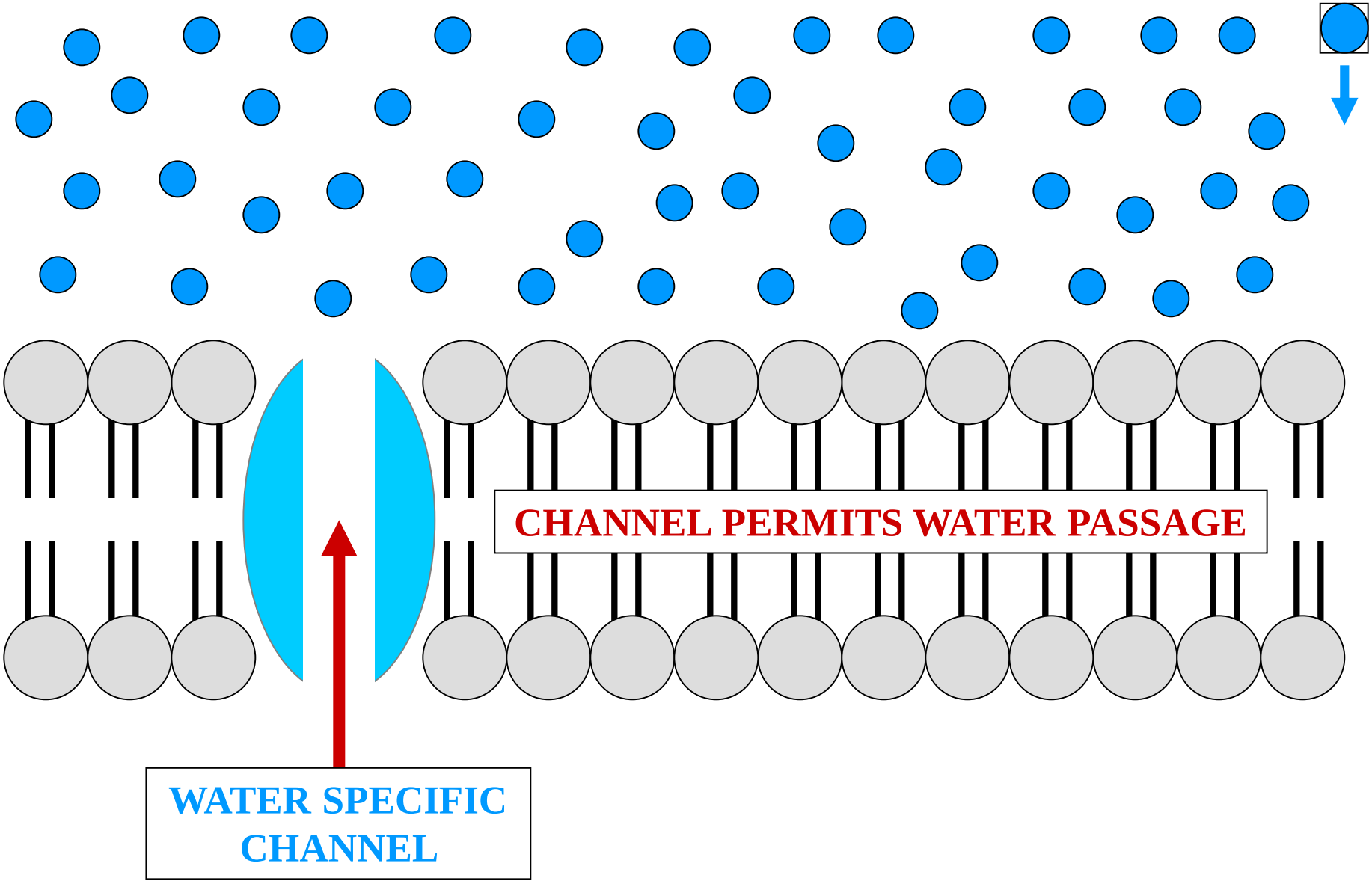
WATER SPECIFIC CHANNEL PROTEIN

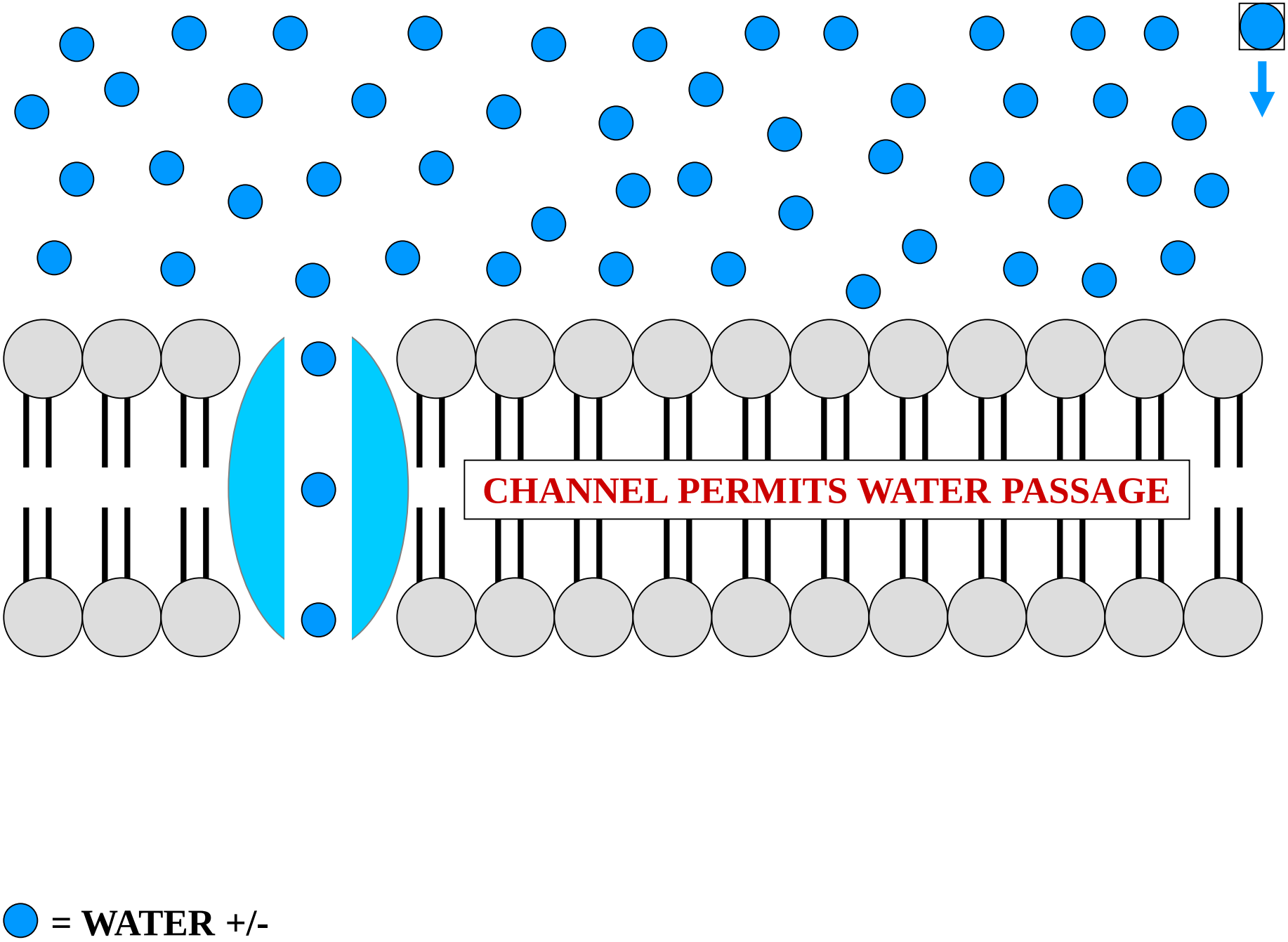
AQUAPORIN PROTEIN

WC



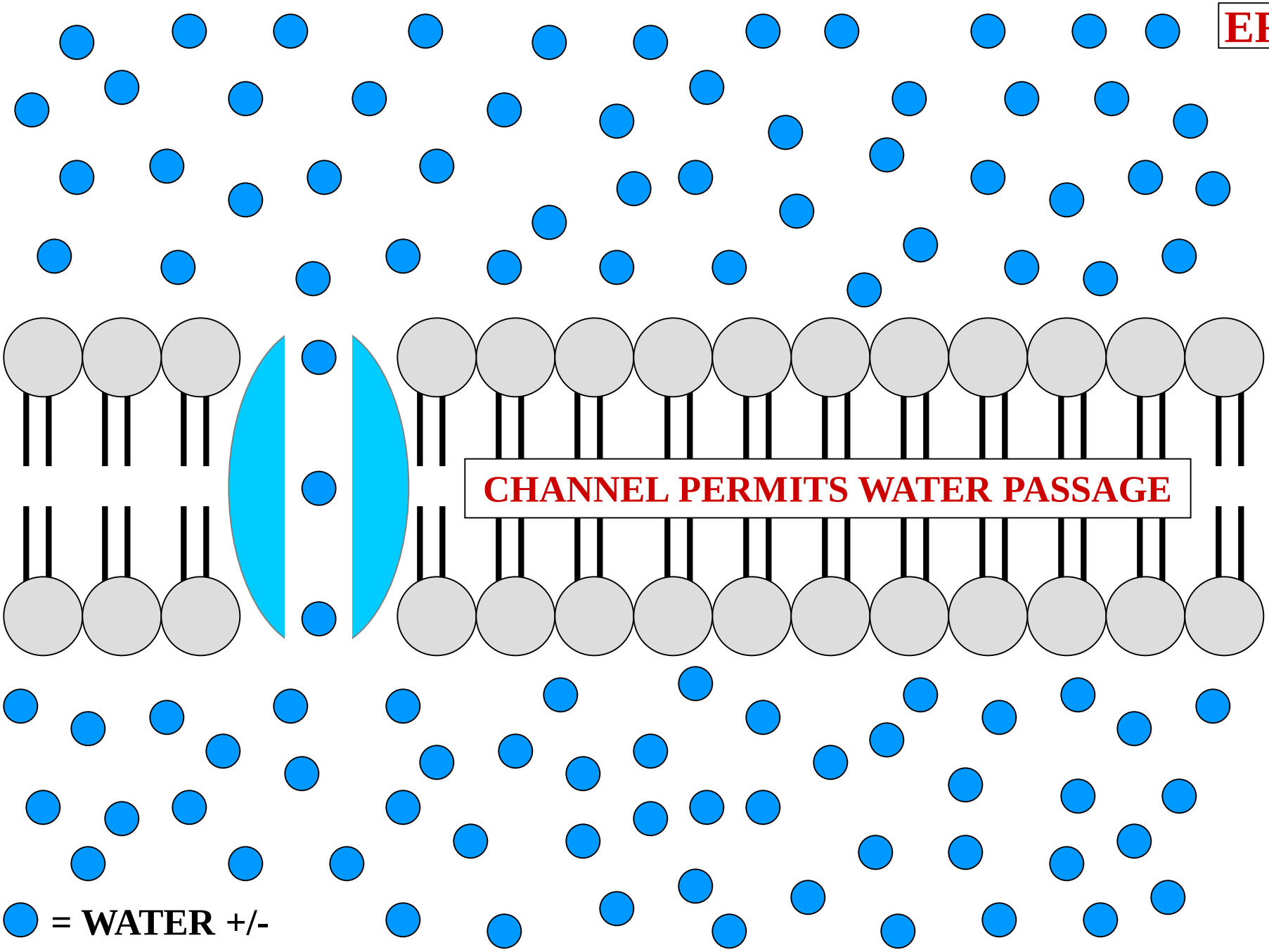
= WATER +/-

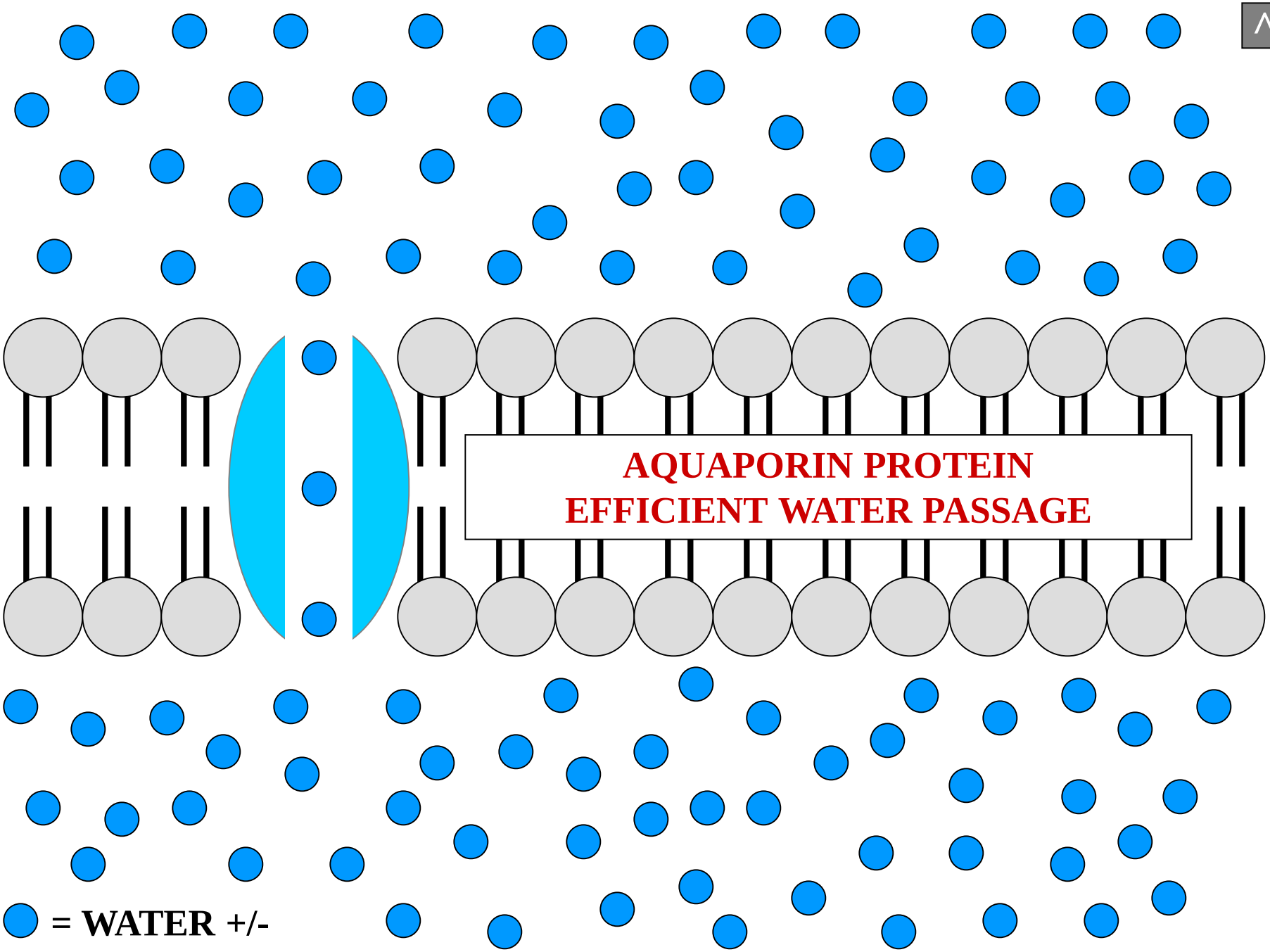

CHANNEL PERMITS WATER PASSAGE
WATER SPECIFIC CHANNEL
= WATER +/-



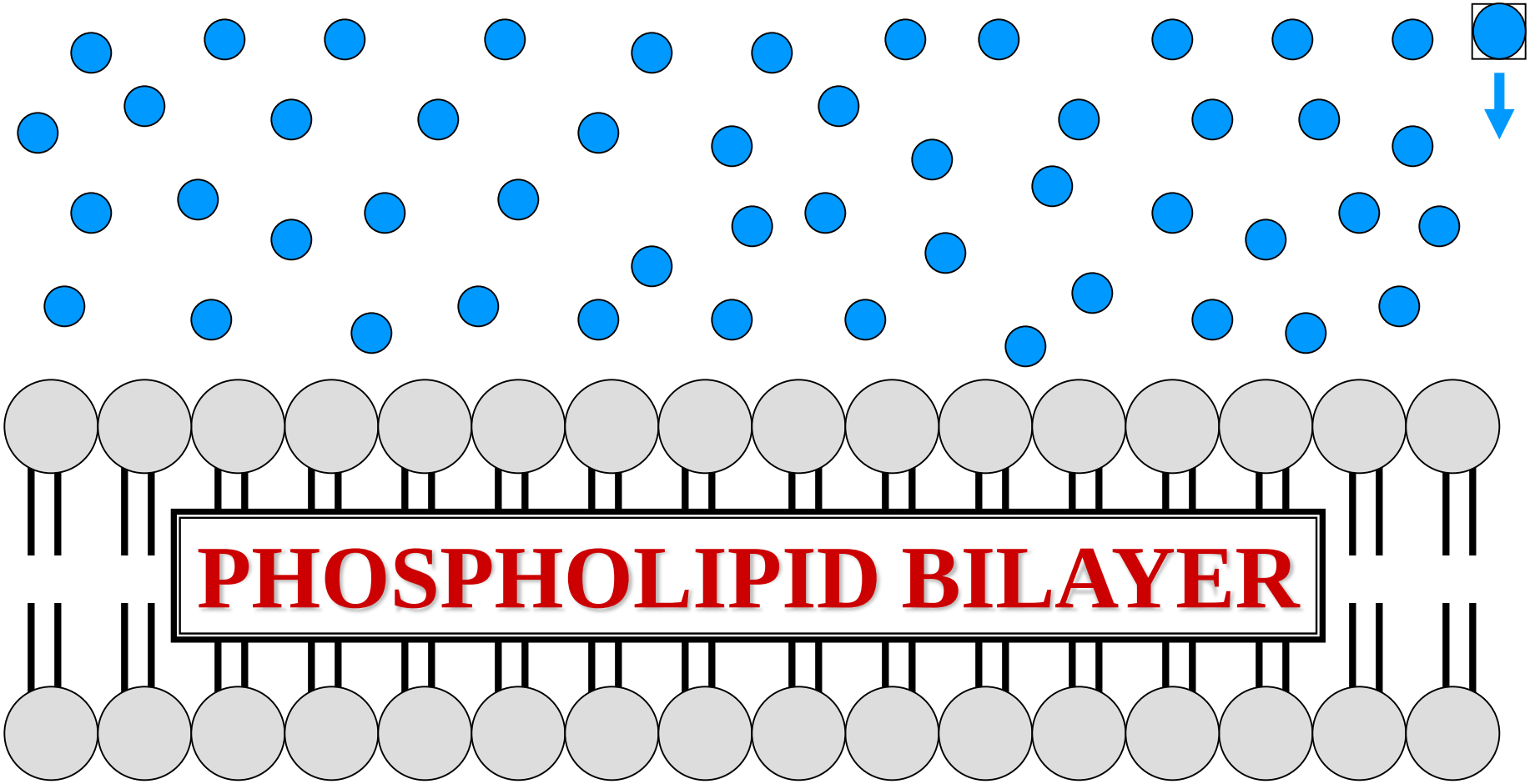
= WATER +/-

EF

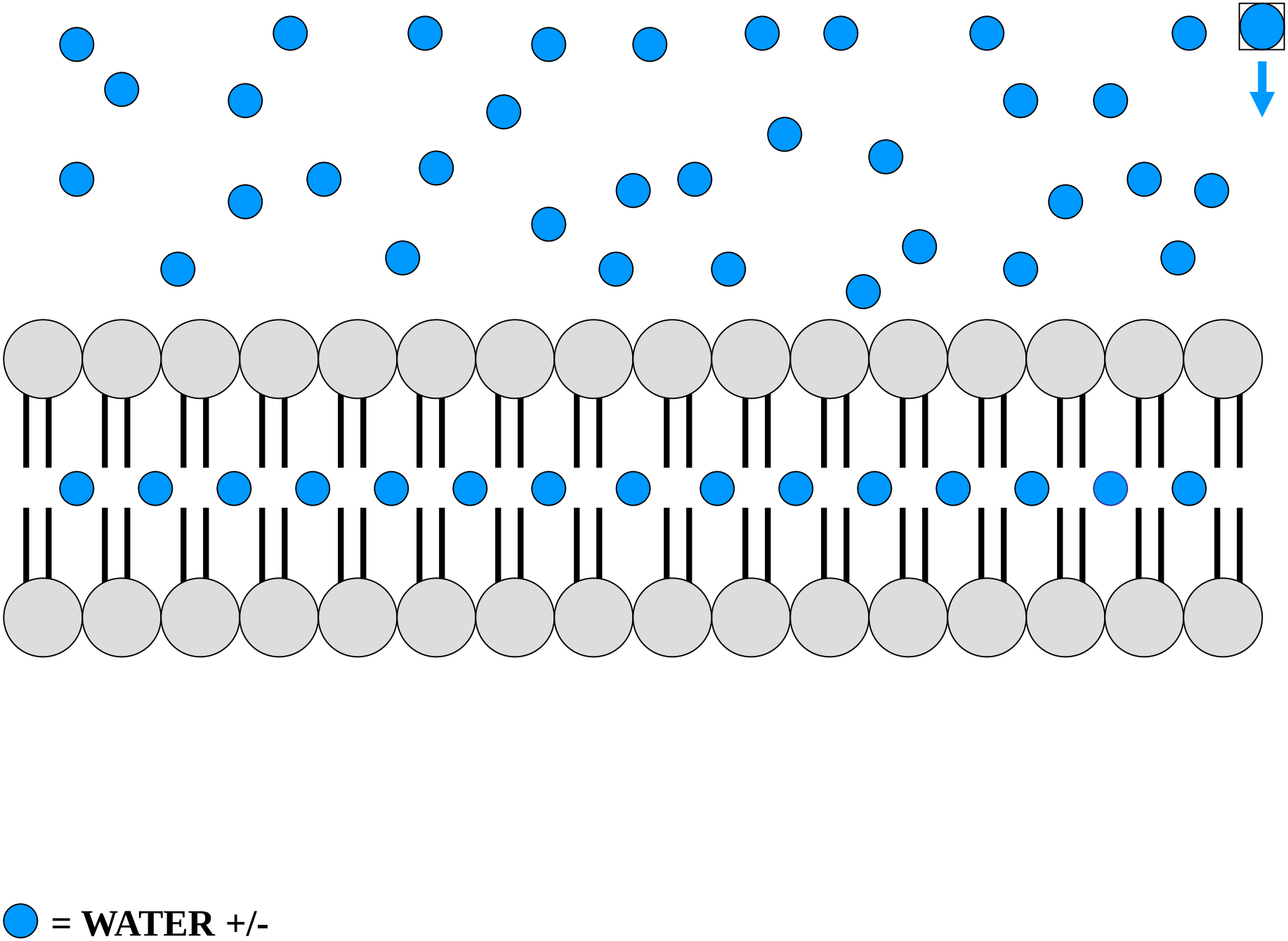



AQUAPORIN PROTEIN
EFFICIENT WATER PASSAGE
= WATER +/-

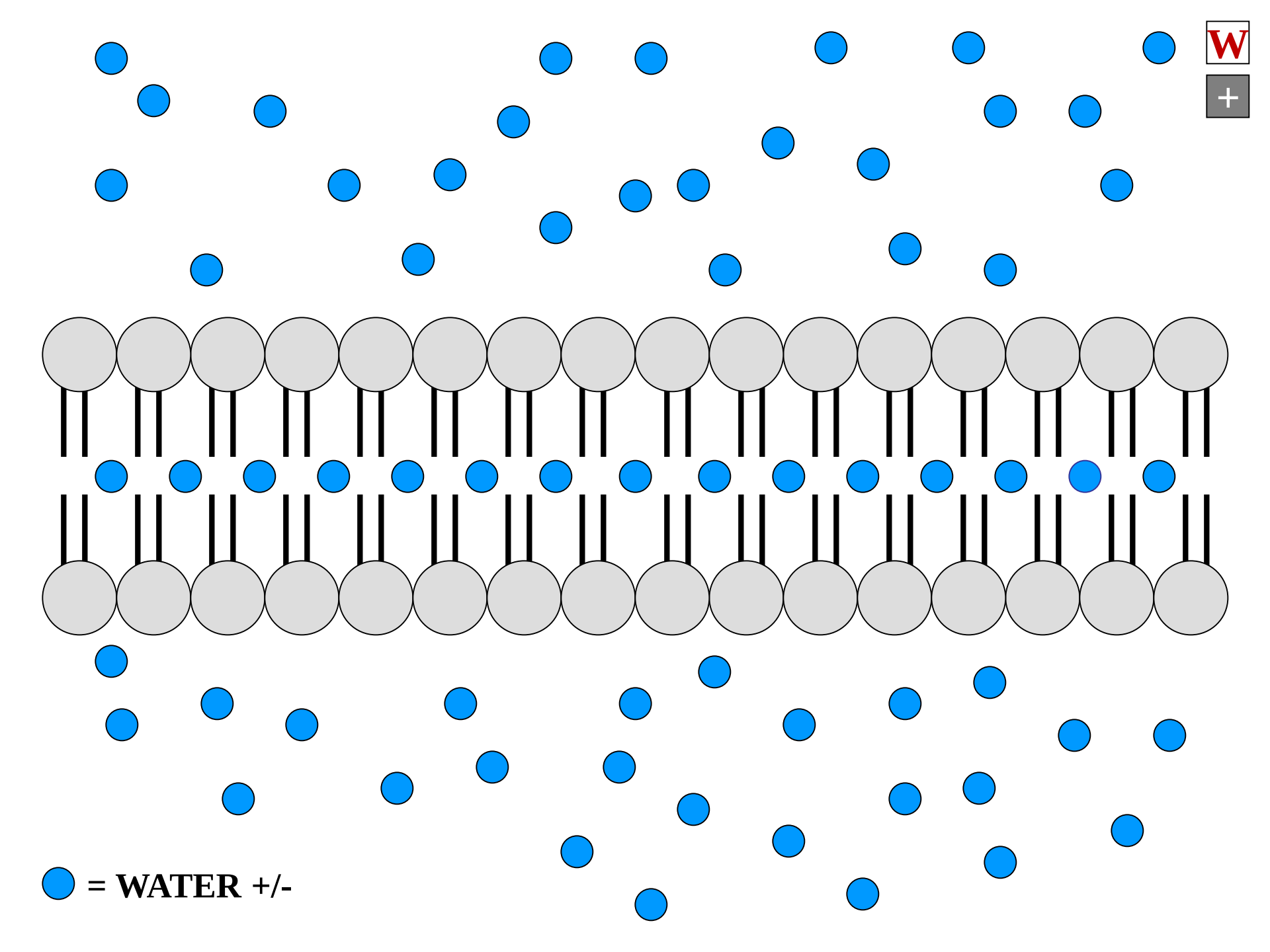
WATER MEMBRANE TRANSPORT SUMMARY

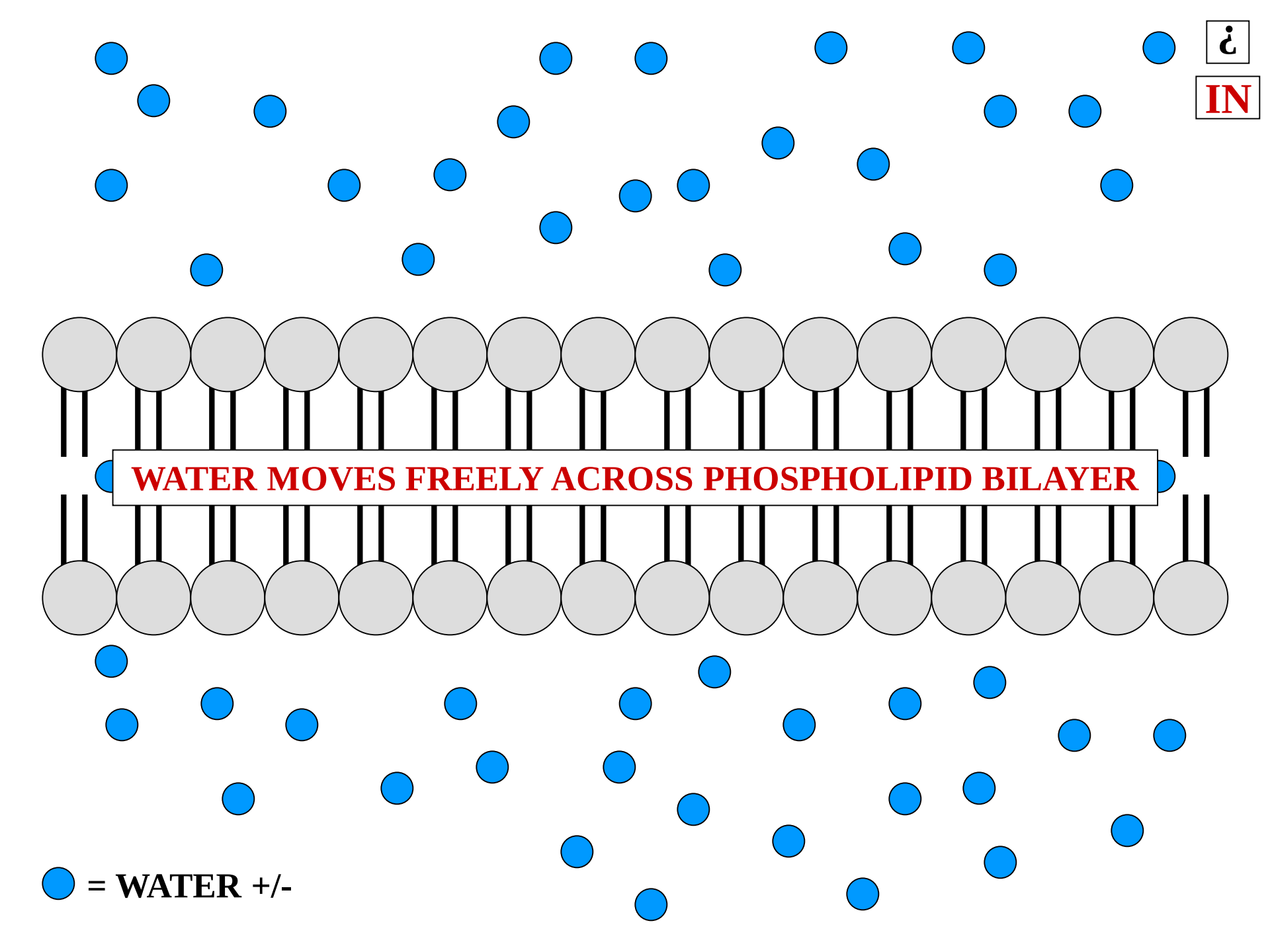


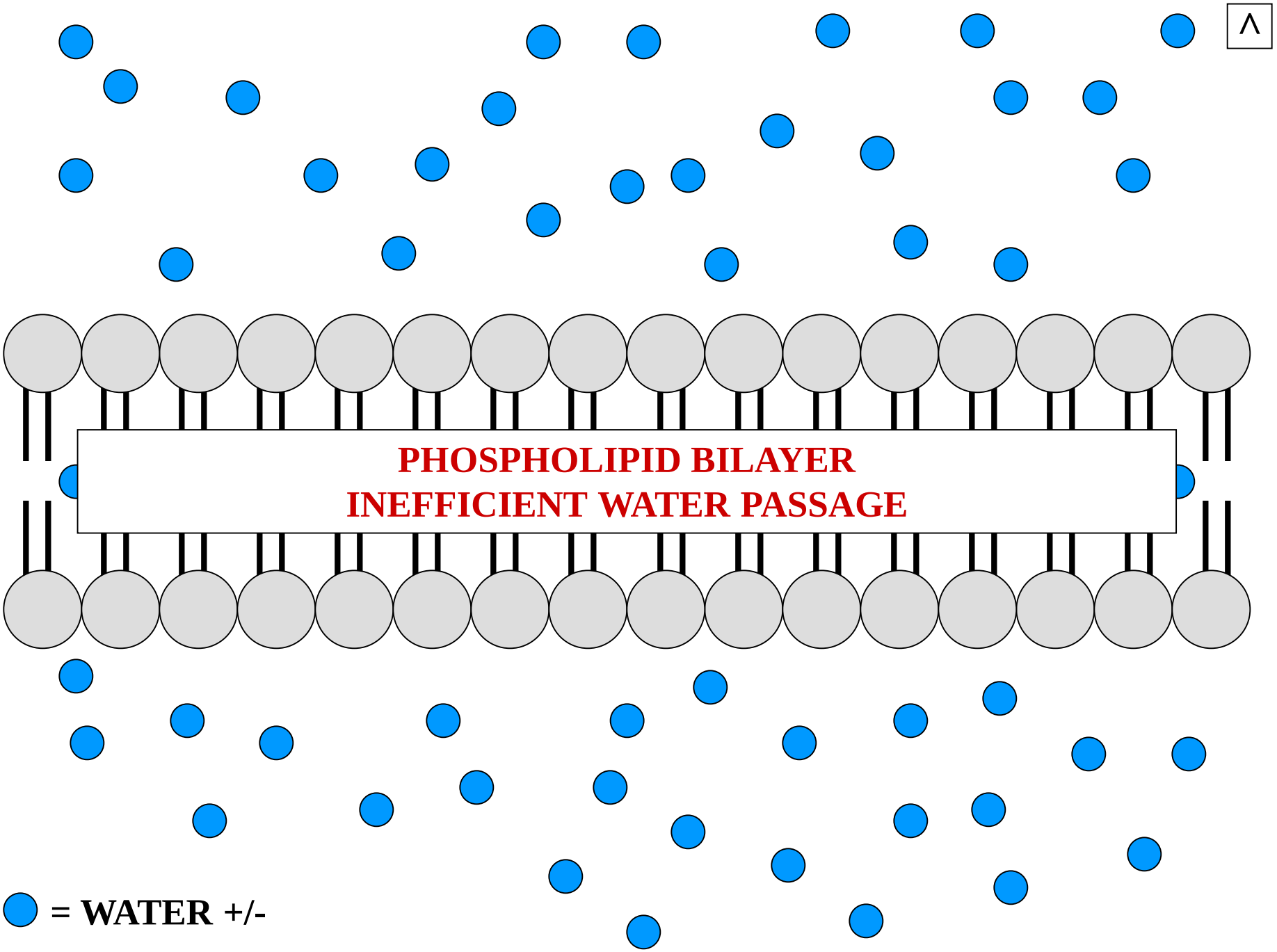
= WATER +/-

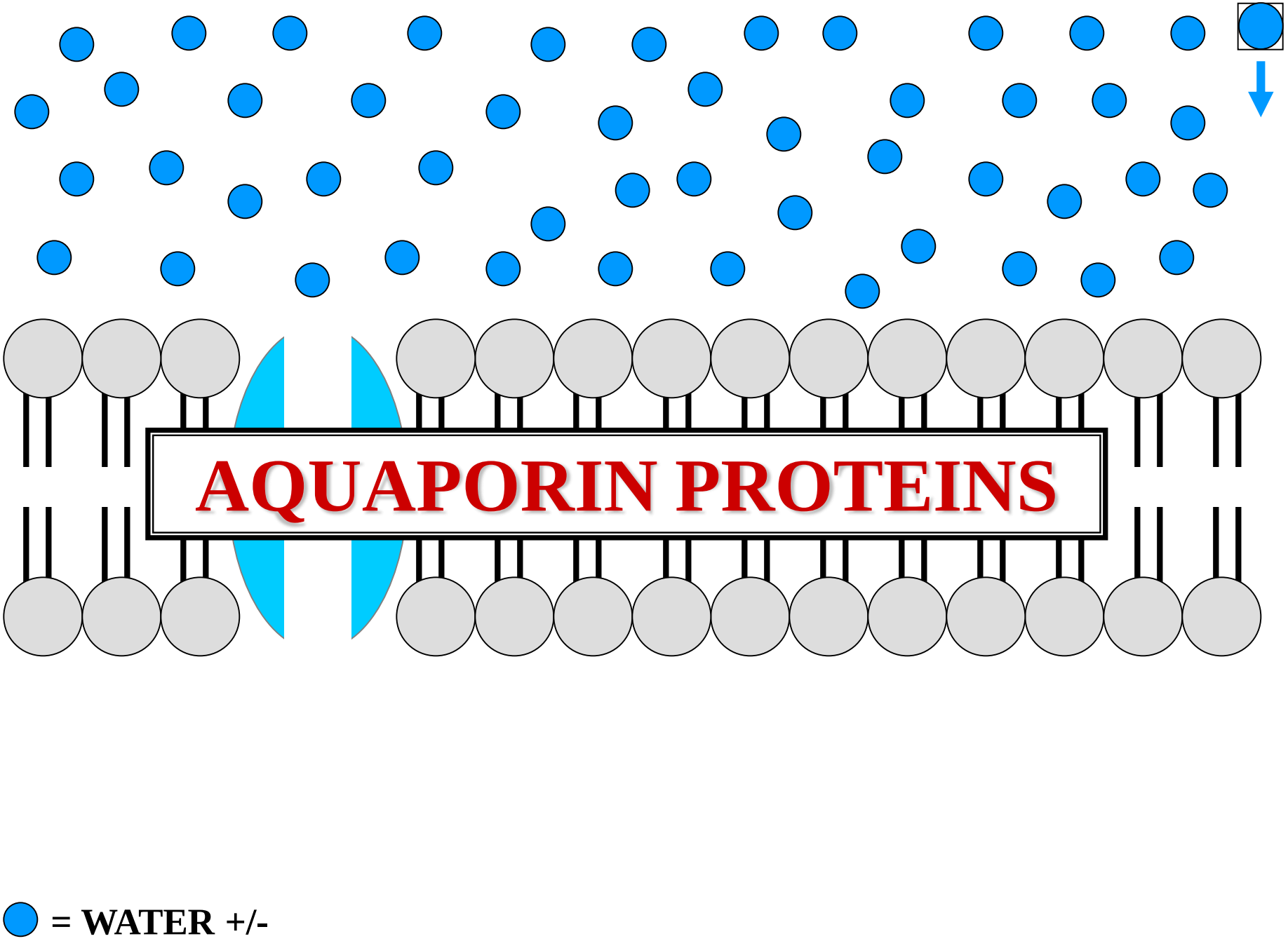


= WATER +/-

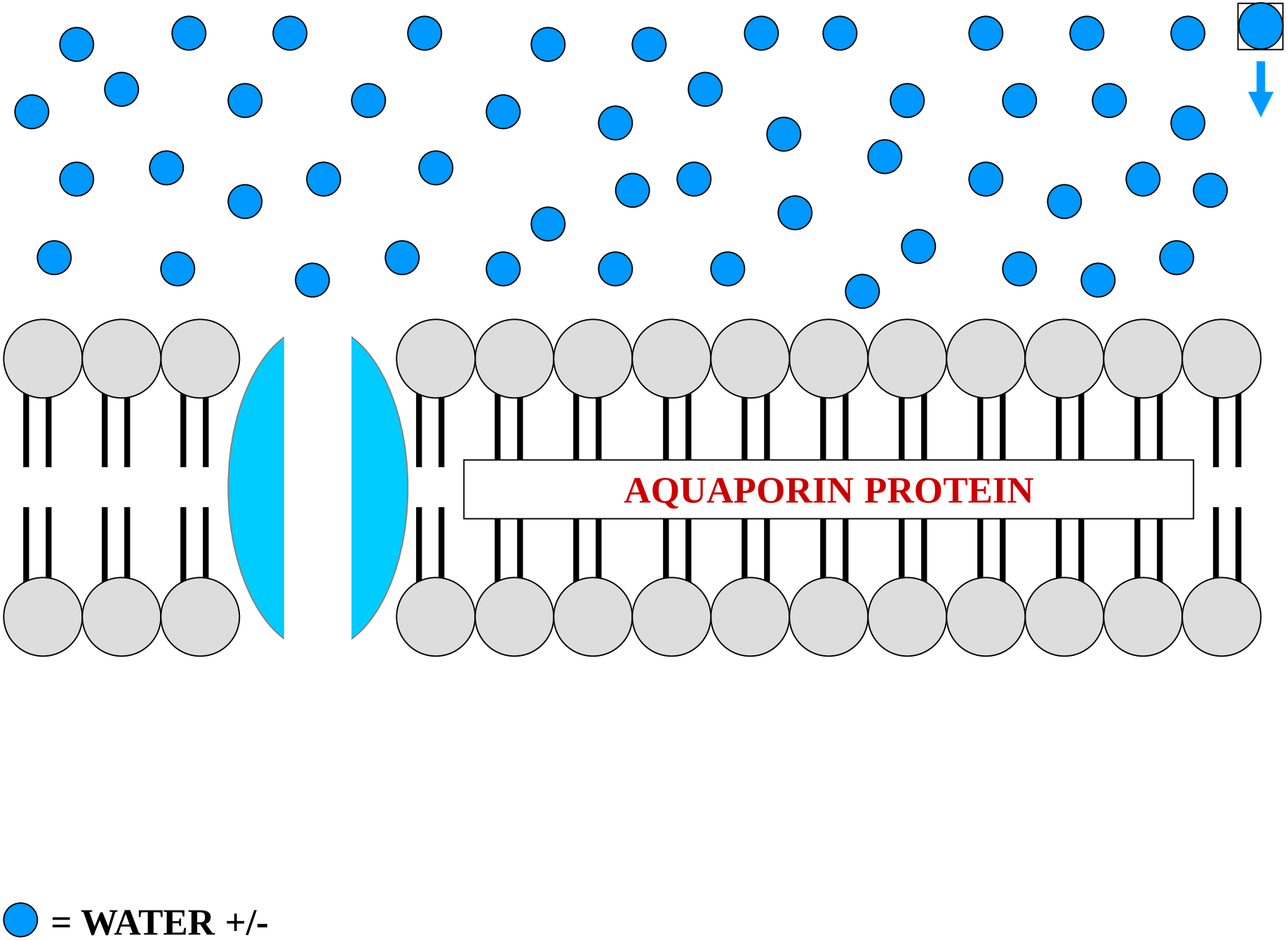

W
+
= WATER +/-


¿
IN
WATER MOVES FREELY ACROSS PHOSPHOLIPID BILAYER
= WATER +/-

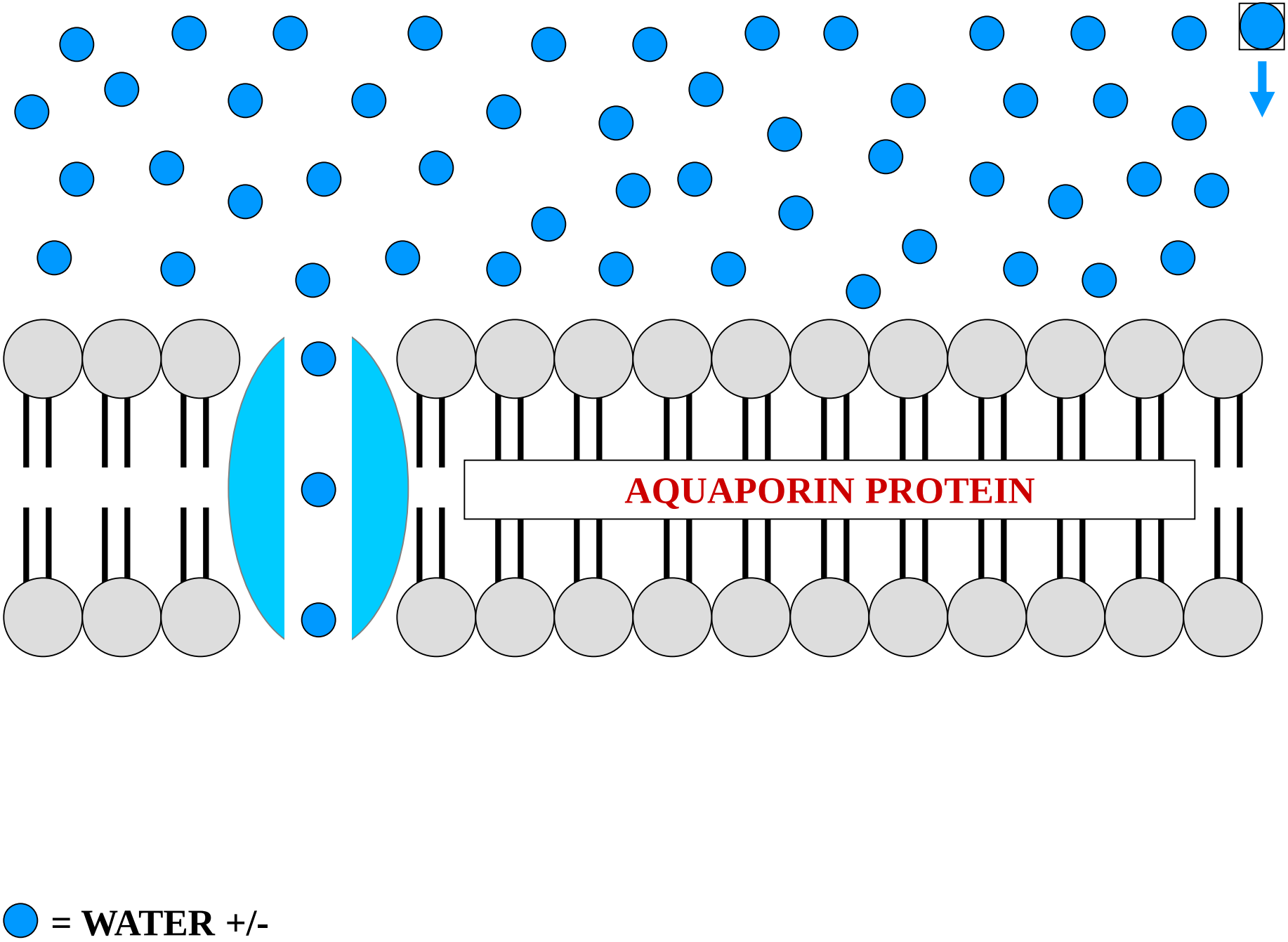

PHOSPHOLIPID BILAYER
INEFFICIENT WATER PASSAGE
= WATER +/-



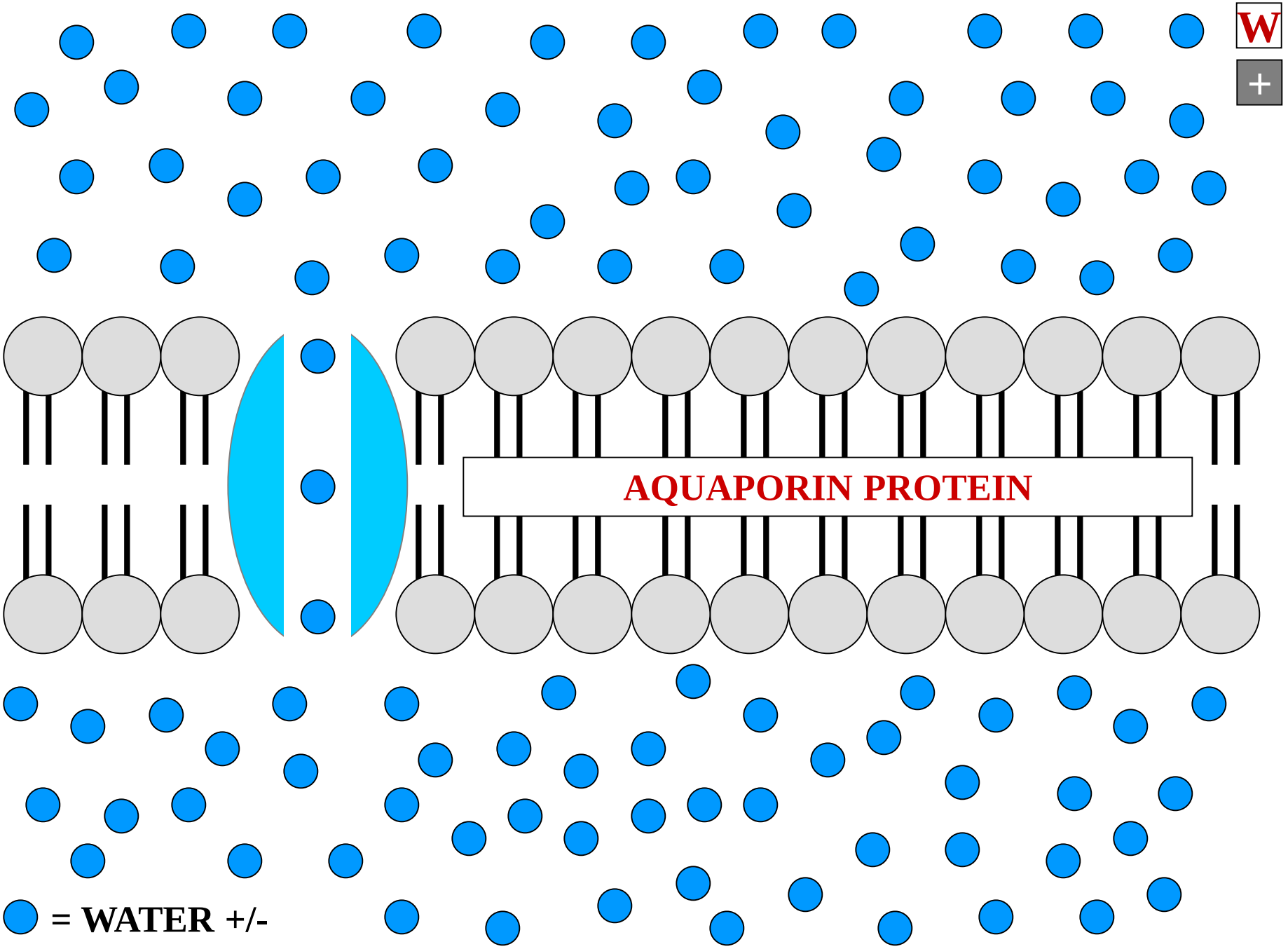
= WATER +/-

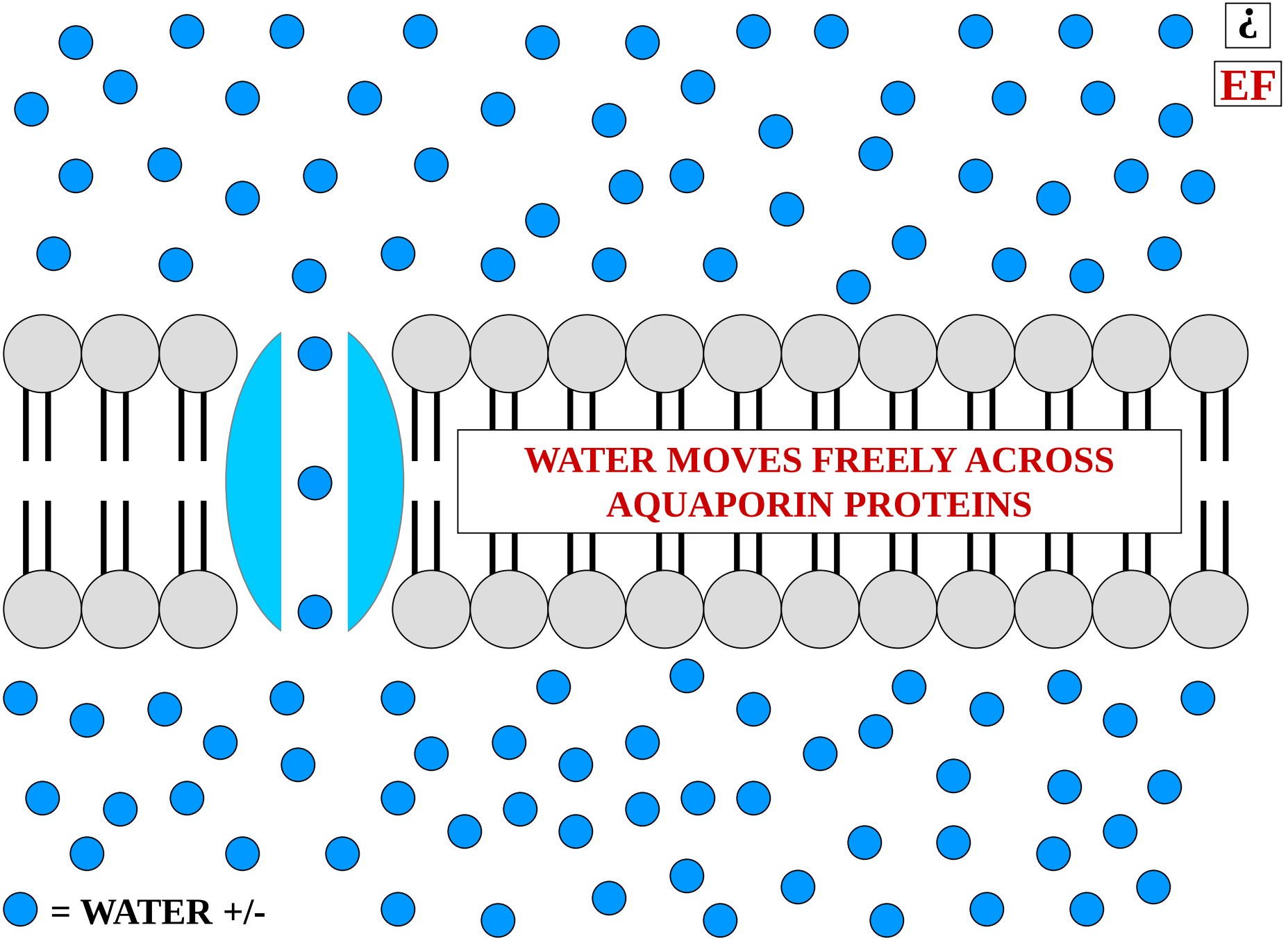


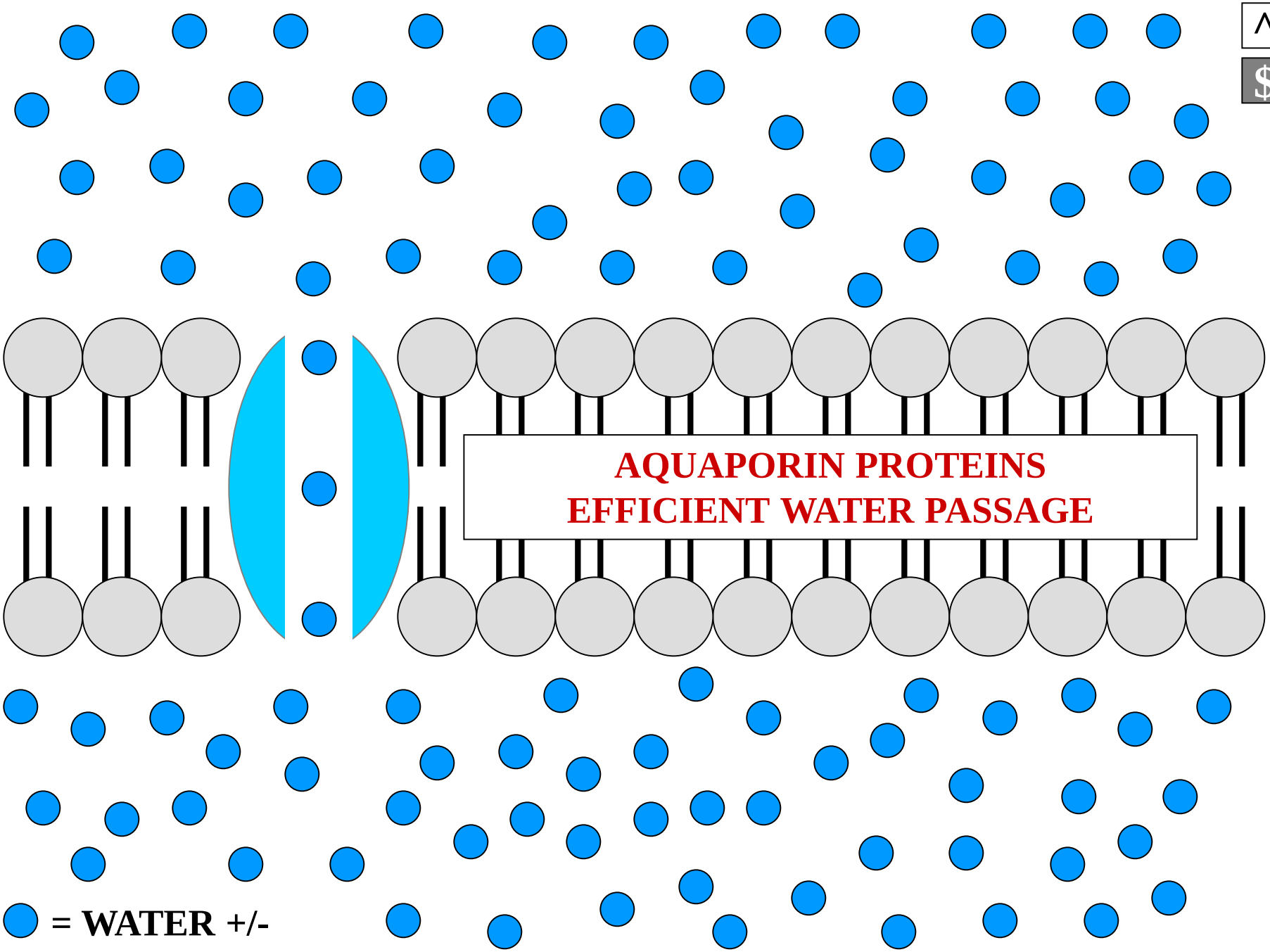
= WATER +/-

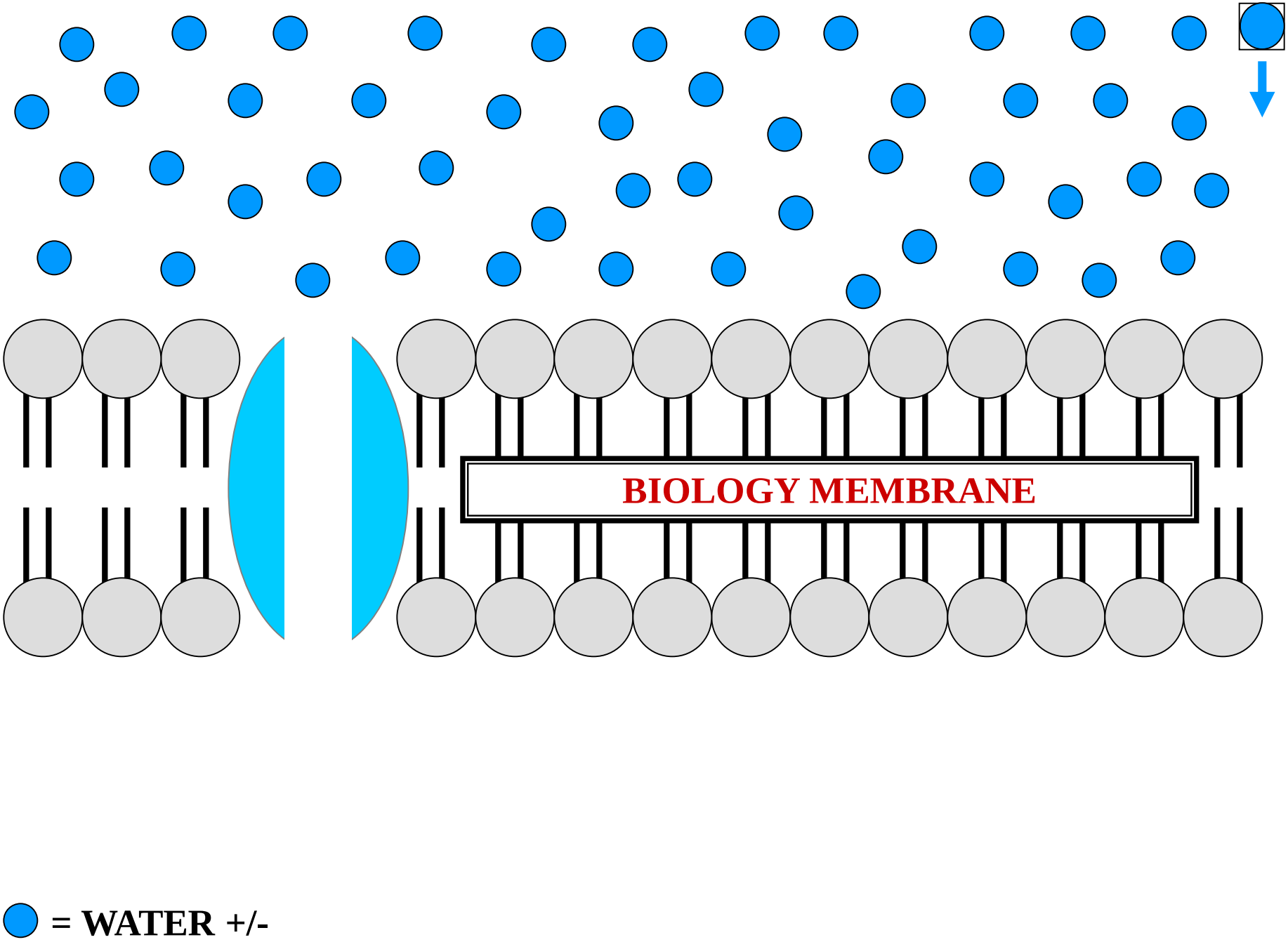


= WATER +/-

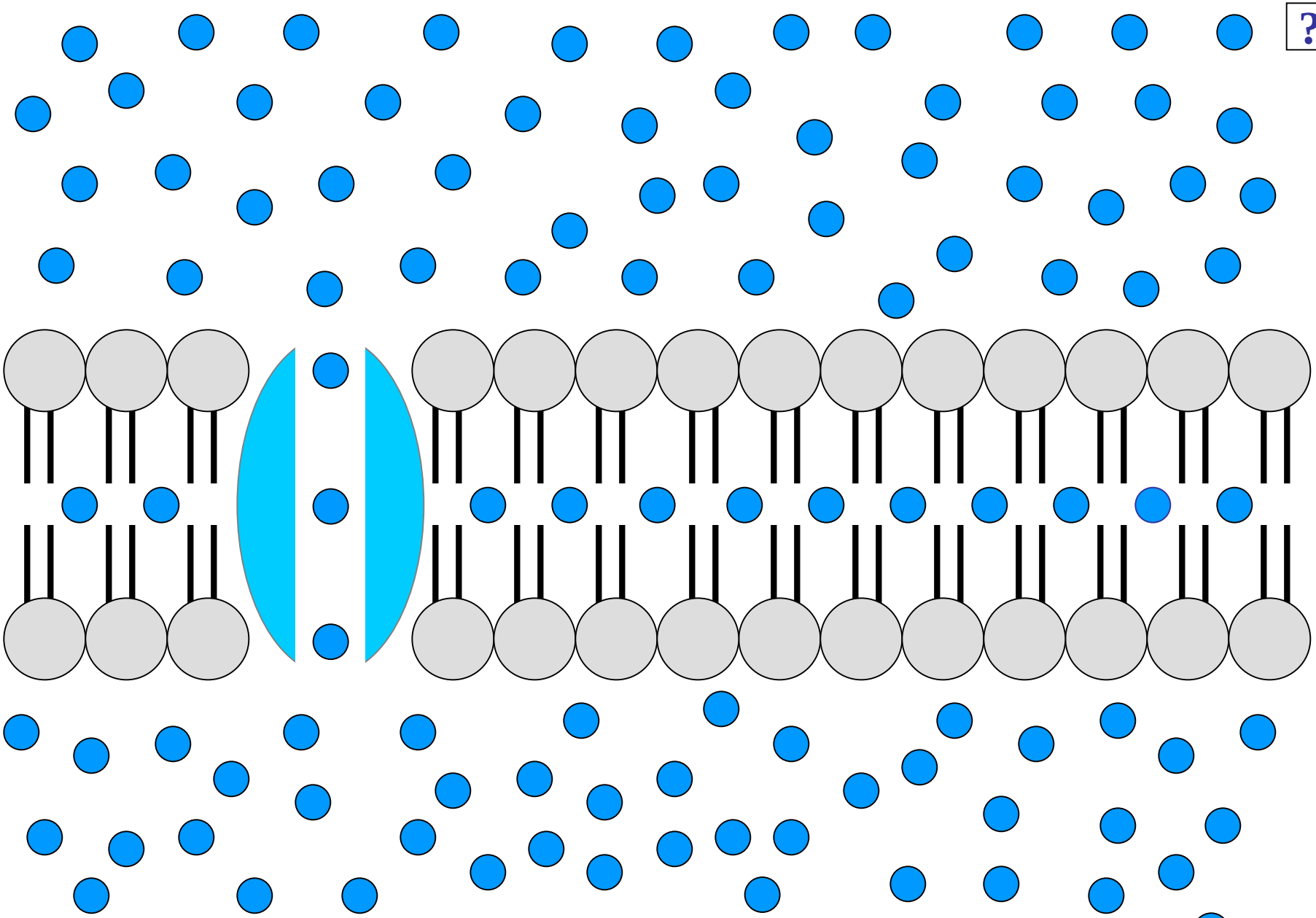

W
+
AQUAPORIN PROTEIN
= WATER +/-


¿
EF
WATER MOVES FREELY ACROSS
AQUAPORIN PROTEINS
= WATER +/-


AQUAPORIN PROTEINS
EFFICIENT WATER PASSAGE
= WATER +/-



= WATER +/-



WATER MOVES FREELY ACROSS BIOLOGY MEMBRANE

QUESTION

A

WHAT DO BIOLOGISTS CALL WATER PASSAGE ACROSS A BIO-MEMBRANE IN RESPONSE TO SOLUTE CONCENTRATION?

QUESTION

ANSWER

OSMOSIS

ANSWER

O

OSMOSIS

OSMOSIS

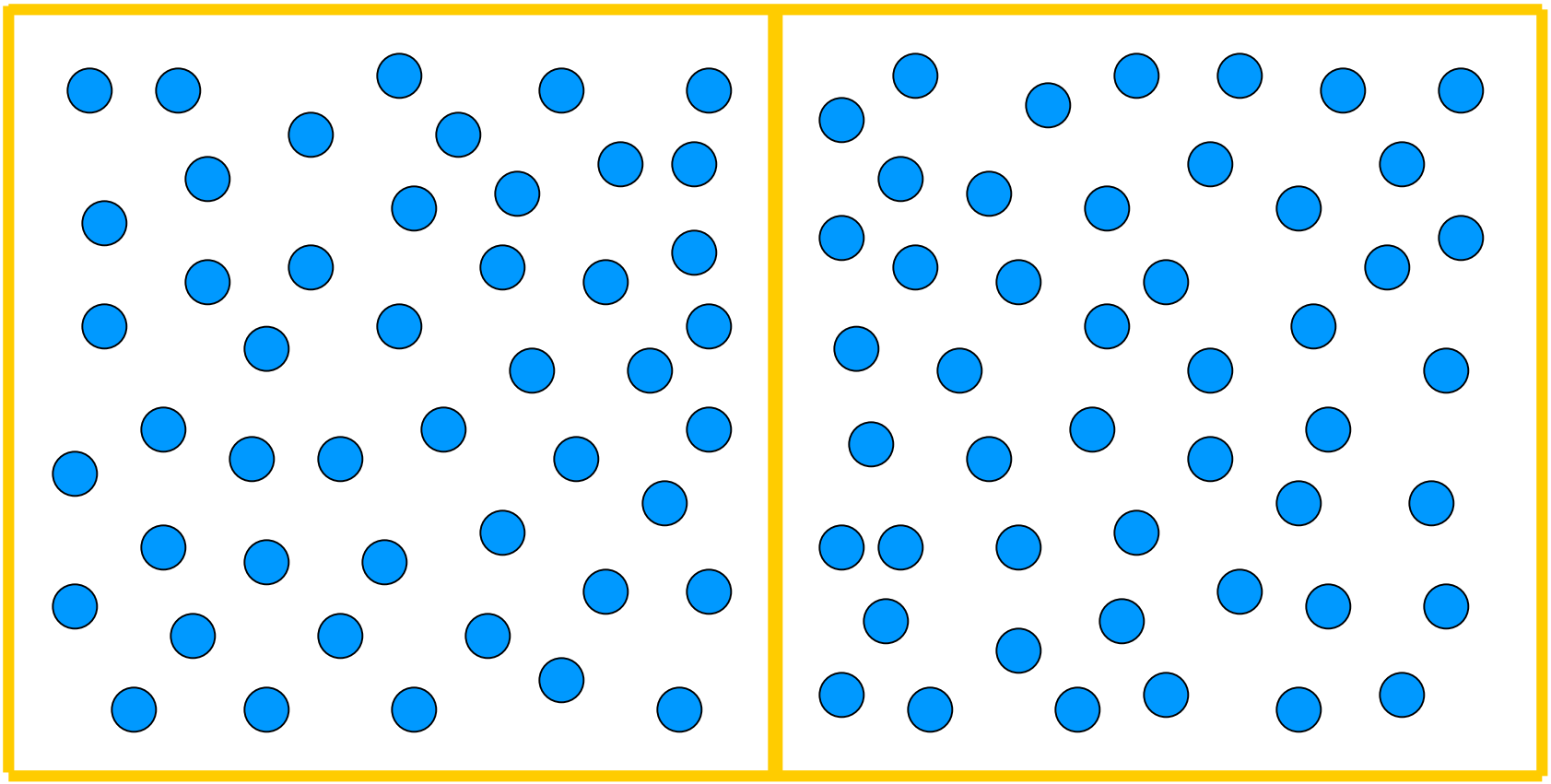
OSMOSIS

WATER PASSAGE ACROSS BIO-MEMBRANE IN RESPONSE TO SOLUTE CONCENTRATION

OSMOSIS

OSMOSIS

CELL A **CELL B**

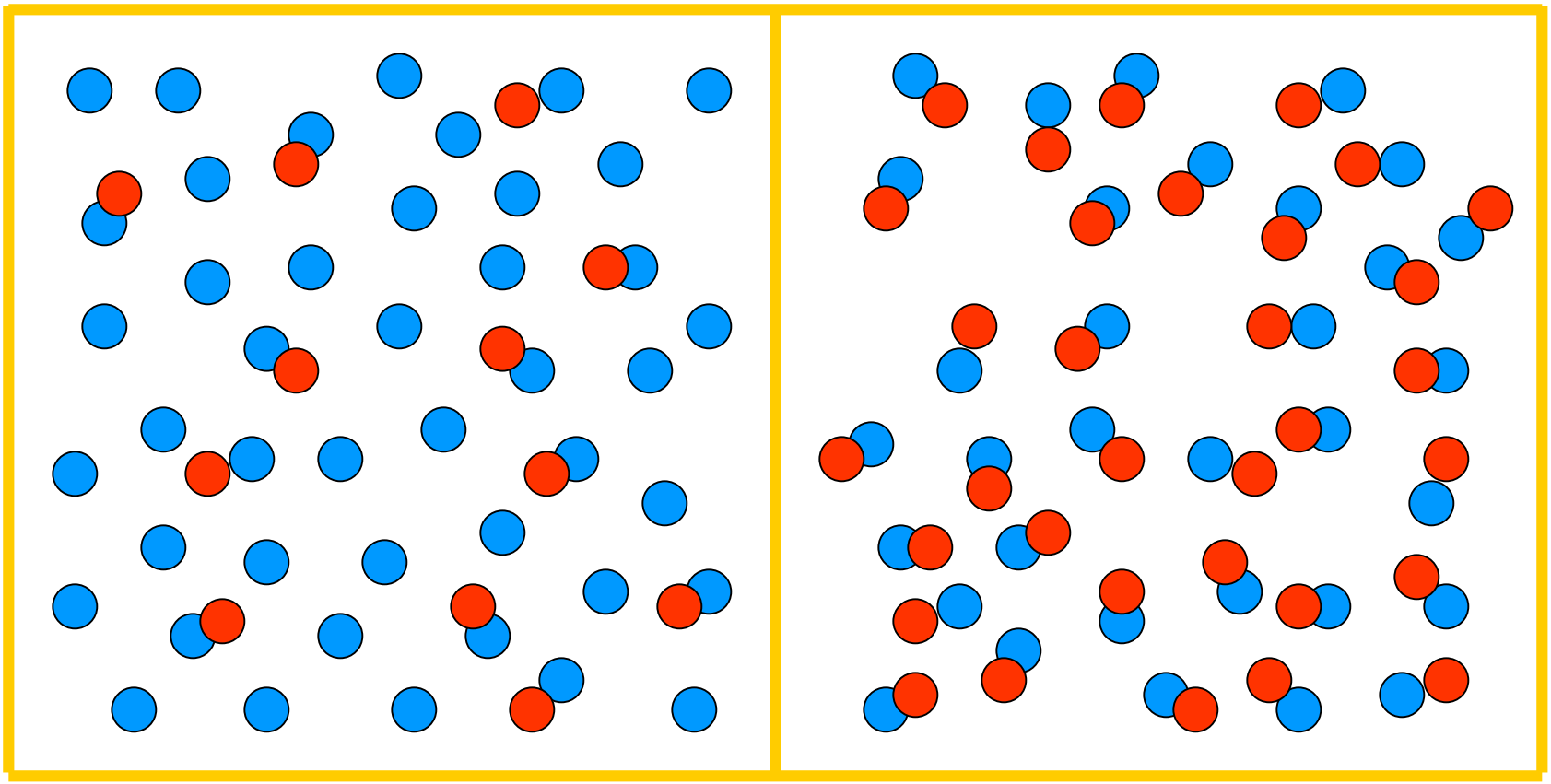


= **WATER MOLECULE**

= **MEMBRANE**

OSMOSIS

CELL A — **SOLUTE CON GRADIENT** — **CELL B**

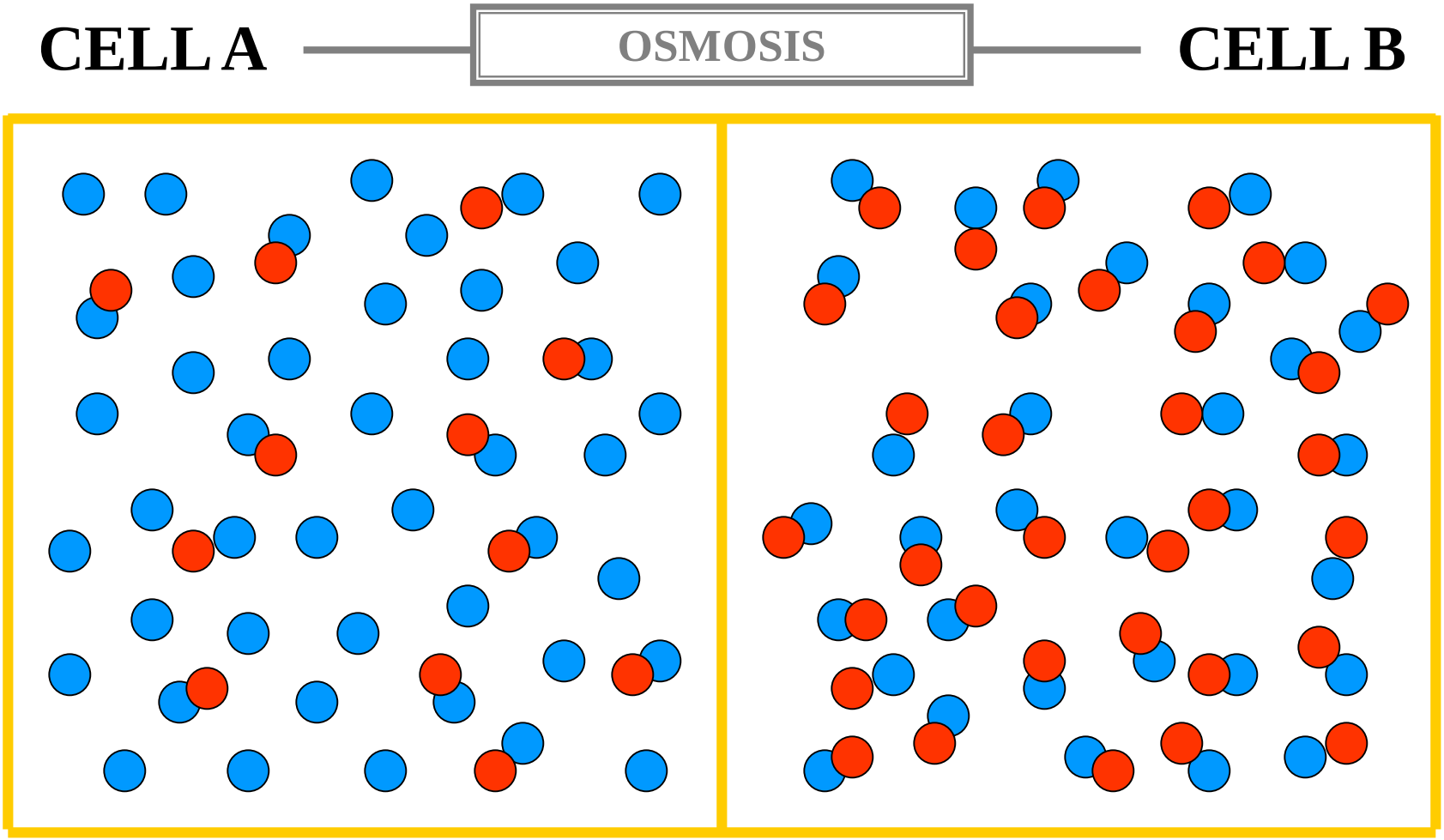


= WATER MOLECULE

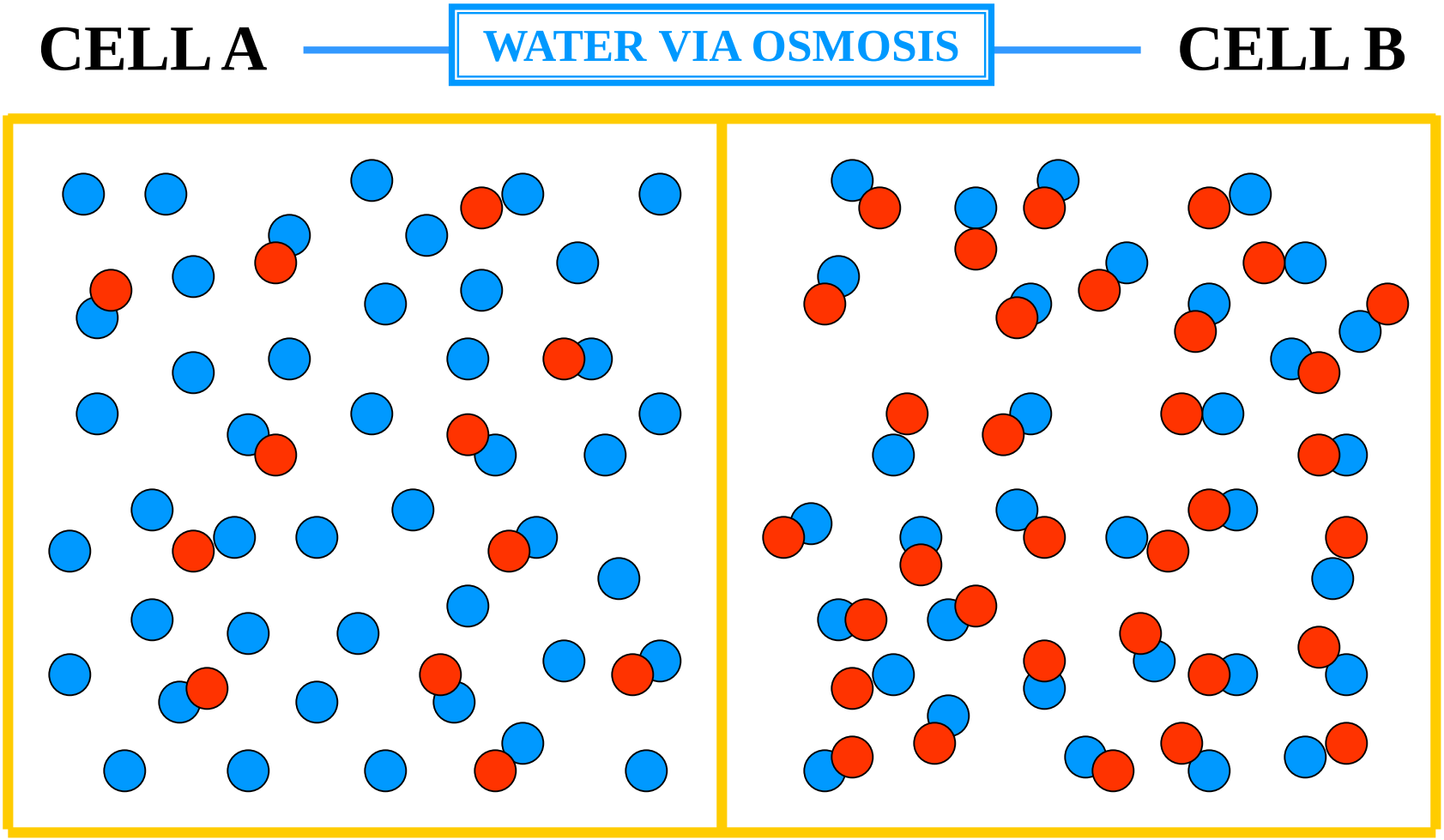
= POLAR SOLUTE MOLECULE

= MEMBRANE

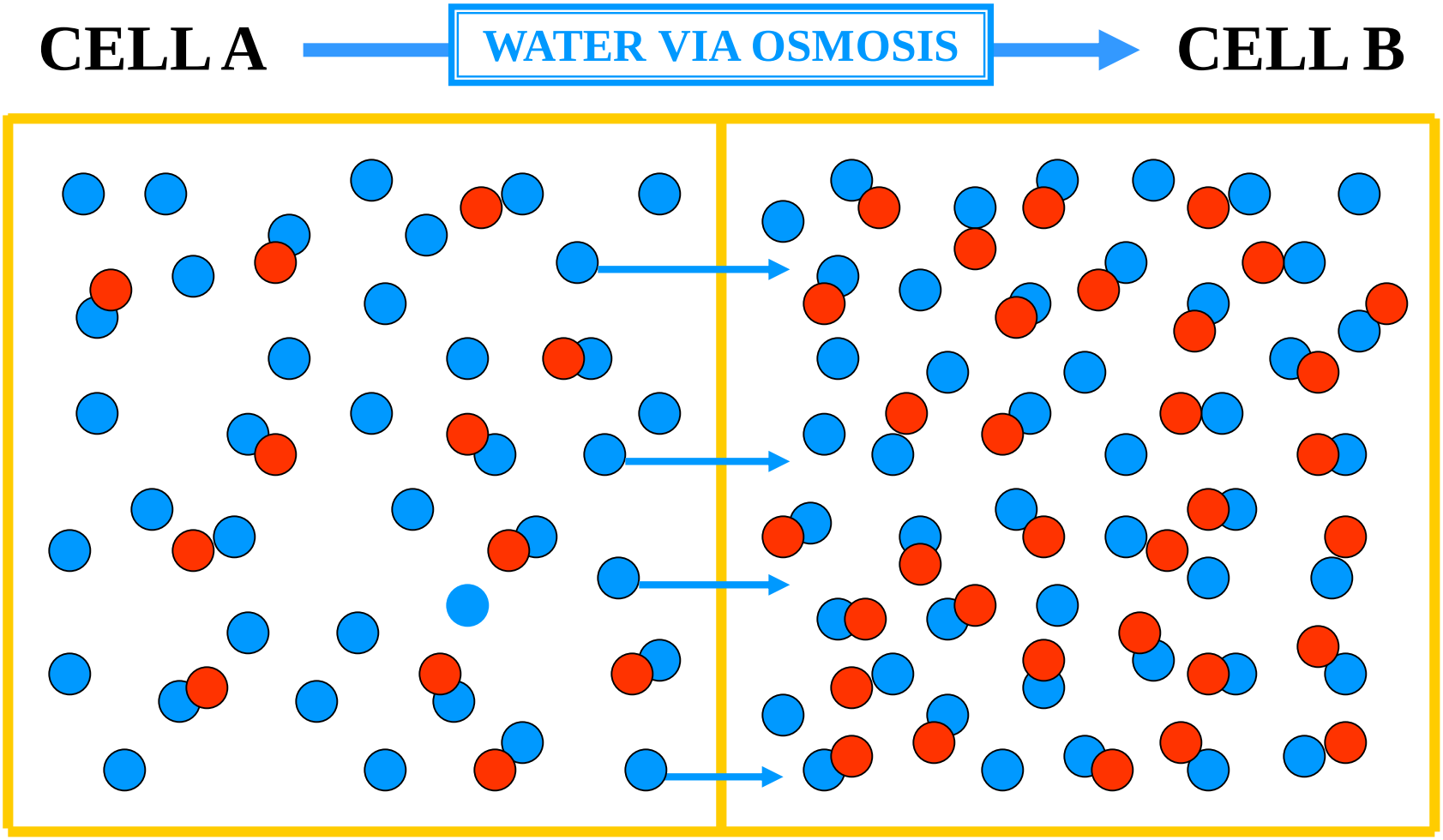
OSMOSIS


CELL A
OSMOSIS
CELL B
= WATER MOLECULE
= POLAR SOLUTE MOLECULE
= MEMBRANE

OSMOSIS


CELL A
WATER VIA OSMOSIS
CELL B
= WATER MOLECULE
= POLAR SOLUTE MOLECULE
= MEMBRANE

OSMOSIS

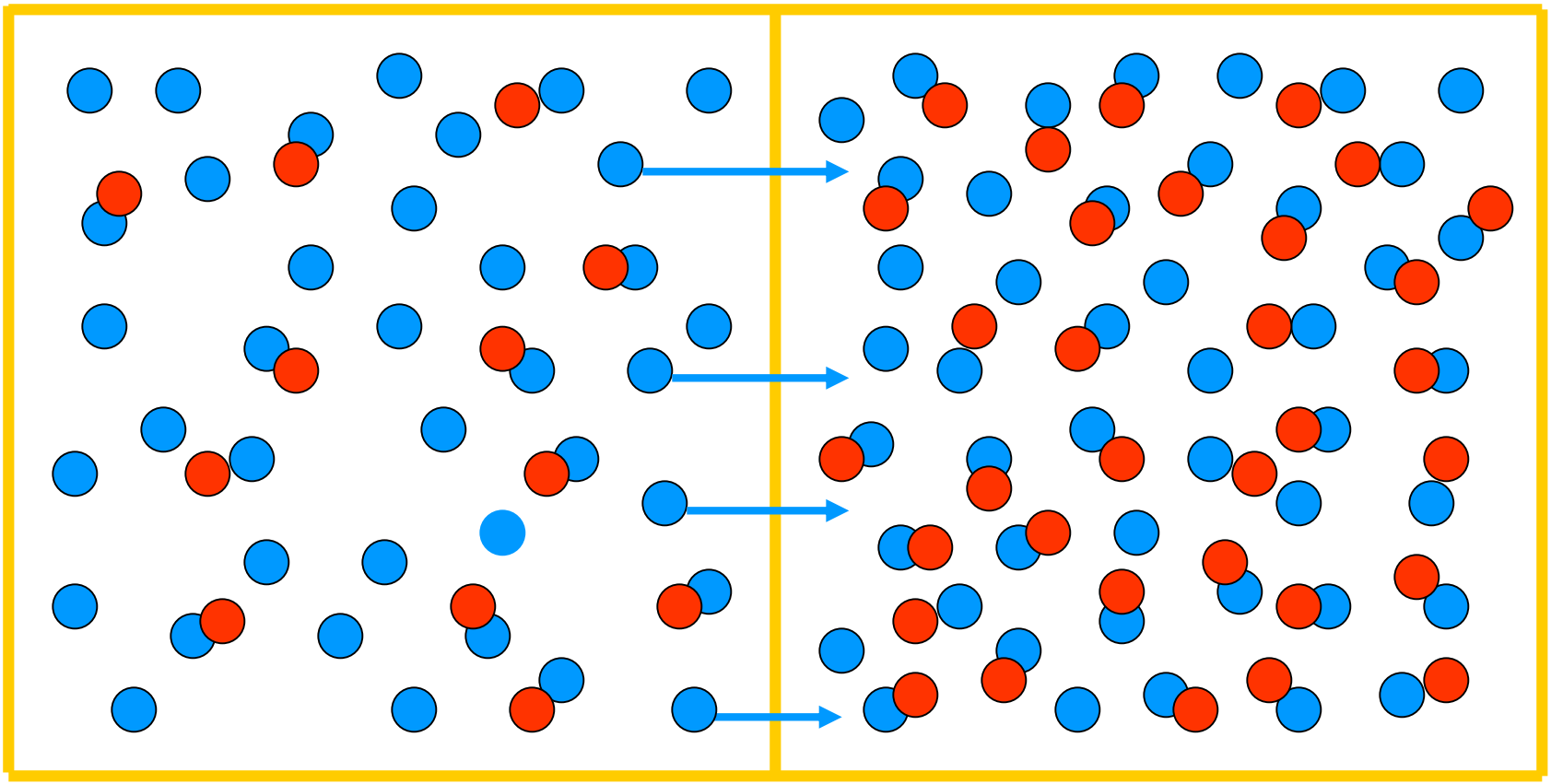

CELL A
WATER VIA OSMOSIS
CELL B
= WATER MOLECULE
= POLAR SOLUTE MOLECULE
= MEMBRANE

OSMOSIS

PASSIVE

CELL A

CELL B



= WATER MOLECULE

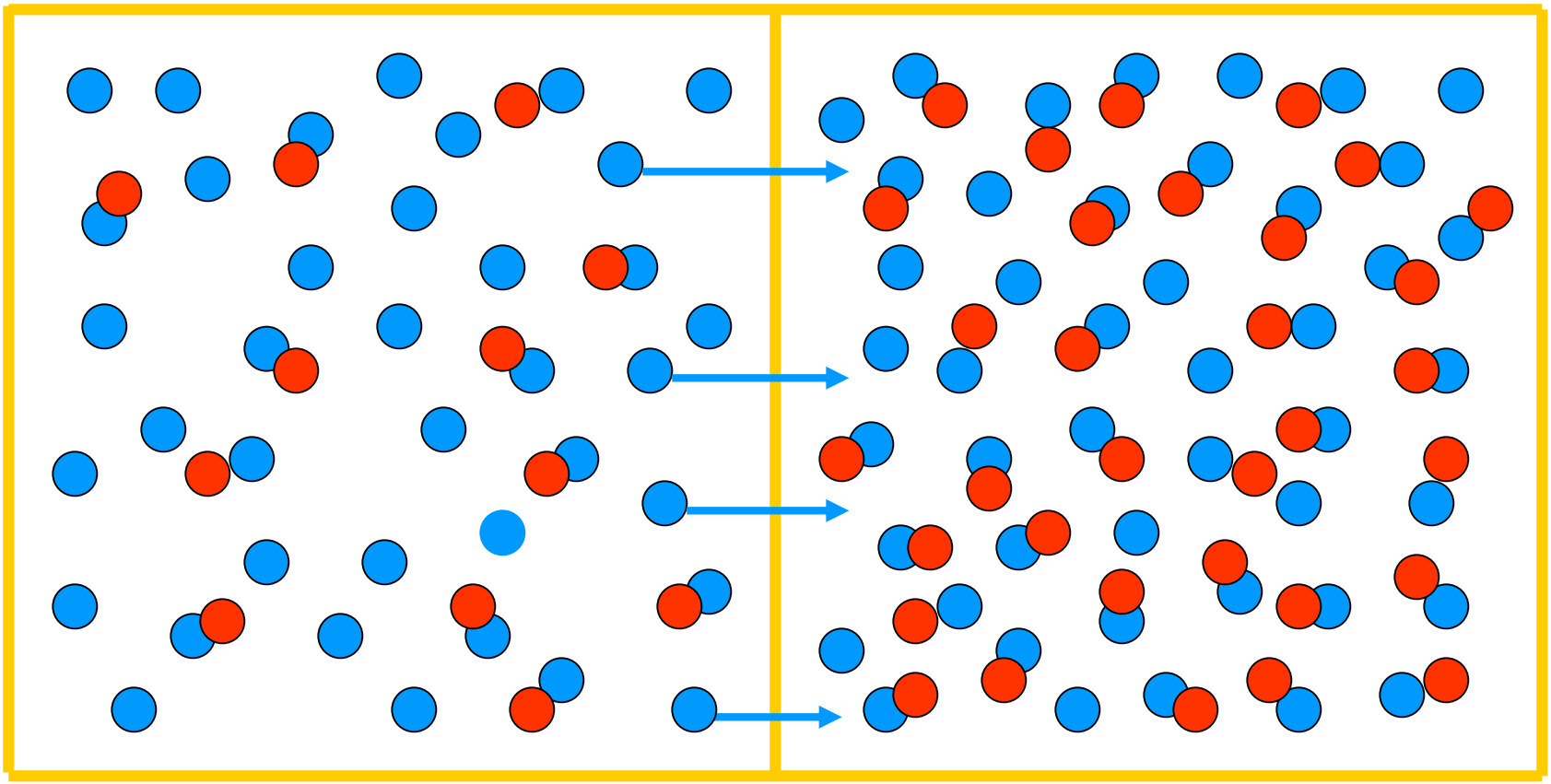
= POLAR SOLUTE MOLECULE

= MEMBRANE

OSMOSIS

ATP EXPENSE: NO

CELL A **CELL B**



= WATER MOLECULE

= POLAR SOLUTE MOLECULE

= MEMBRANE

T

TONICITY TERMS

TONICITY

TONICITY

SOLUTION

SOLUTE

CONCENTRATION

TONICITY

ISOTONIC SOLUTIONS

ISOTONIC SOLUTIONS

EQUAL SOLUTE CONCENTRATION

ISOTONIC SOLUTIONS

HYPOTONIC SOLUTION

H

HYPOTONIC SOLUTION

LOWER SOLUTE CONCENTRATION

HYPOTONIC SOLUTION

HYPERTONIC SOLUTION

AP

HYPERTONIC SOLUTION

HIGHER SOLUTE CONCENTRATION

HYPERTONIC SOLUTION

TONICITY TERMS APPLIED