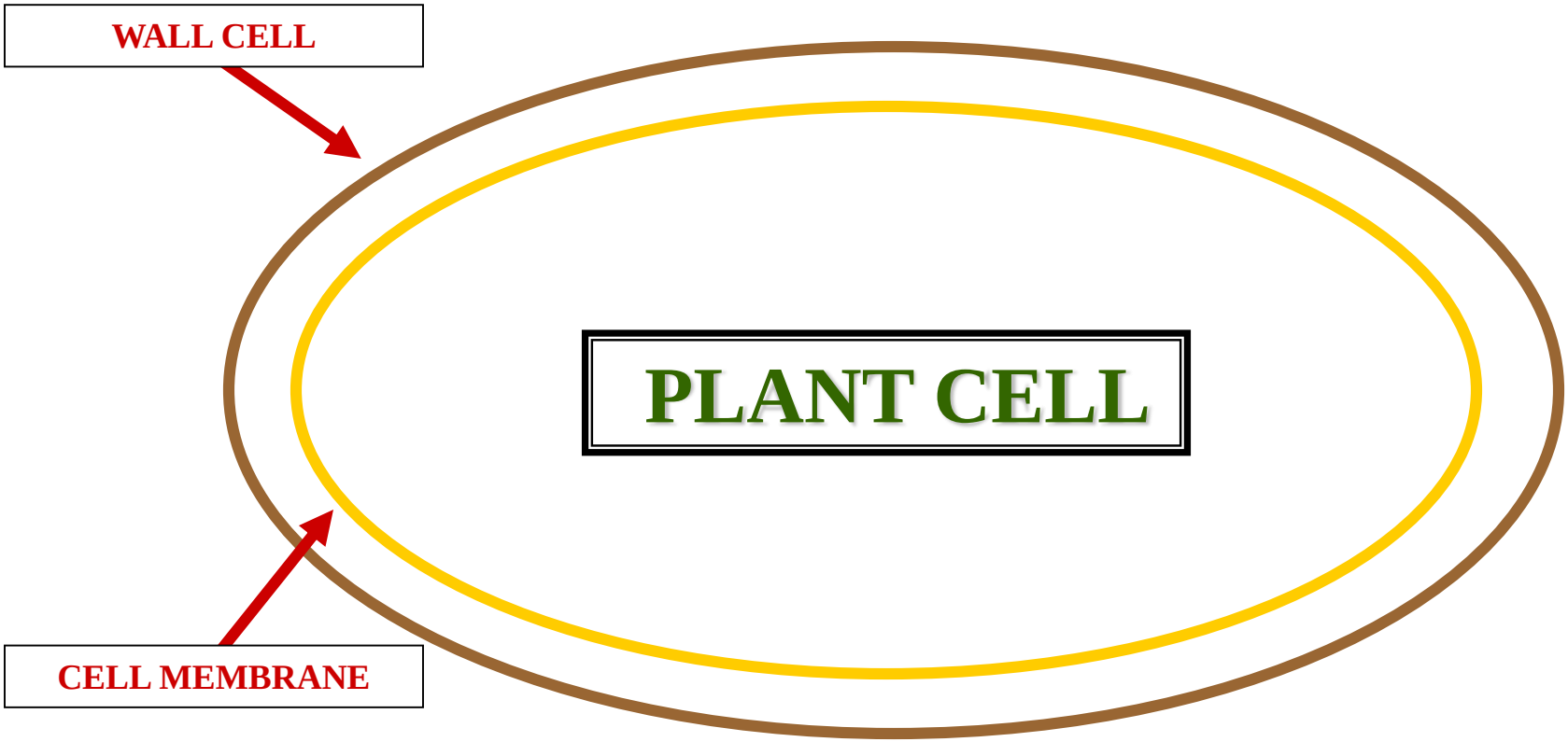
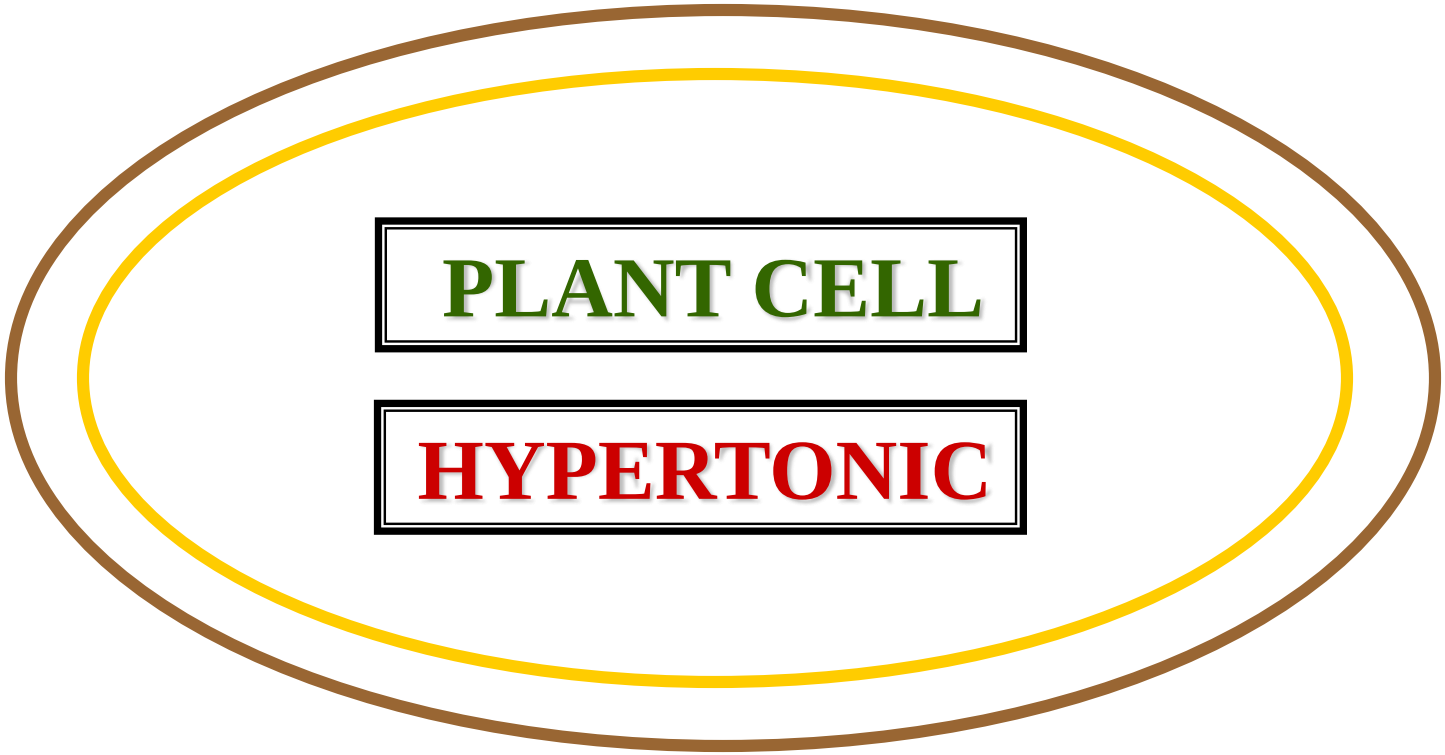
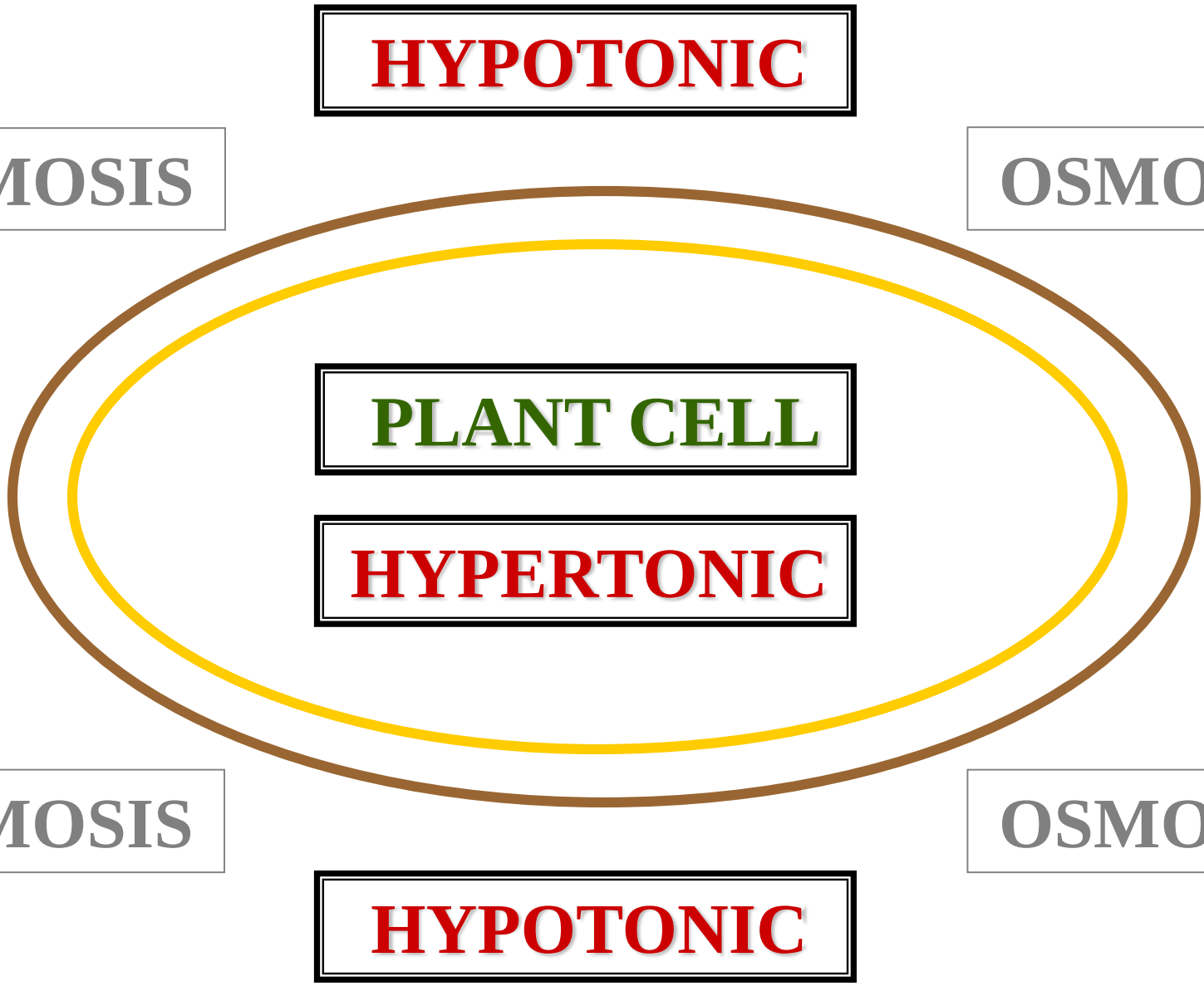
HY



HYPOTONIC

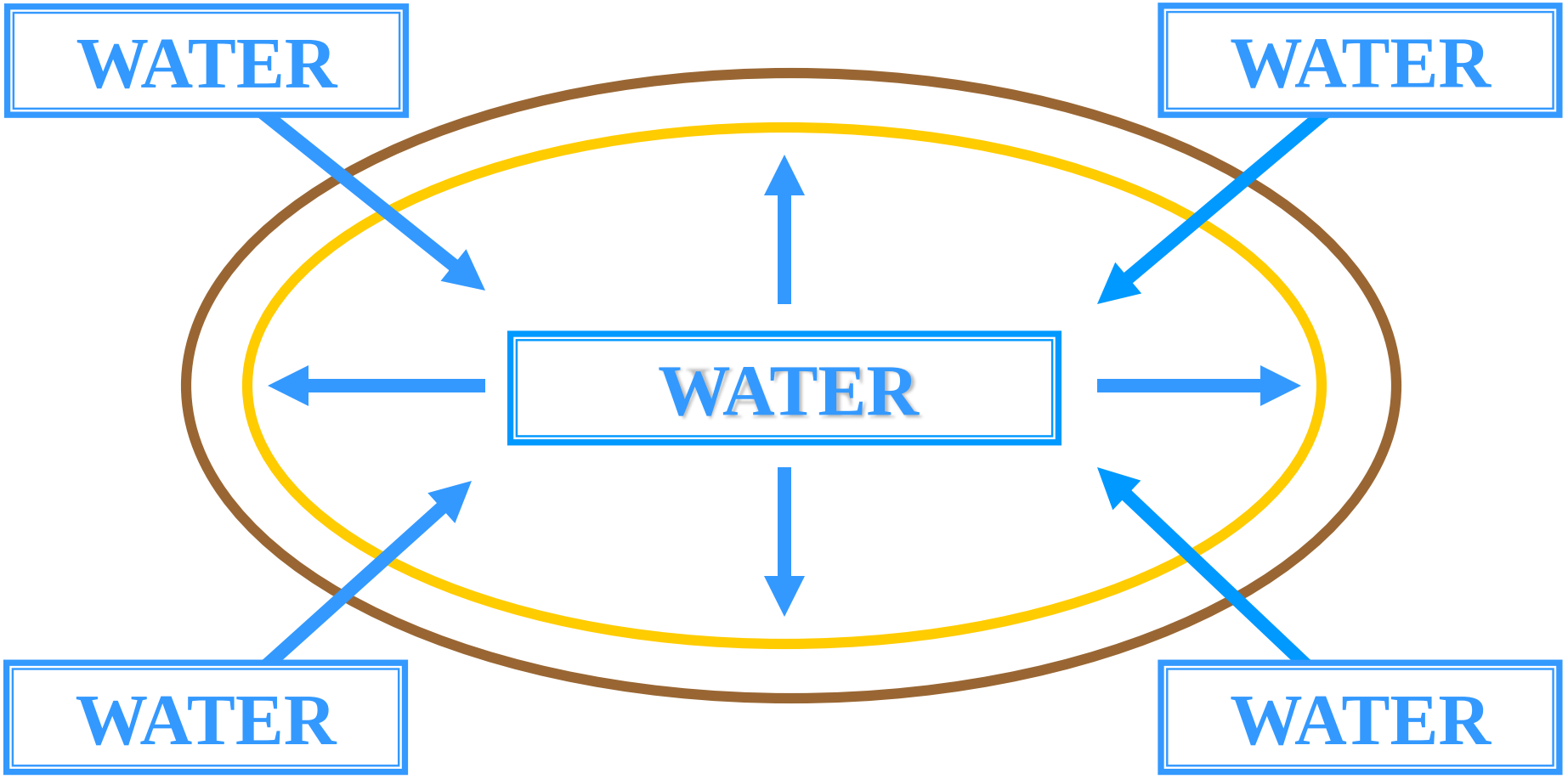


HYPOTONIC

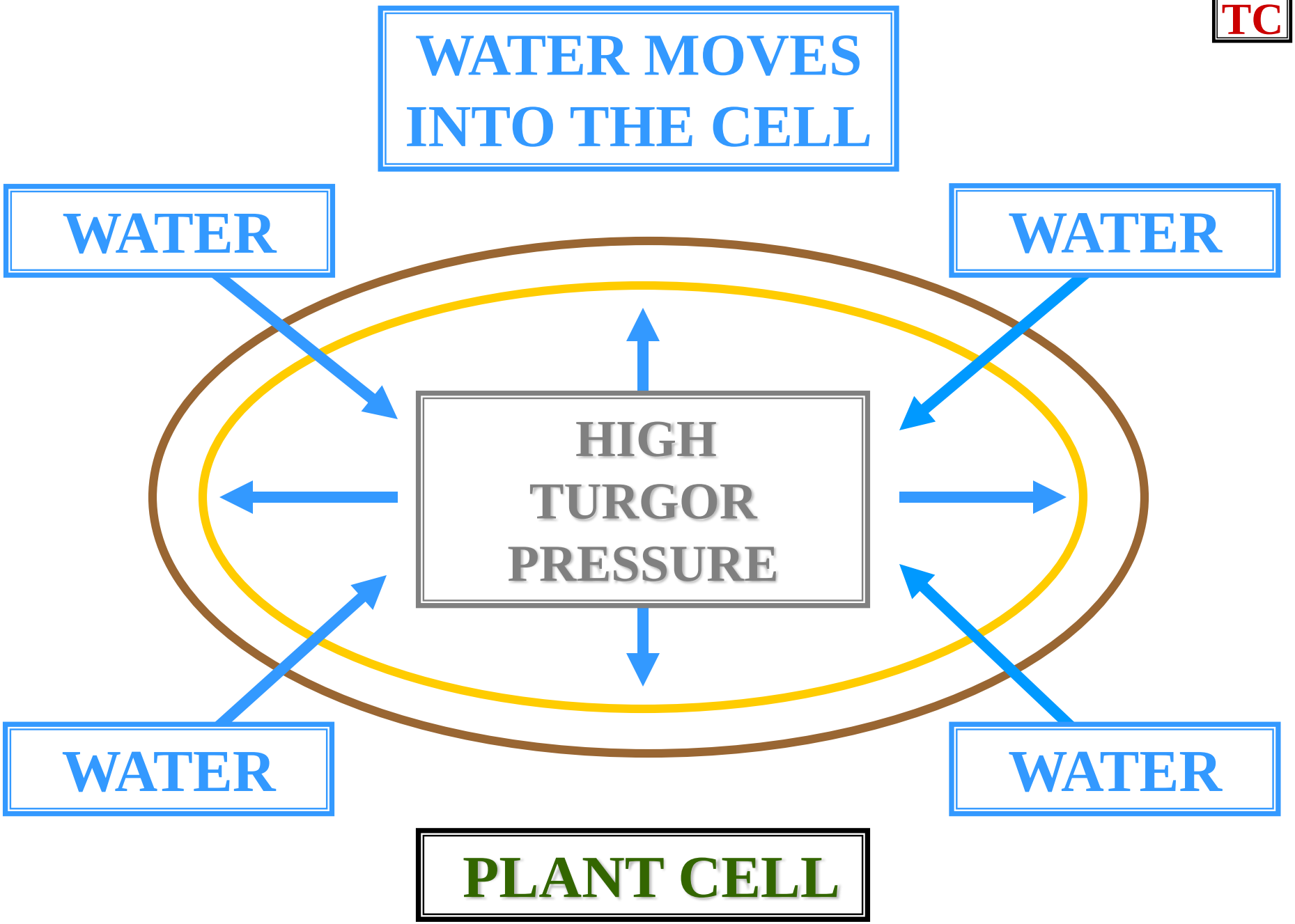

HYPOTONIC
OSMOSIS
OSMOSIS
PLANT CELL
HYPERTONIC
OSMOSIS
OSMOSIS
HYPOTONIC

HTP

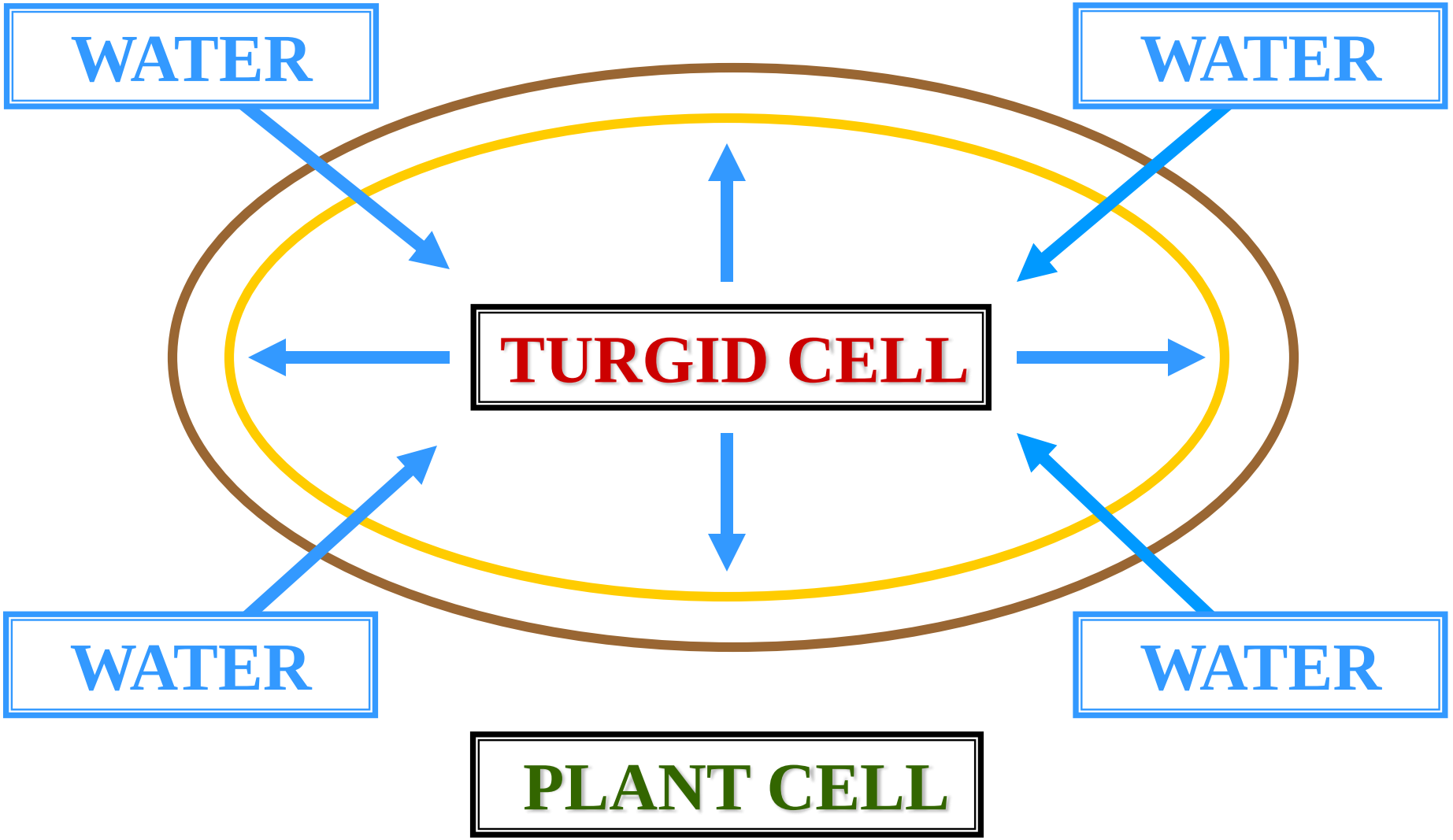
WATER MOVES INTO THE CELL



PLANT CELL


WATER MOVES INTO THE CELL
WATER
WATER
HIGH TURGOR PRESSURE
WATER
WATER
PLANT CELL

WATER MOVES INTO THE CELL



FLACCID CELL

FLACCID CELL

AP

FLACCID CELL

LOW TURGOR PRESSURE

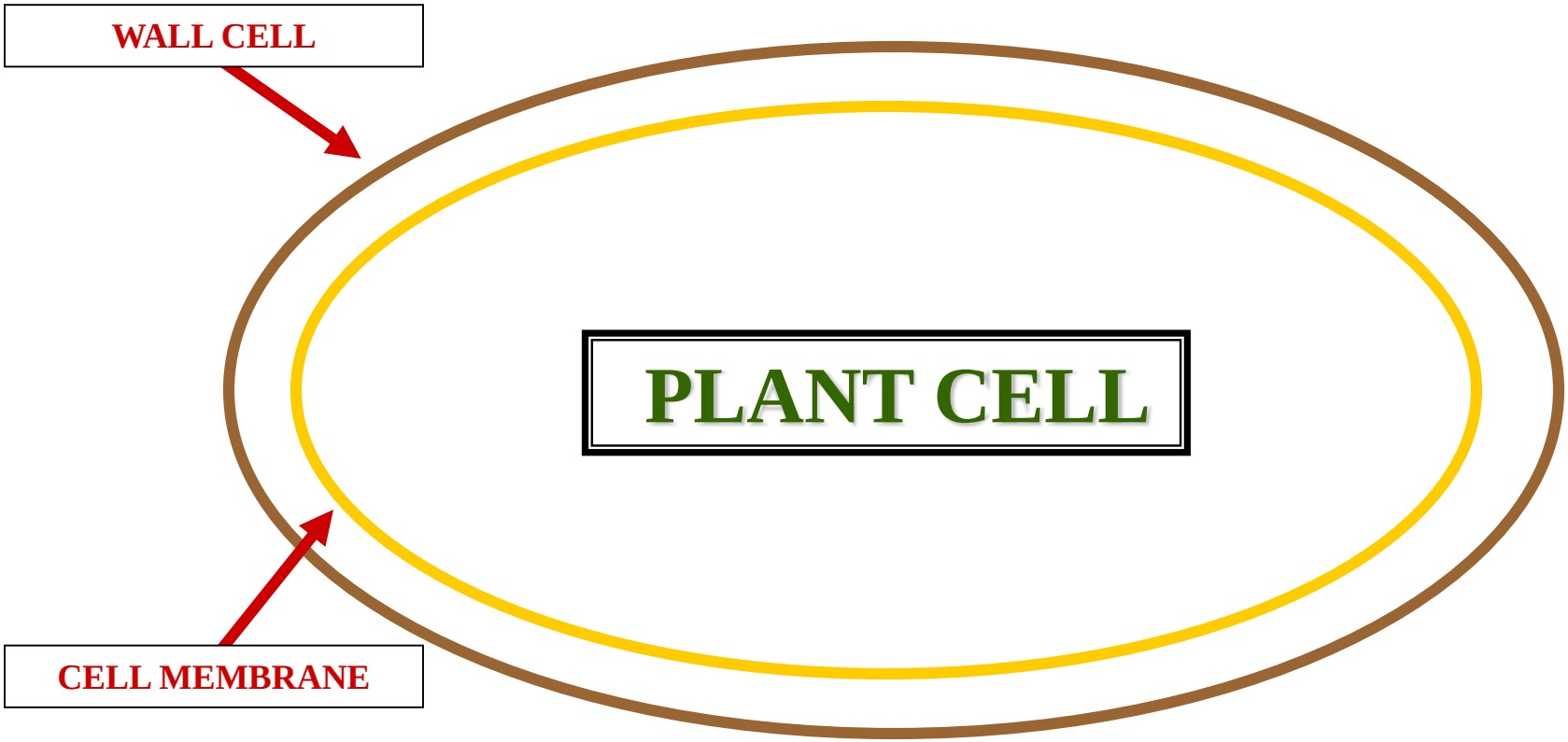
FLACCID CELL

FLACCID CELL

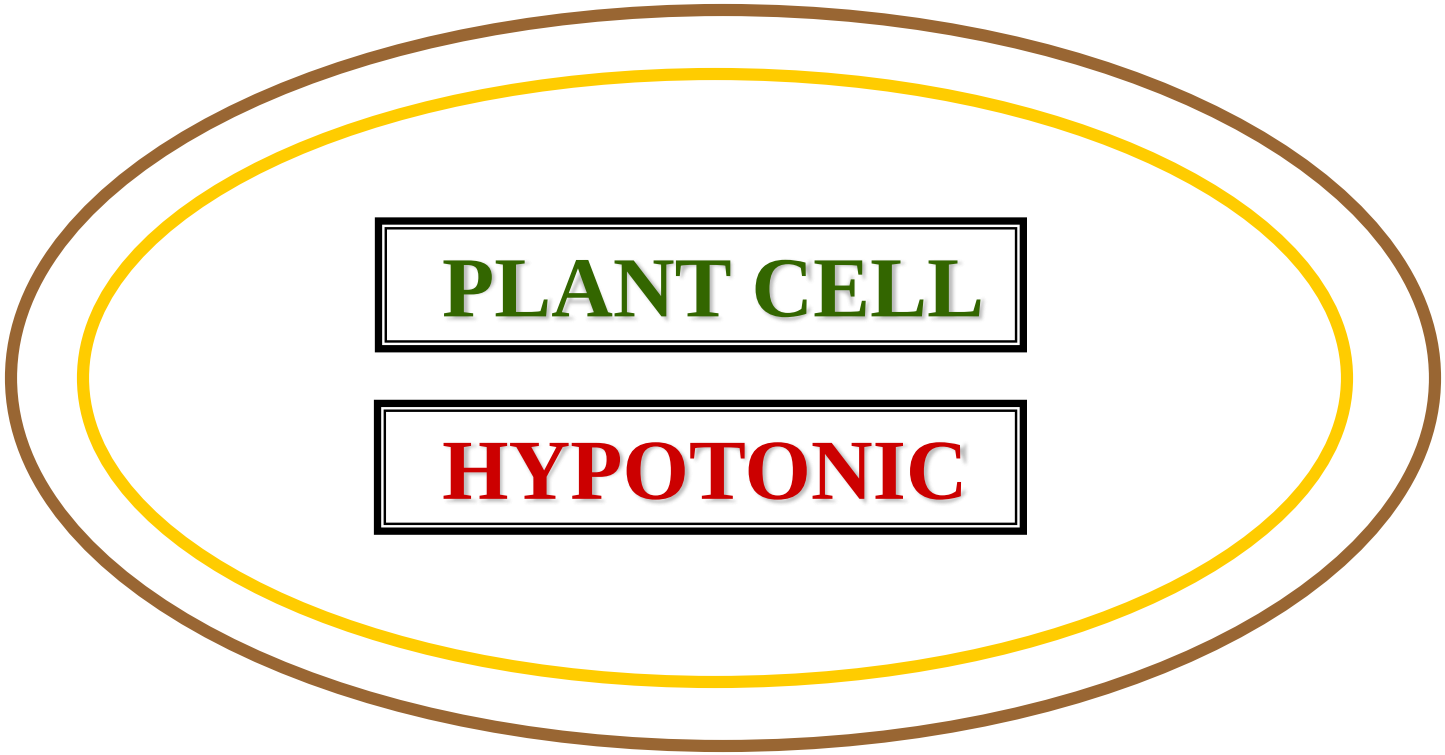
TURGOR PRESSURE

APPLIED

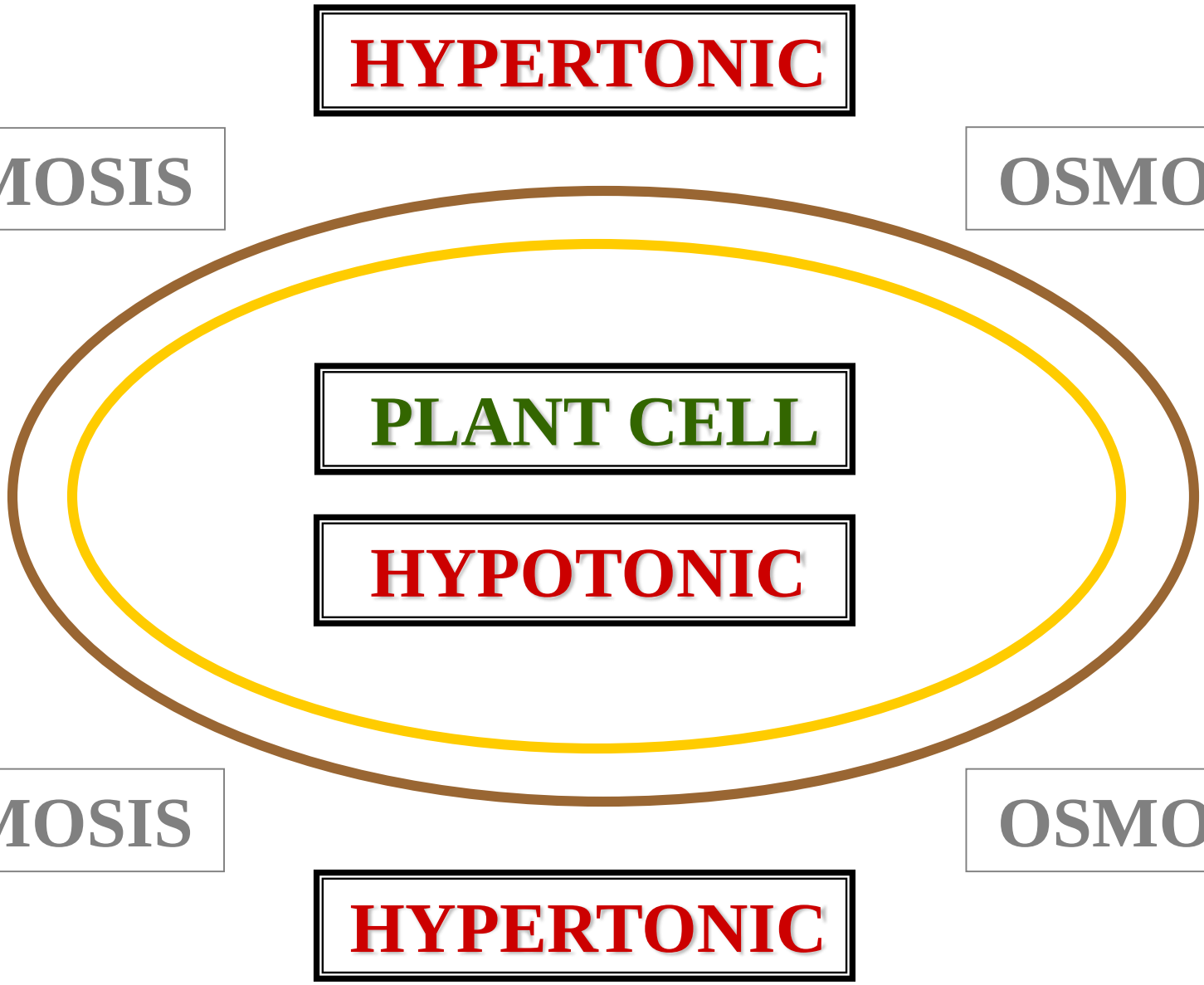
HY



HYPERTONIC

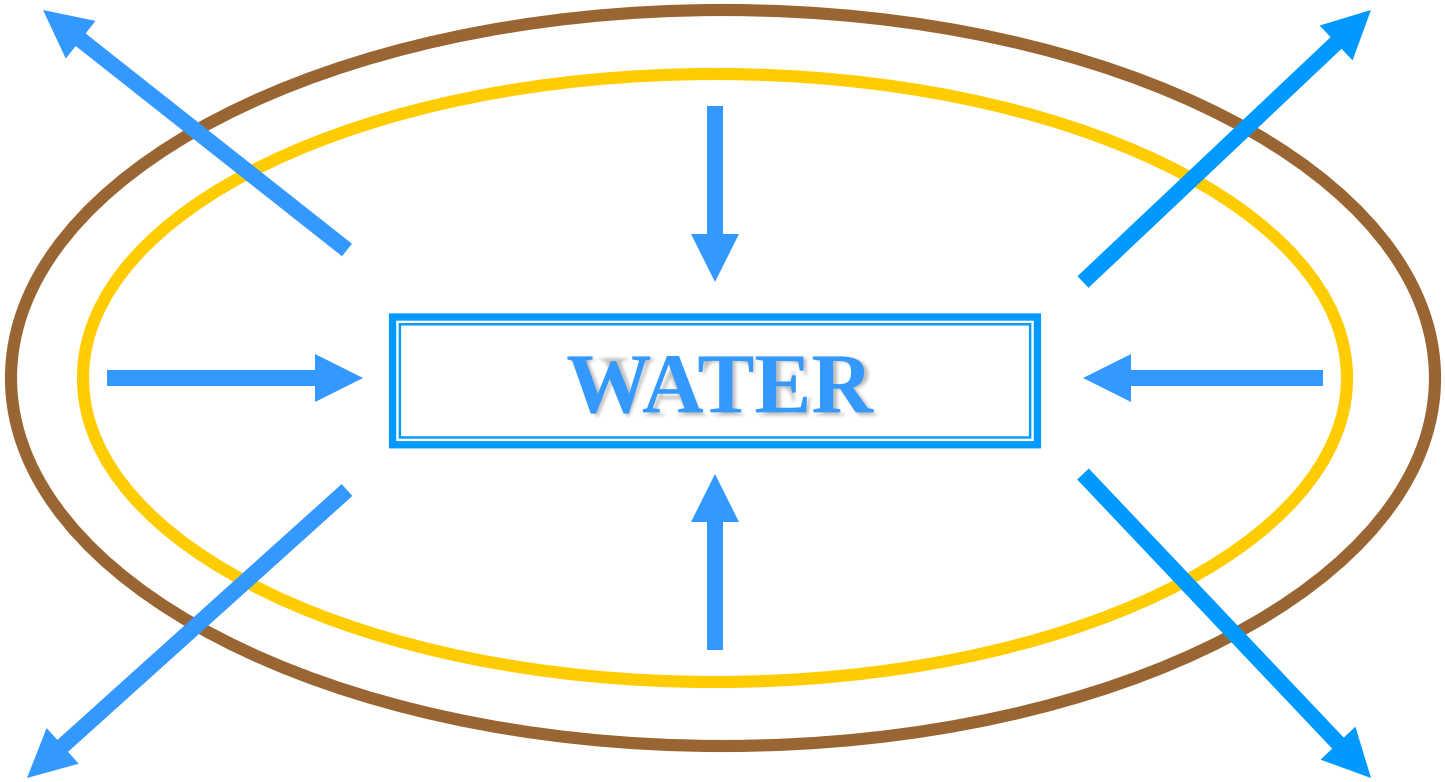


HYPERTONIC


HYPERTONIC
OSMOSIS
OSMOSIS
PLANT CELL
HYPOTONIC
OSMOSIS
OSMOSIS
HYPERTONIC

LTP

WATER MOVES OUT OF THE CELL

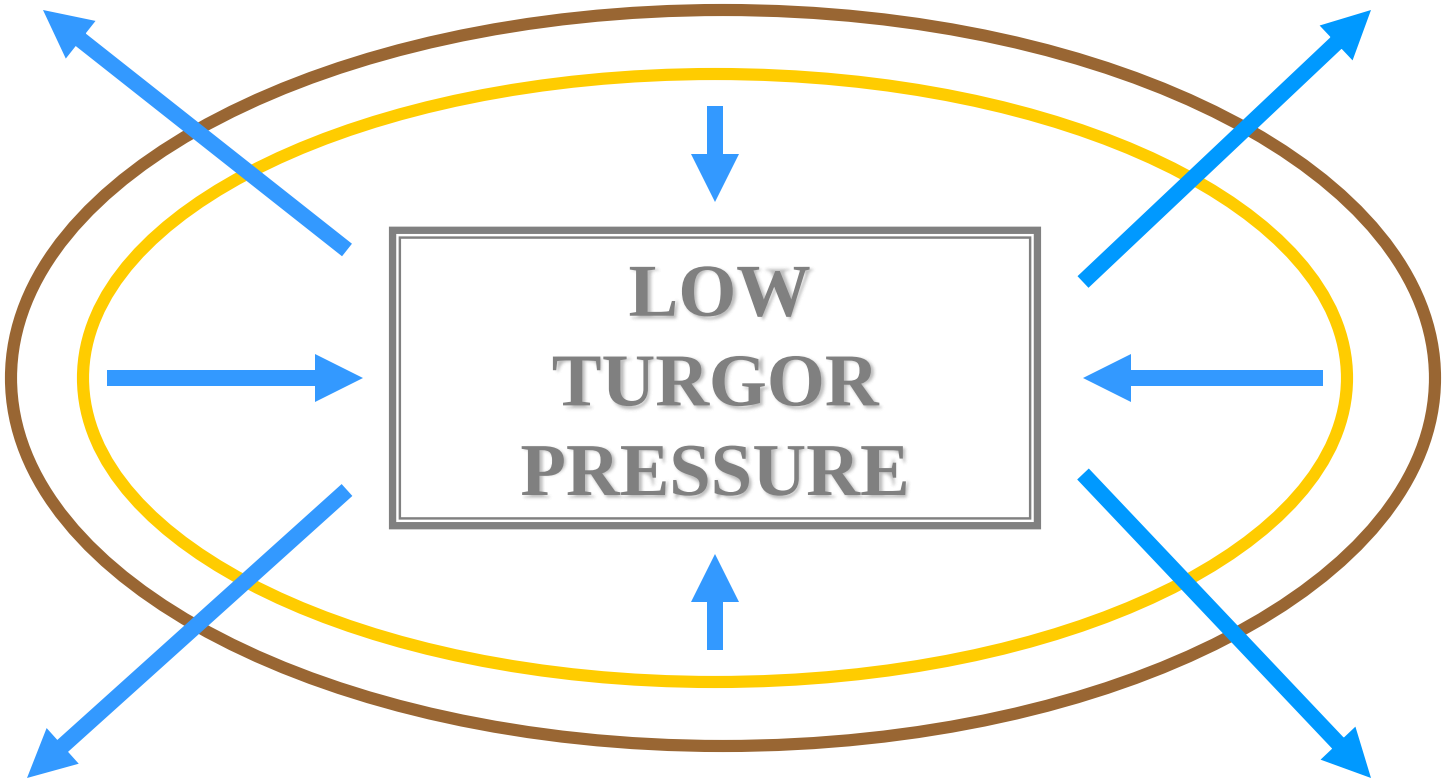


FC

WATER MOVES OUT OF THE CELL

WATER

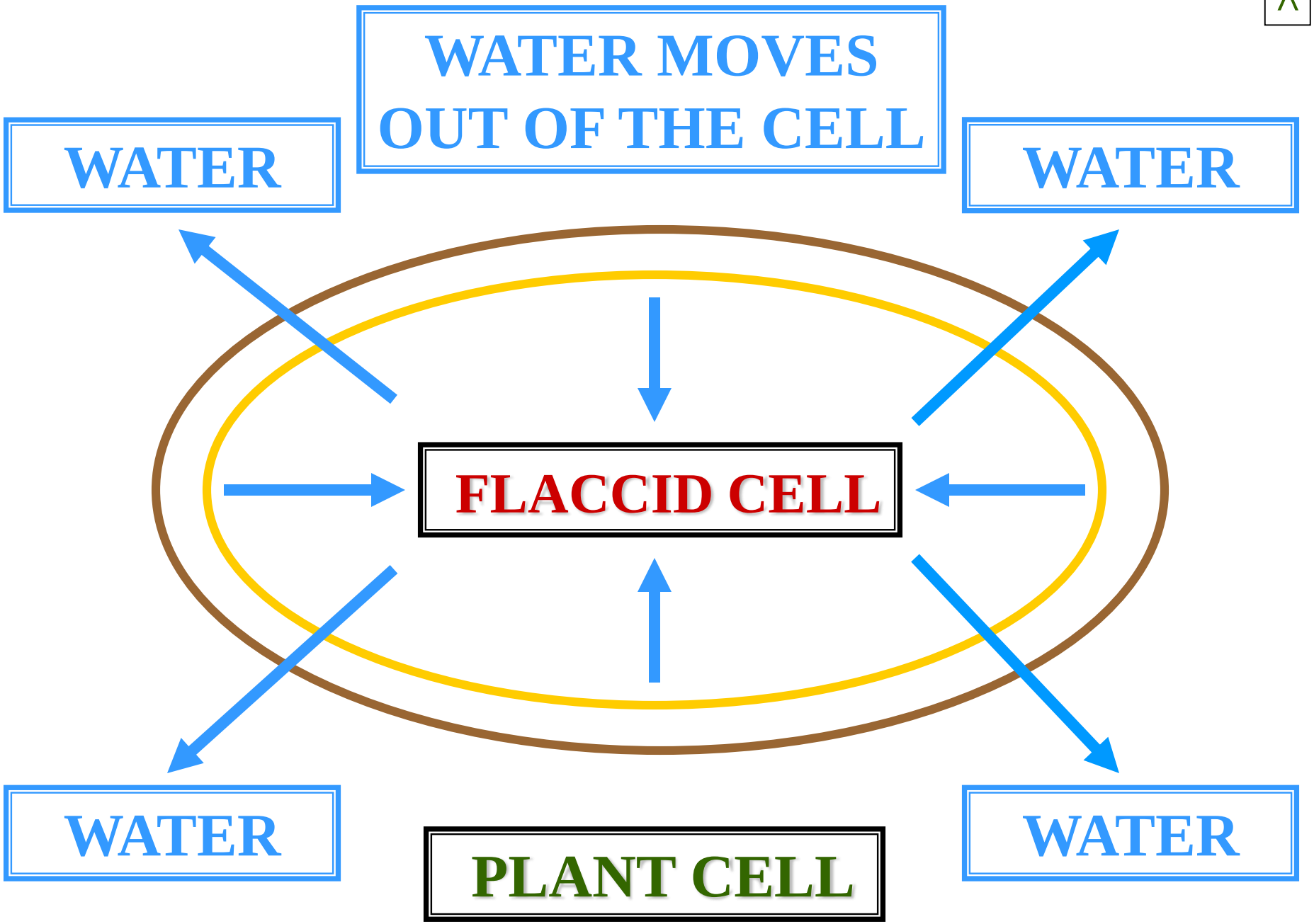
WATER



WATER

WATER

PLANT CELL

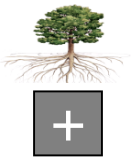

WATER MOVES
OUT OF THE CELL
WATER
WATER
FLACCID CELL
WATER
WATER
PLANT CELL

T

TRANSPIRATION

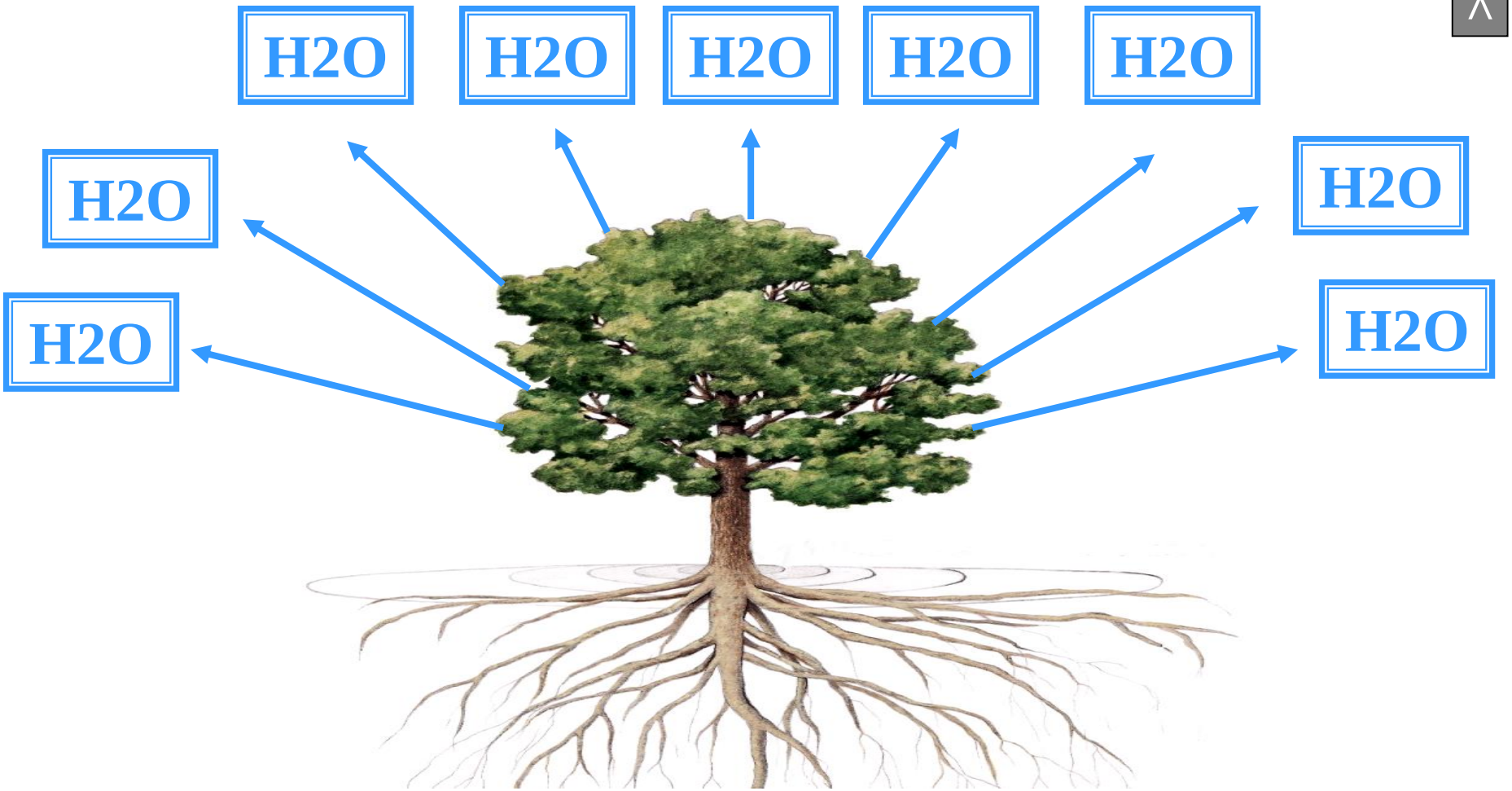
TRANSPIRATION

TRANSPIRATION



PLANT WATER LOSS

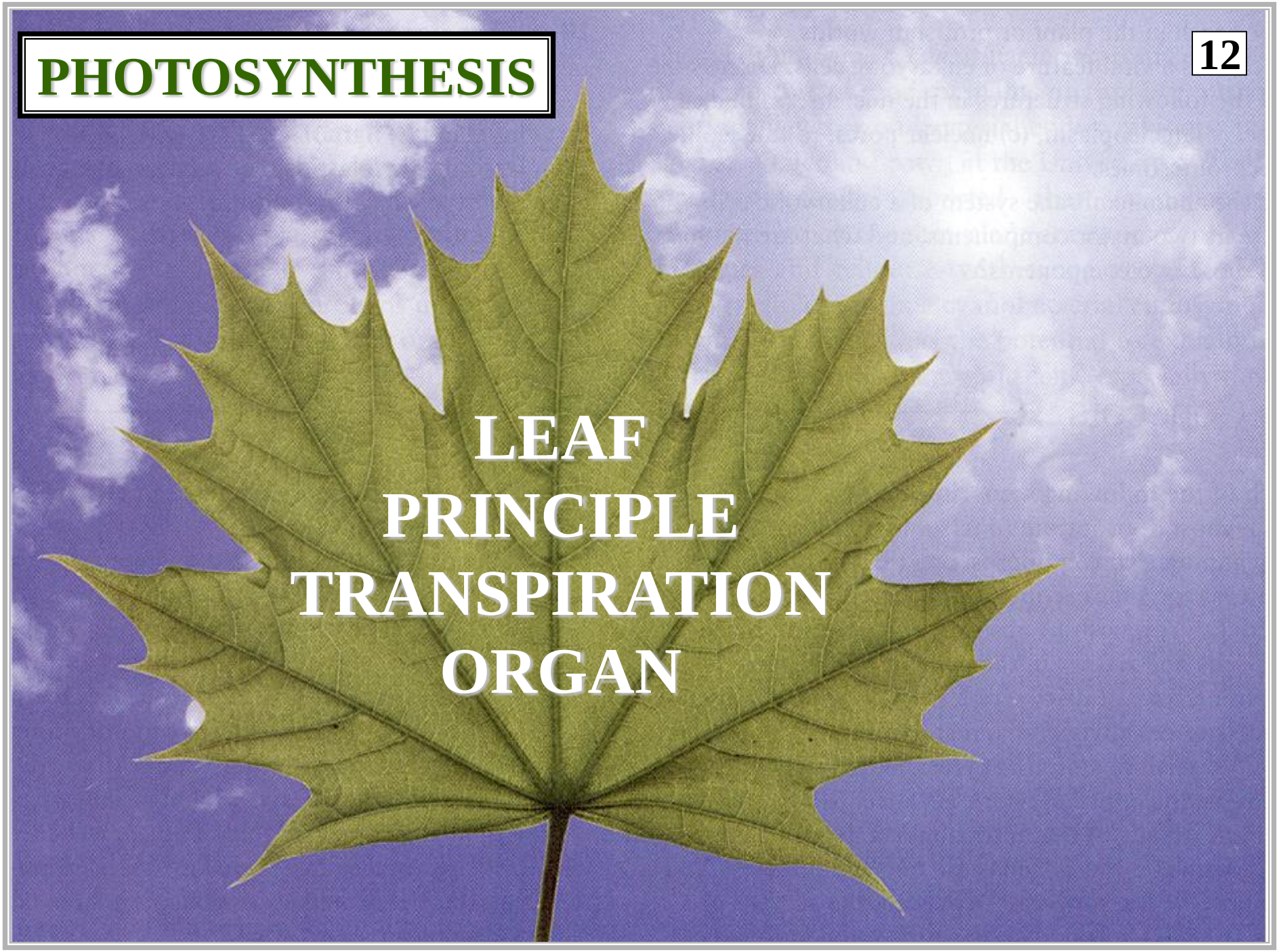
TRANSPIRATION



TRANSPIRATION

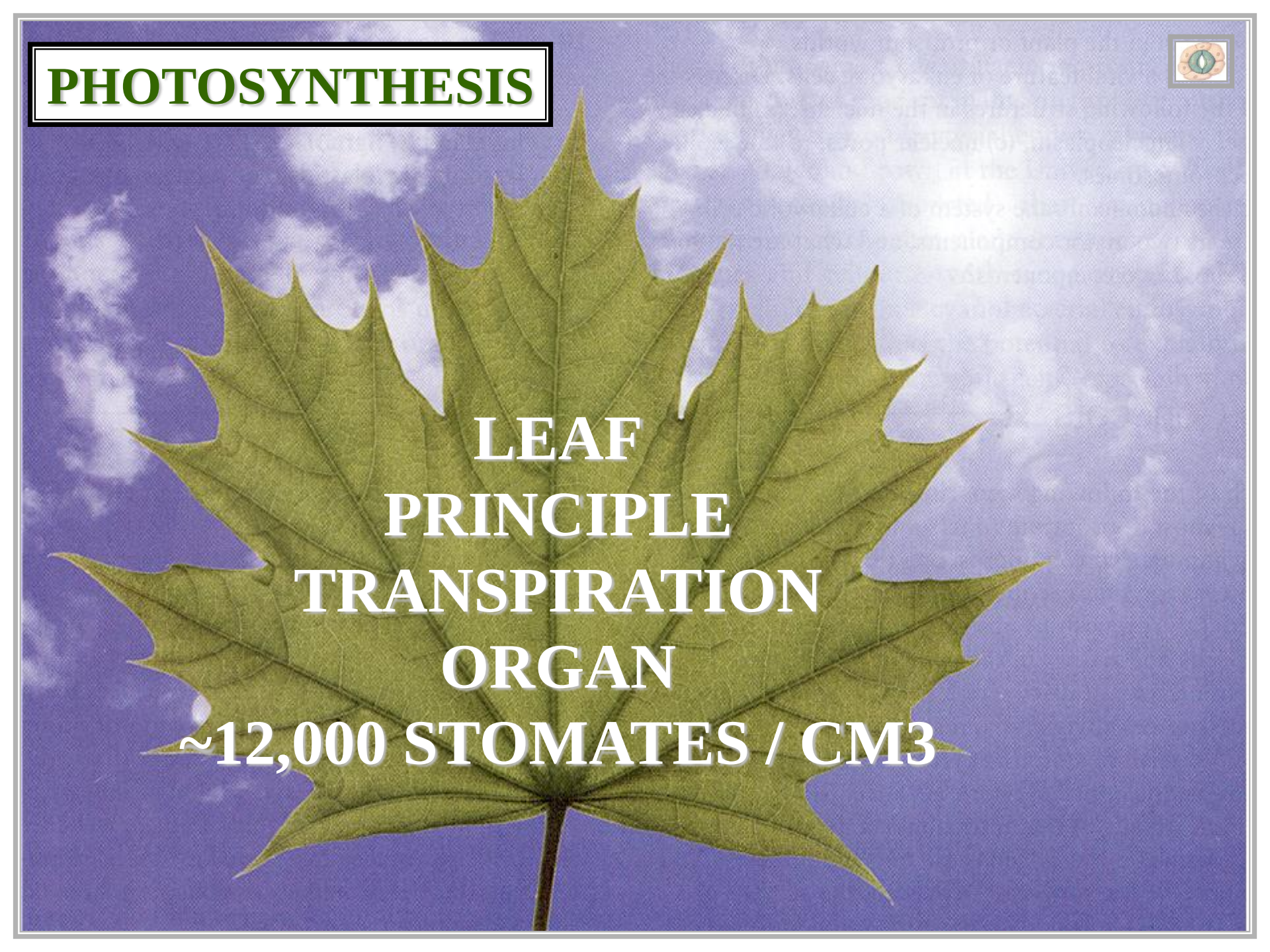
TRANSPIRATION SPECIFICS

PHOTOSYNTHESIS



LEAF
PRINCIPLE
TRANSPIRATION
ORGAN

PHOTOSYNTHESIS



LEAF

PRINCIPLE

TRANSPIRATION

ORGAN

~12,000 STOMATES / CM3

D

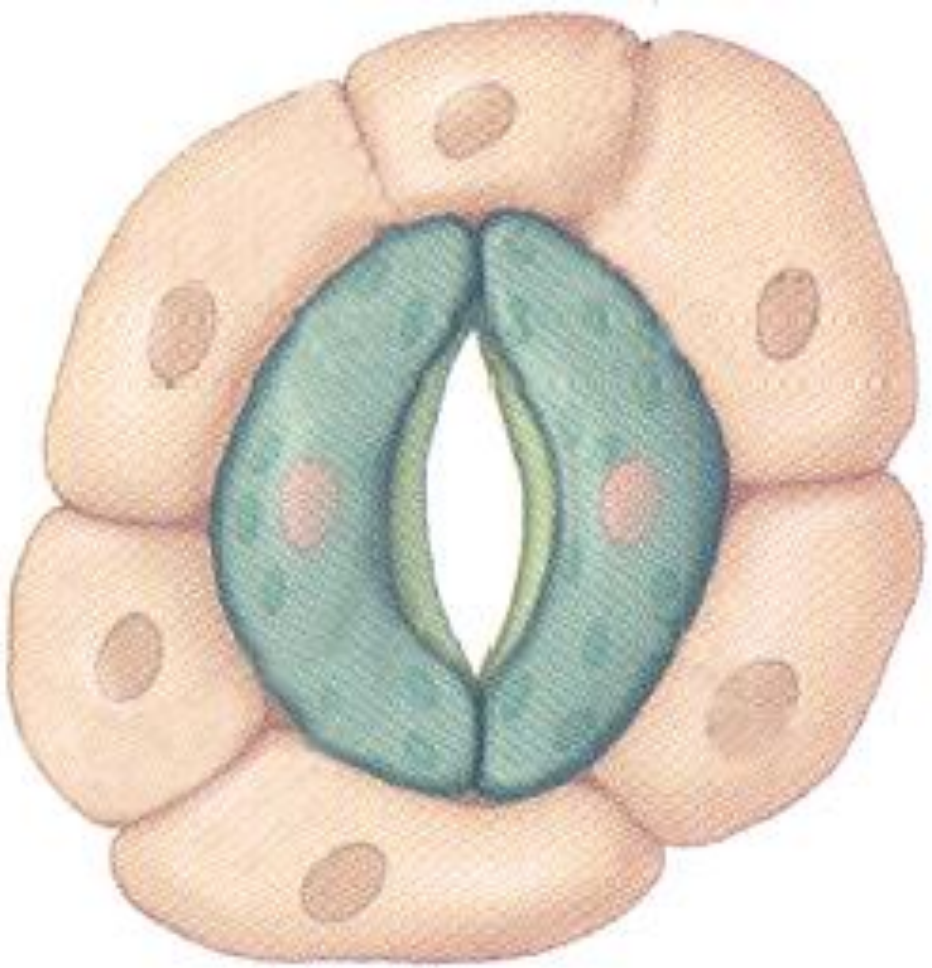
LEAF STOMATE

ATMOSPHERE

ATMOSPHERE

CO2

CO2



CO2

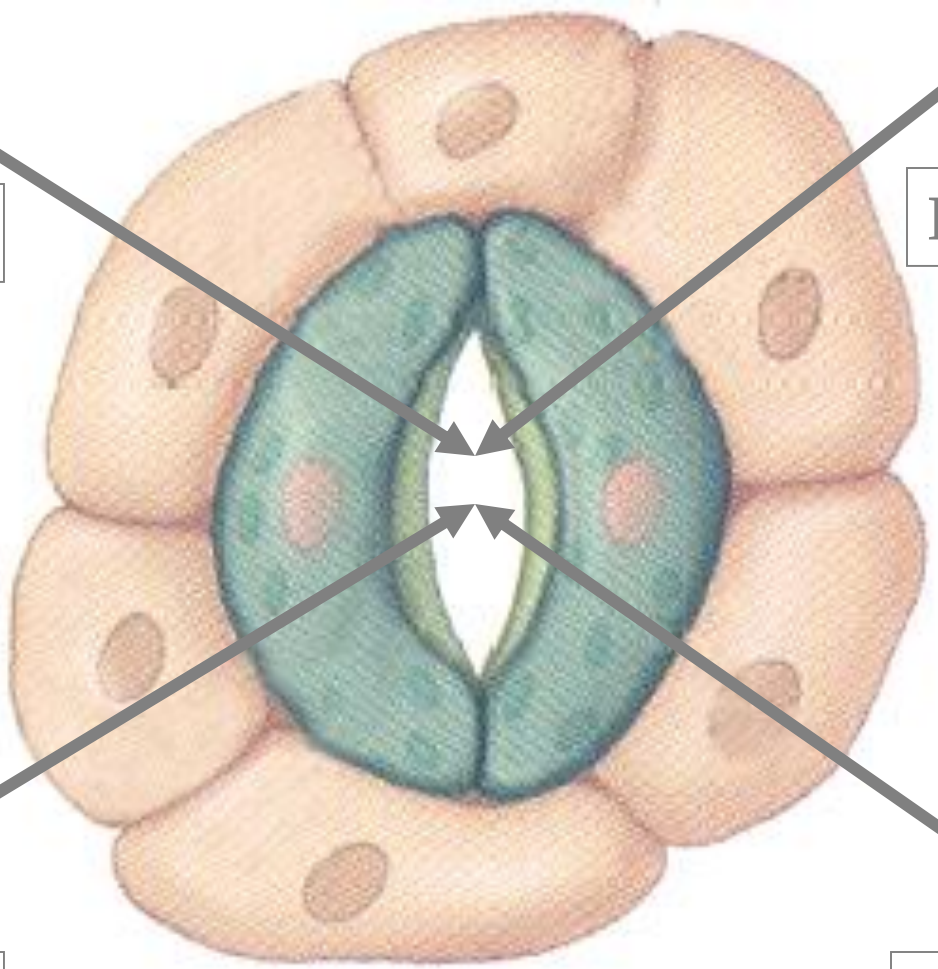
CO2

D

LEAF STOMATE

ATMOSPHERE

ATMOSPHERE



CO2

DIFFUSION

CO2

DIFFUSION

CO2

DIFFUSION

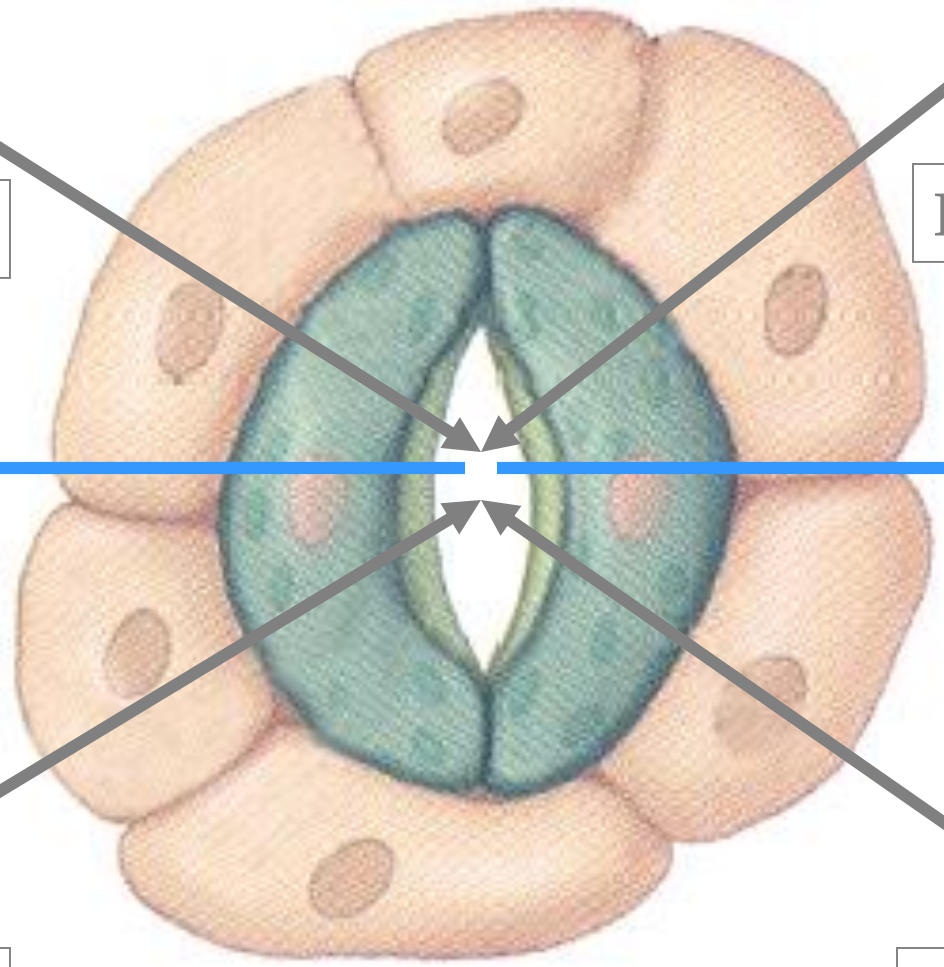
CO2

DIFFUSION

LEAF STOMATE

ATMOSPHERE

ATMOSPHERE



CO2

DIFFUSION

CO2

DIFFUSION

H2O

DIFFUSION

H2O

DIFFUSION

CO2

DIFFUSION

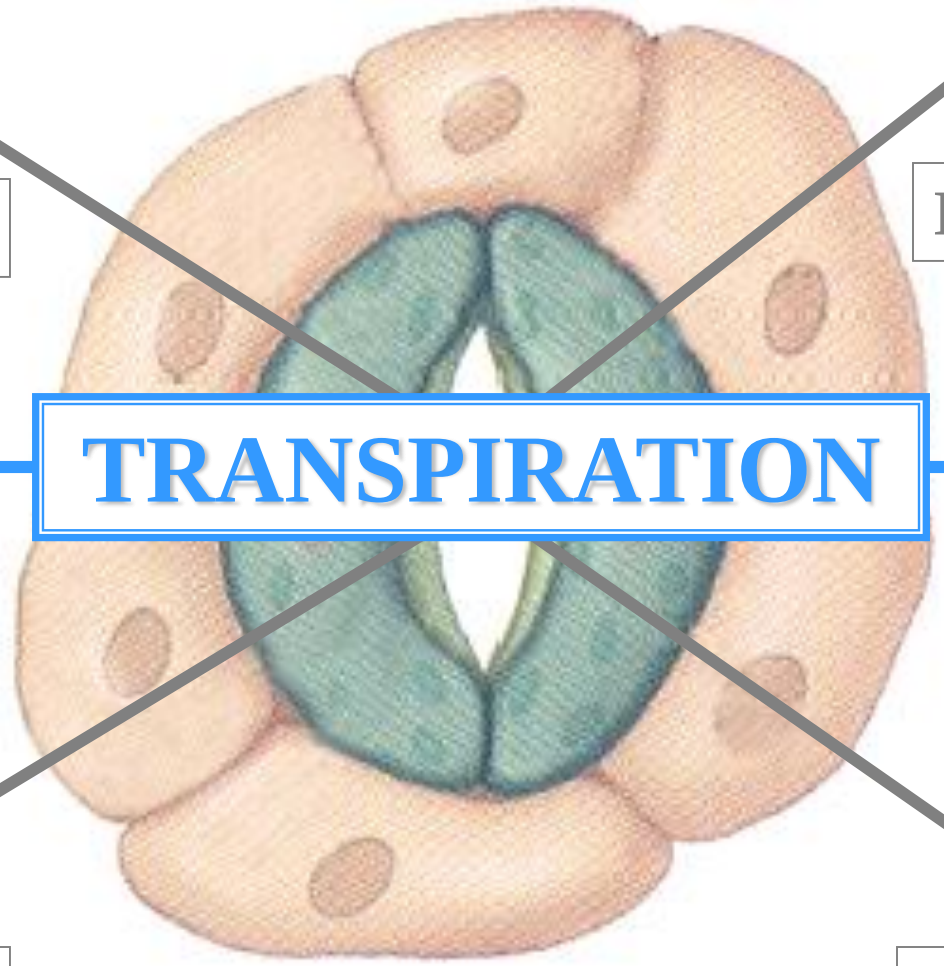
CO2

DIFFUSION

LEAF STOMATE

ATMOSPHERE

ATMOSPHERE



CO2

DIFFUSION

CO2

DIFFUSION

H2O

DIFFUSION

TRANSPIRATION

H2O

DIFFUSION

CO2

DIFFUSION

CO2

DIFFUSION

LEAF STOMATE

ATMOSPHERE

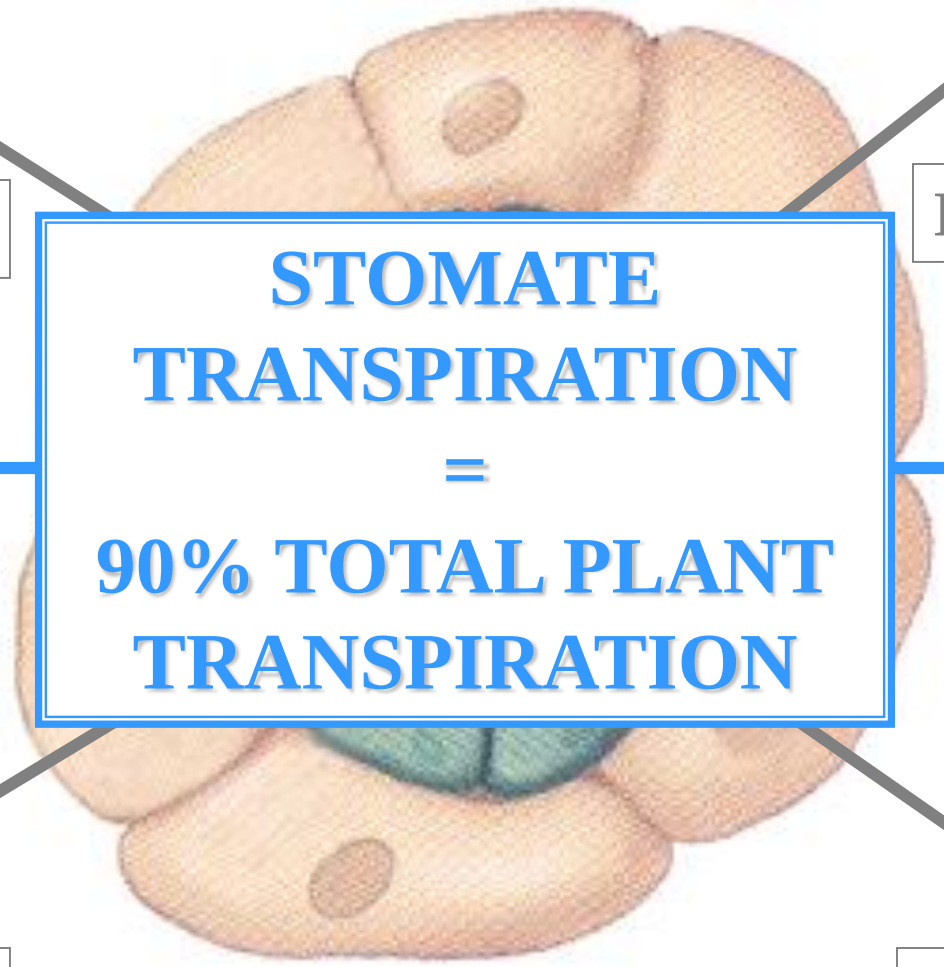
ATMOSPHERE

CO2

DIFFUSION

CO2

DIFFUSION



STOMATE TRANSPIRATION = 90% TOTAL PLANT TRANSPIRATION

H2O

DIFFUSION

H2O

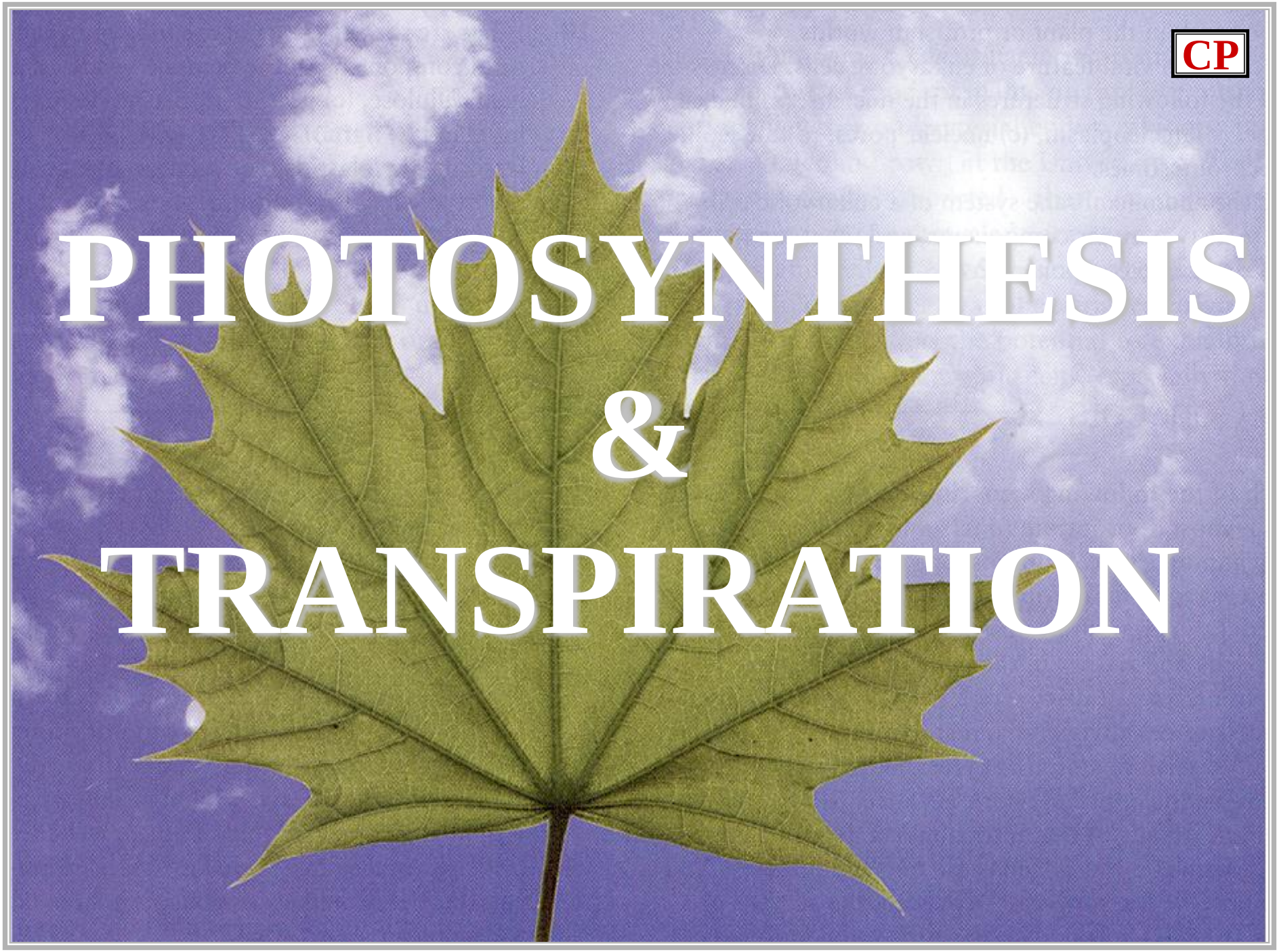
DIFFUSION

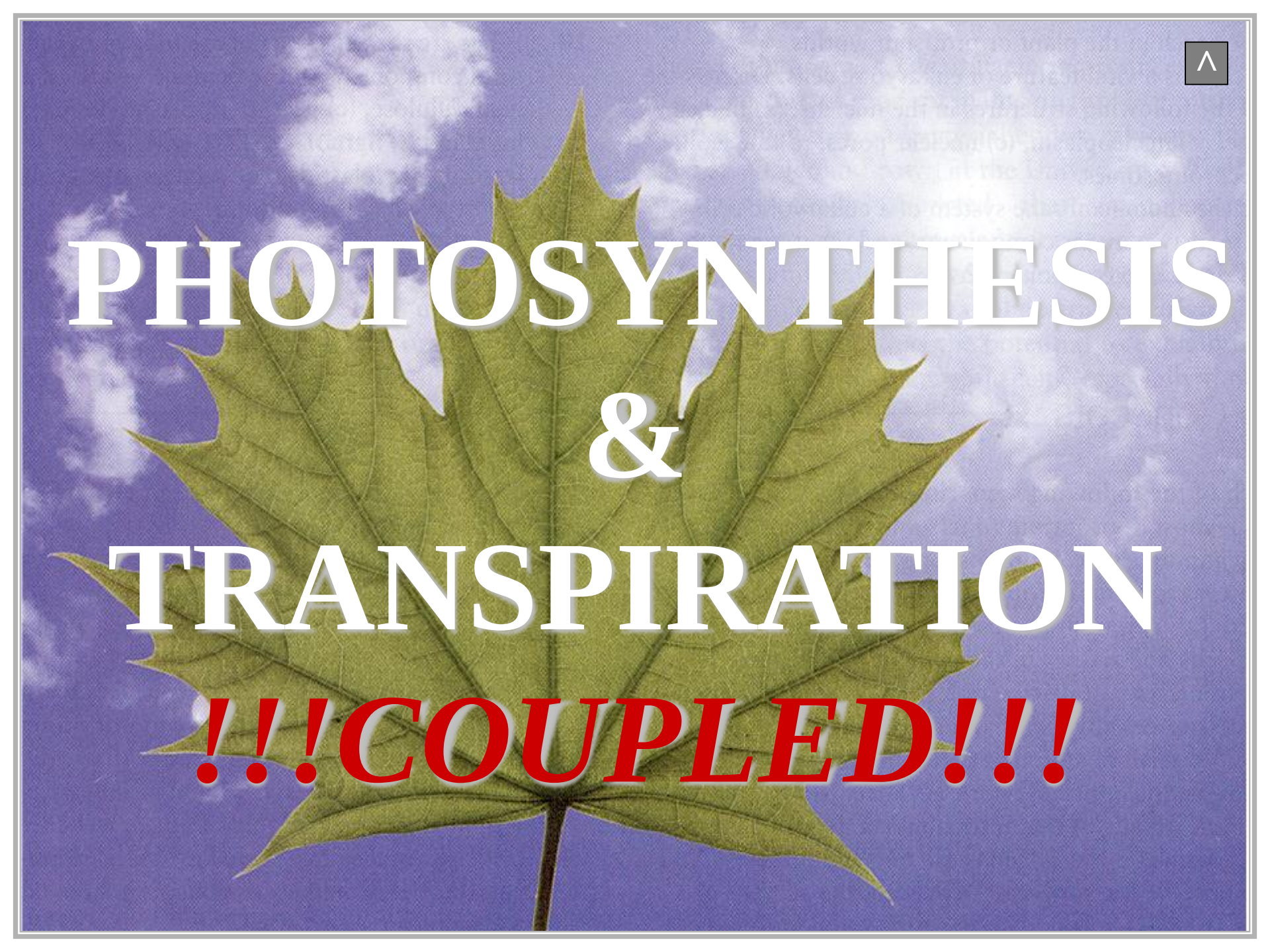
CO2

DIFFUSION

CO2

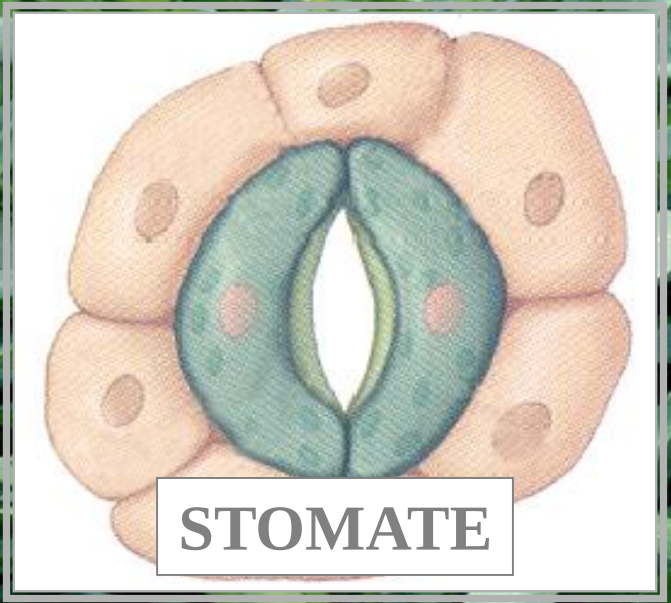
DIFFUSION

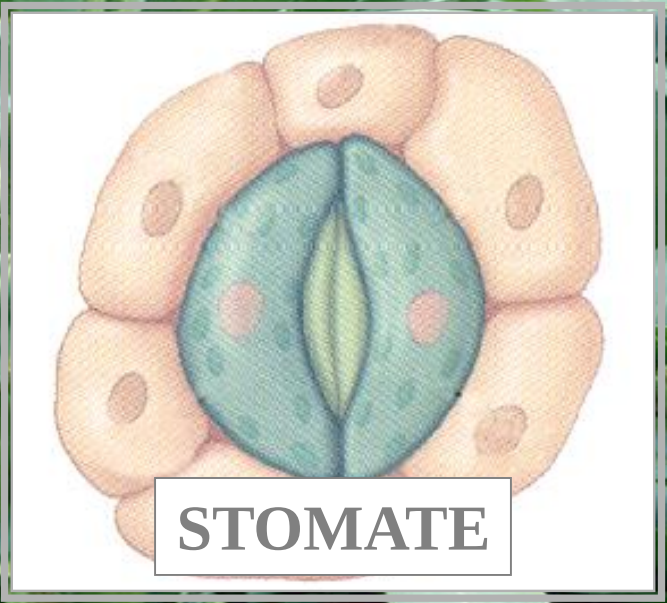

CP
PHOTOSYNTHESIS
&
TRANSPIRATION


PHOTOSYNTHESIS
&
TRANSPIRATION
!!!COUPLED!!!

TRANSPIRATION REGULATION

TRANSPIRATION REGULATIONS

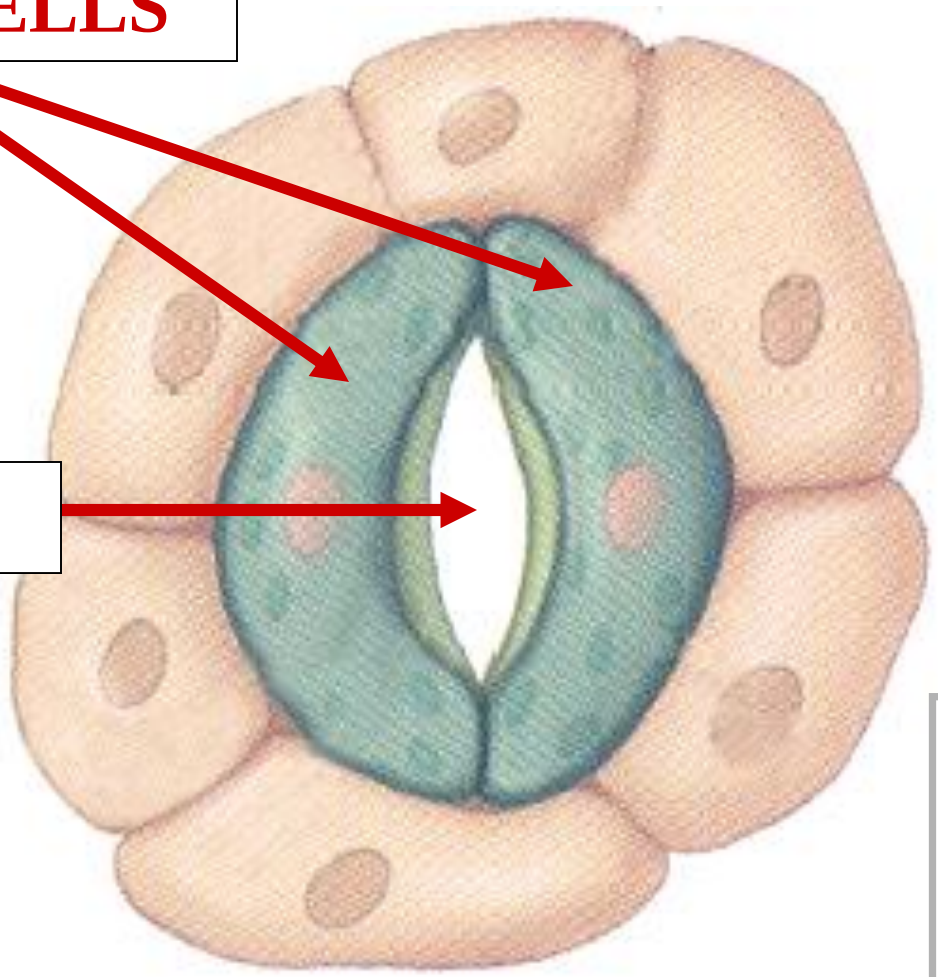




LEAF
STOMATE

GUARD CELLS

STOMA

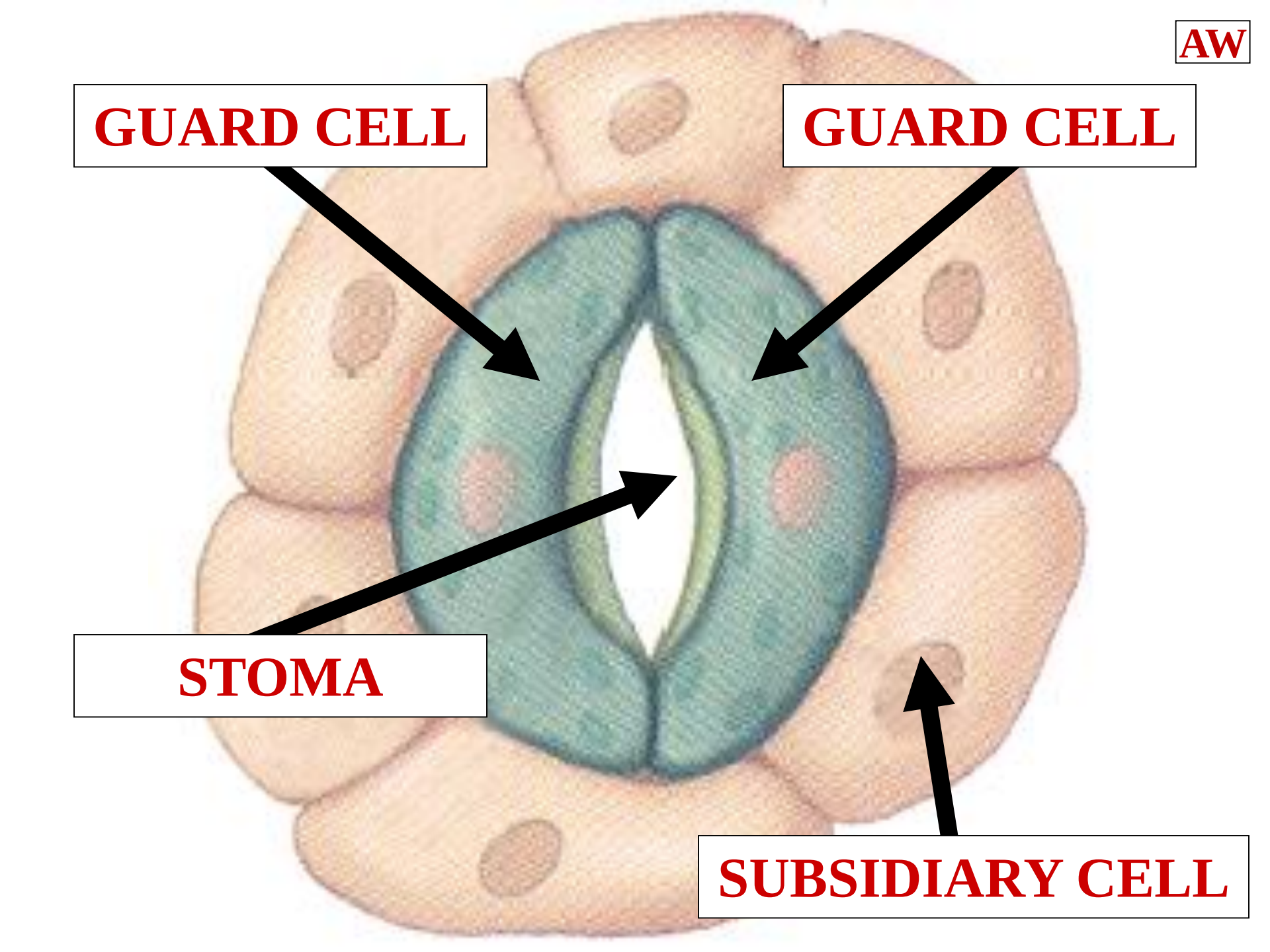


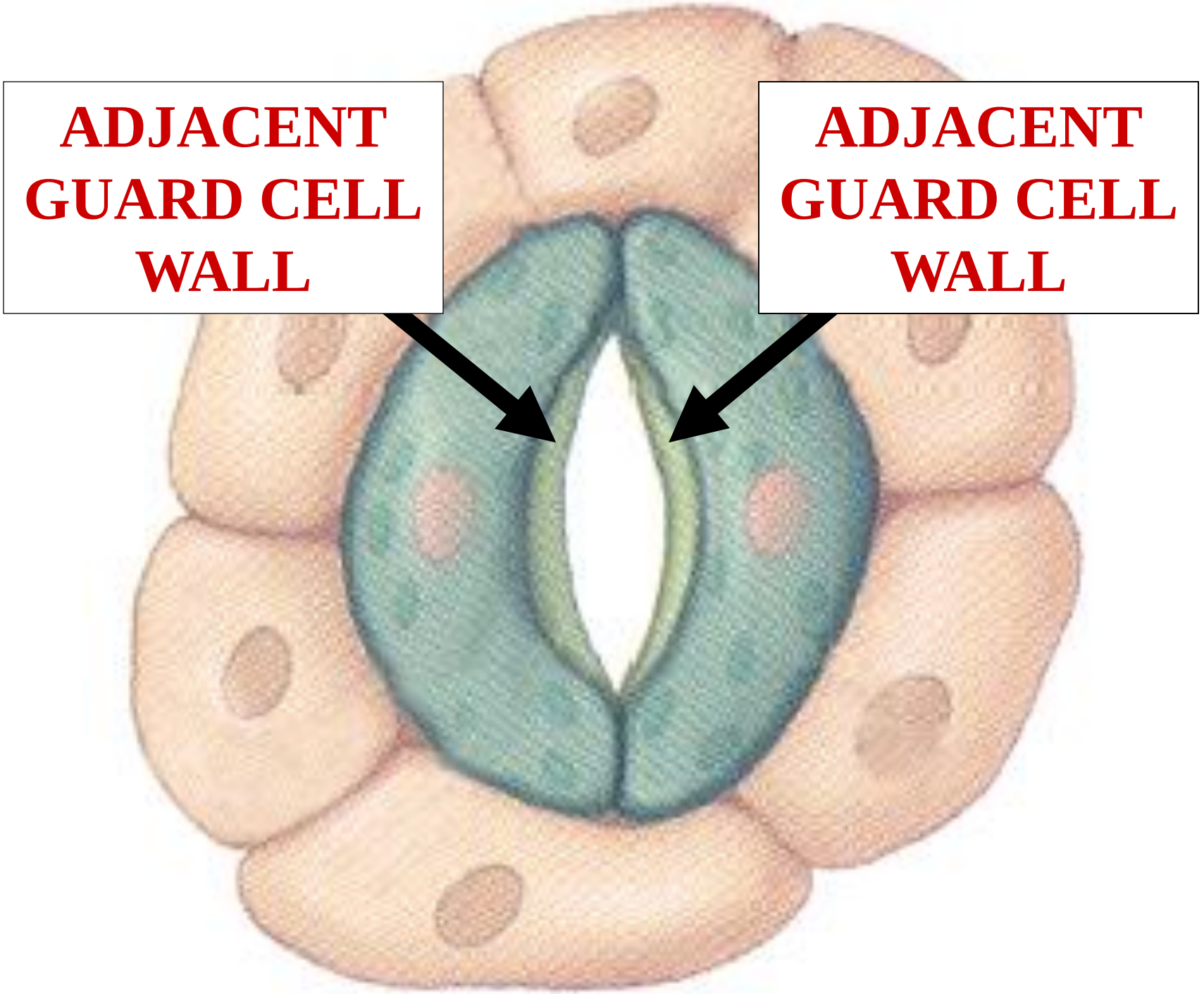
STOMATE
GUARD CELLS

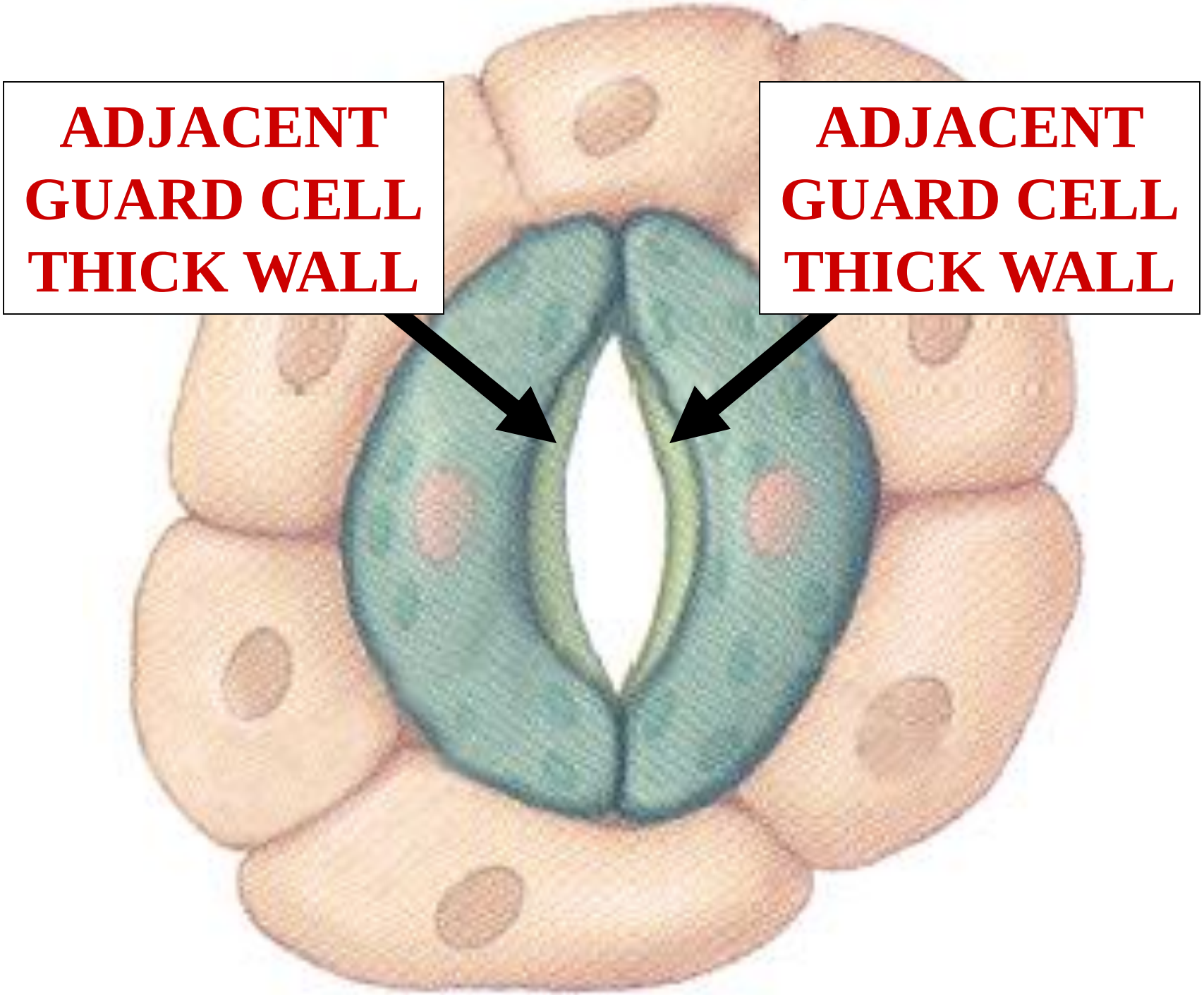
AW

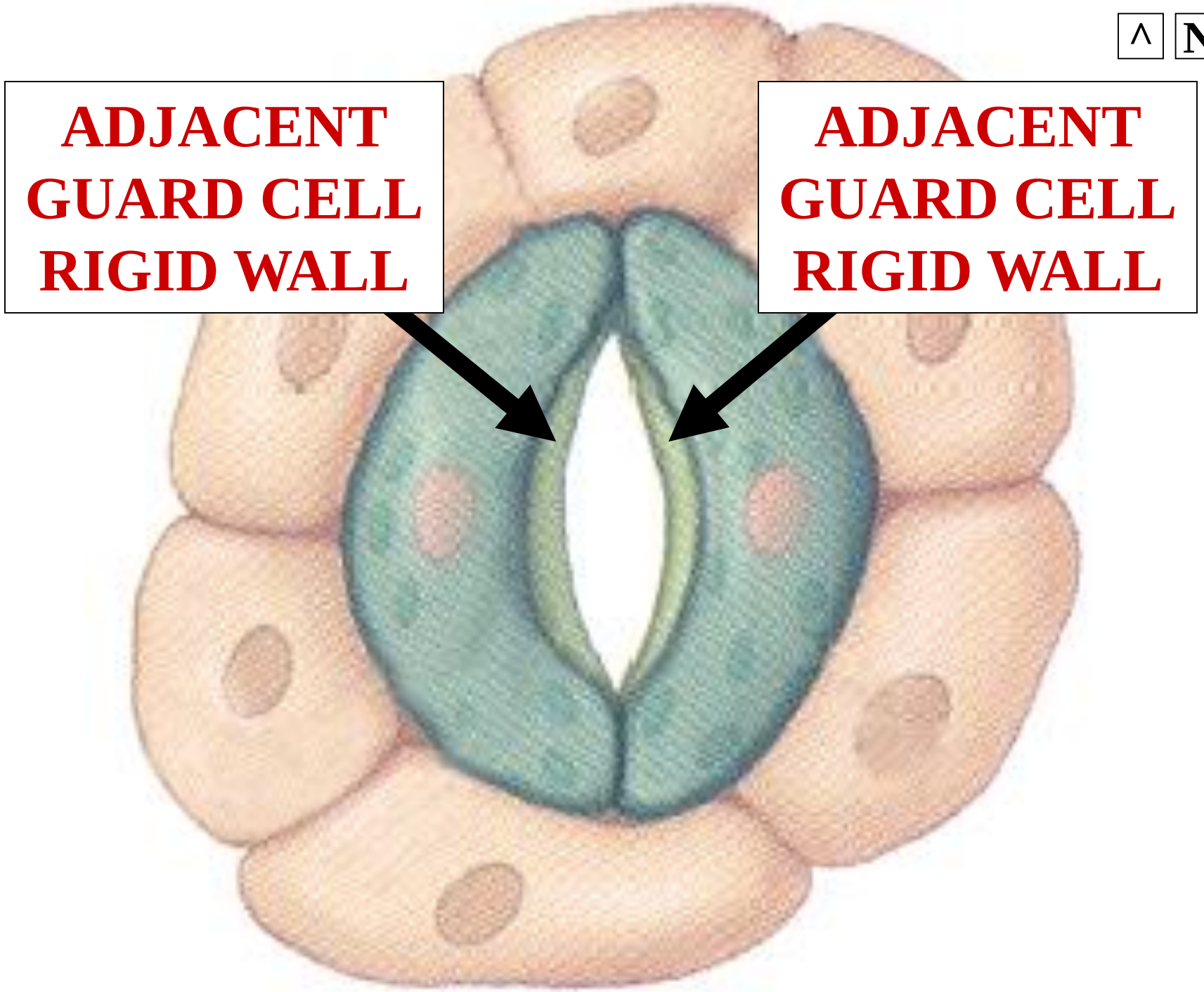
STOMATE GUARD CELL STRUCTURE

ADJACENT GUARD CELL WALLS

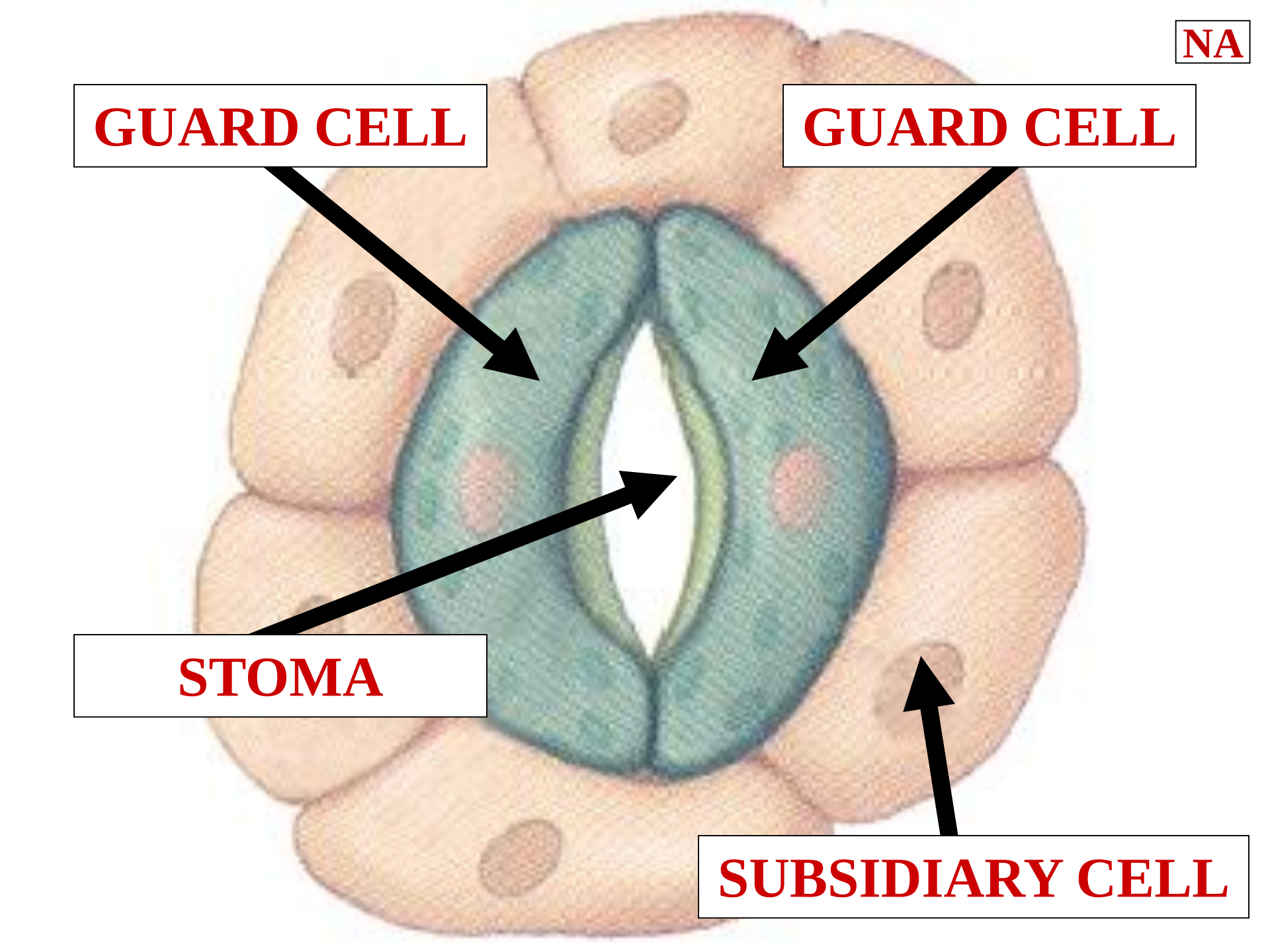

AW
GUARD CELL
GUARD CELL
STOMA
SUBSIDIARY CELL

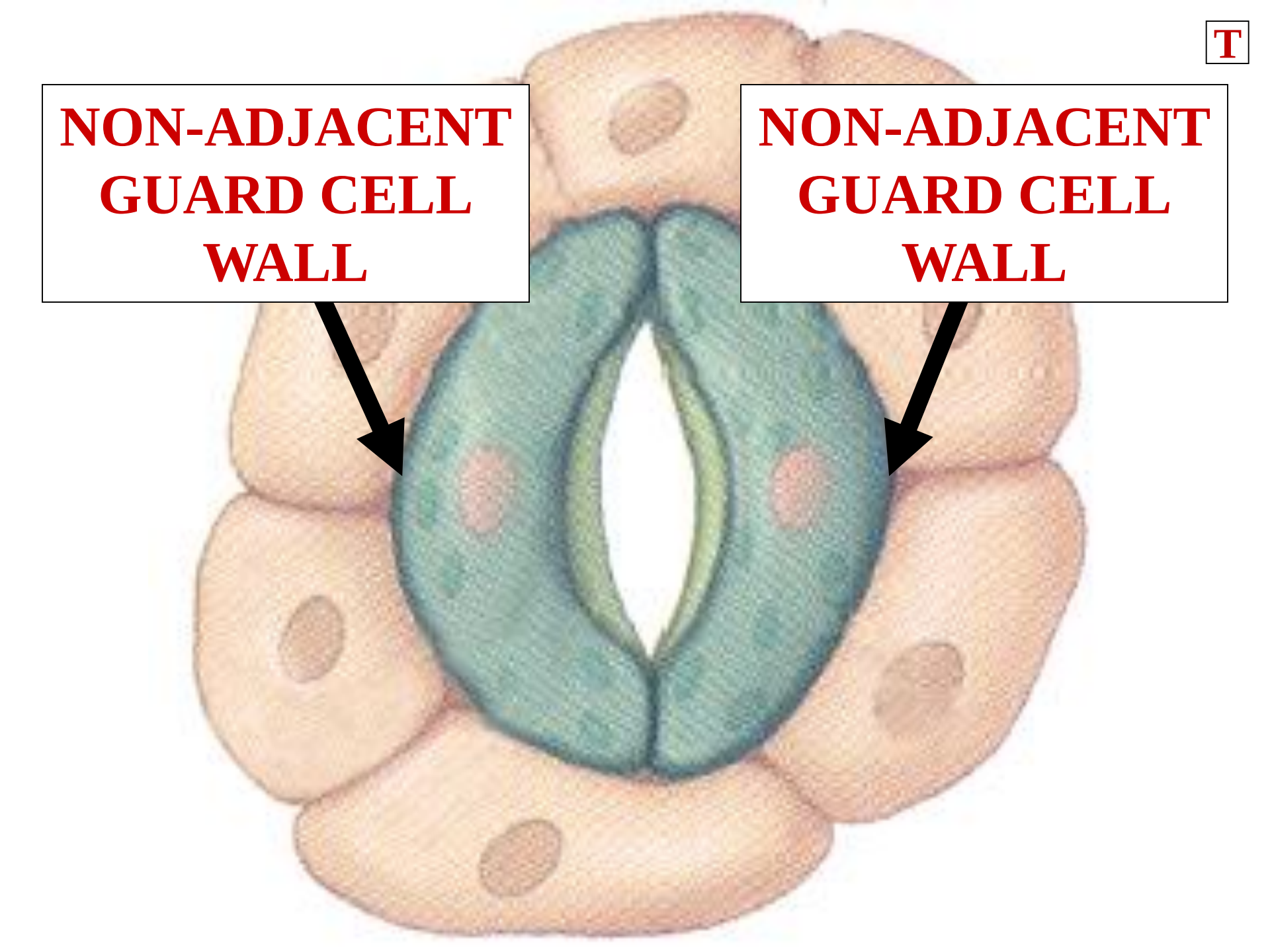

ADJACENT GUARD CELL WALL
ADJACENT GUARD CELL WALL


ADJACENT GUARD CELL THICK WALL
ADJACENT GUARD CELL THICK WALL

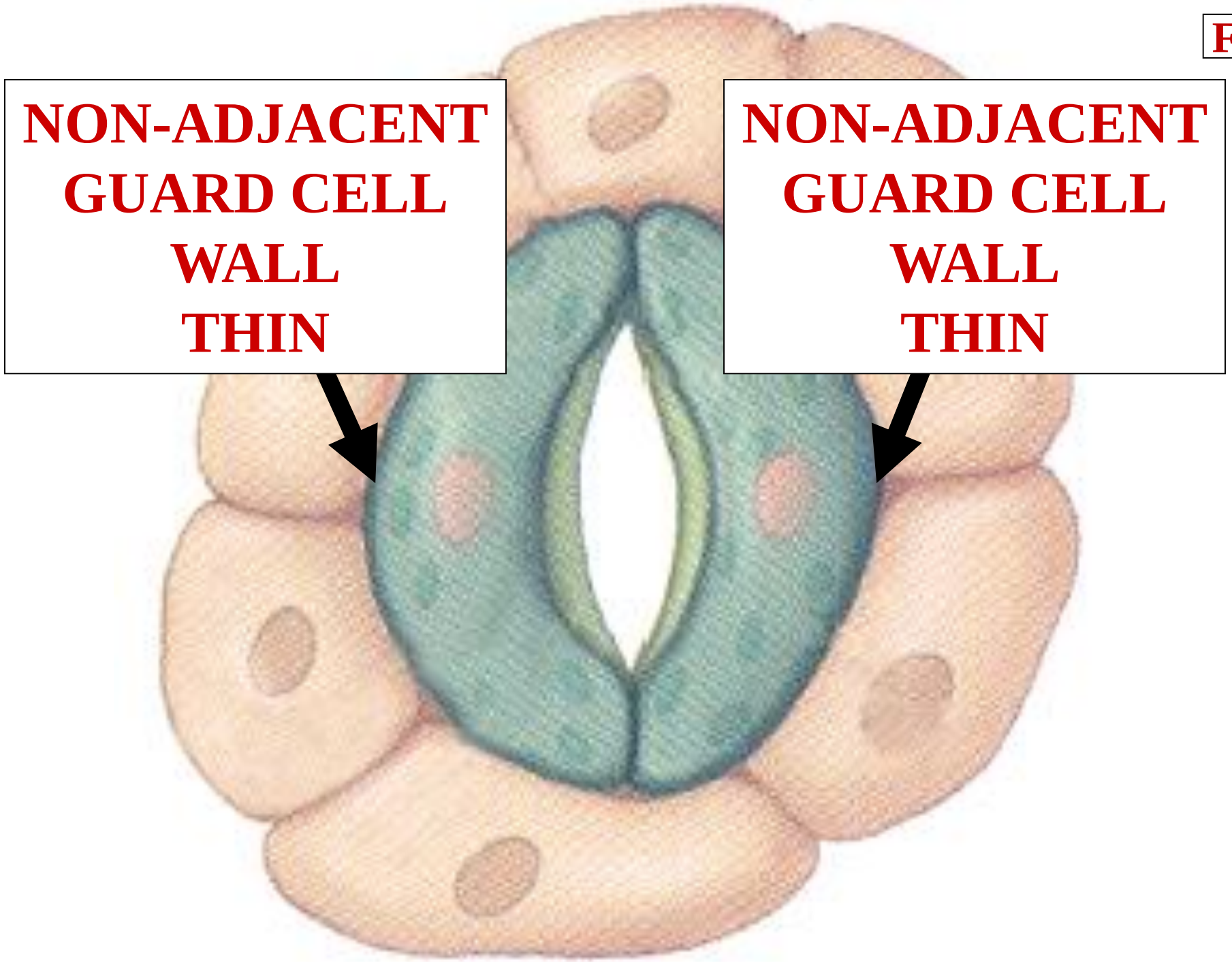

ADJACENT GUARD CELL RIGID WALL
ADJACENT GUARD CELL RIGID WALL

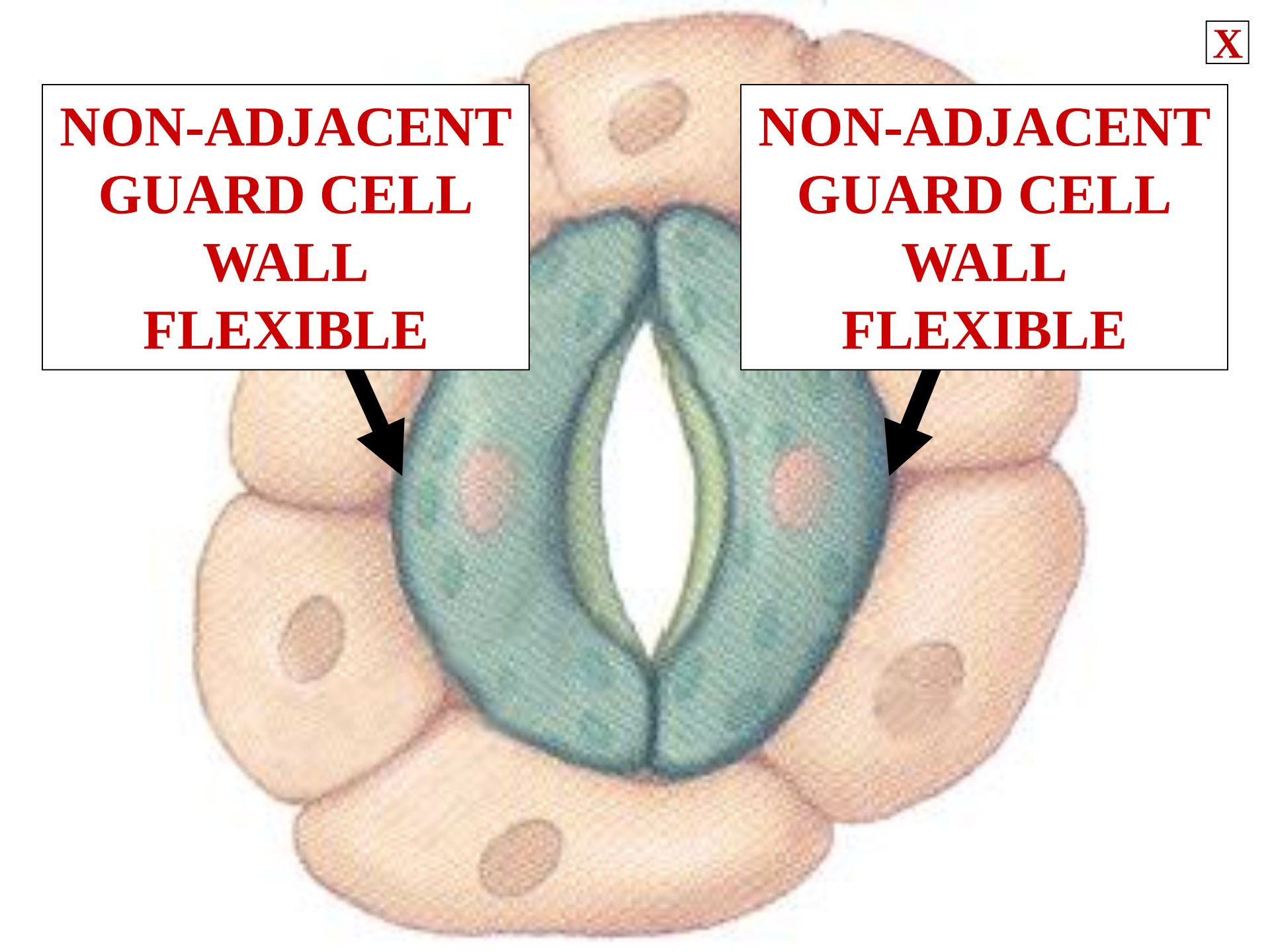
NON-ADJACENT GUARD CELL WALLS


NA
GUARD CELL
GUARD CELL
STOMA
SUBSIDIARY CELL

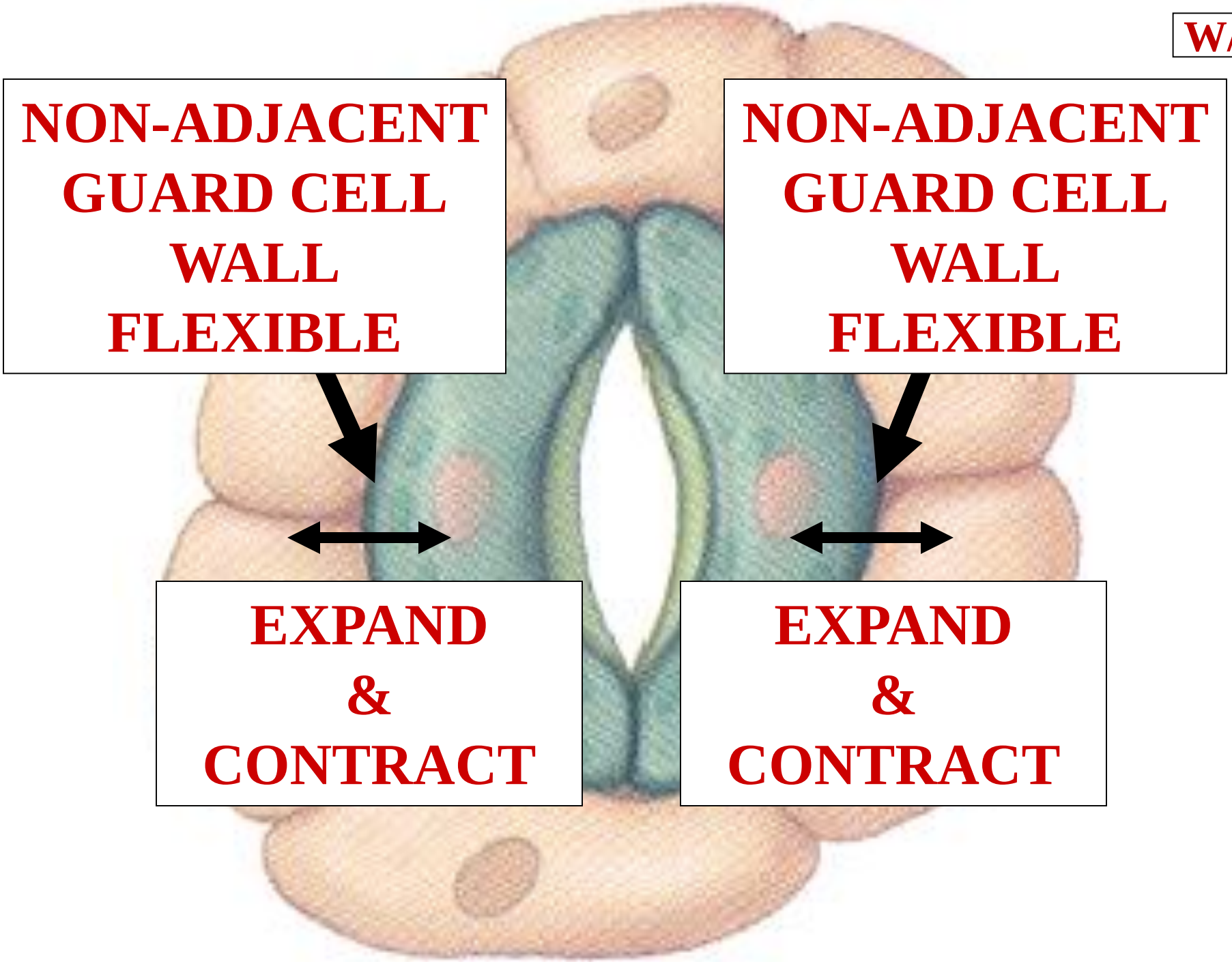

NON-ADJACENT GUARD CELL WALL
NON-ADJACENT GUARD CELL WALL

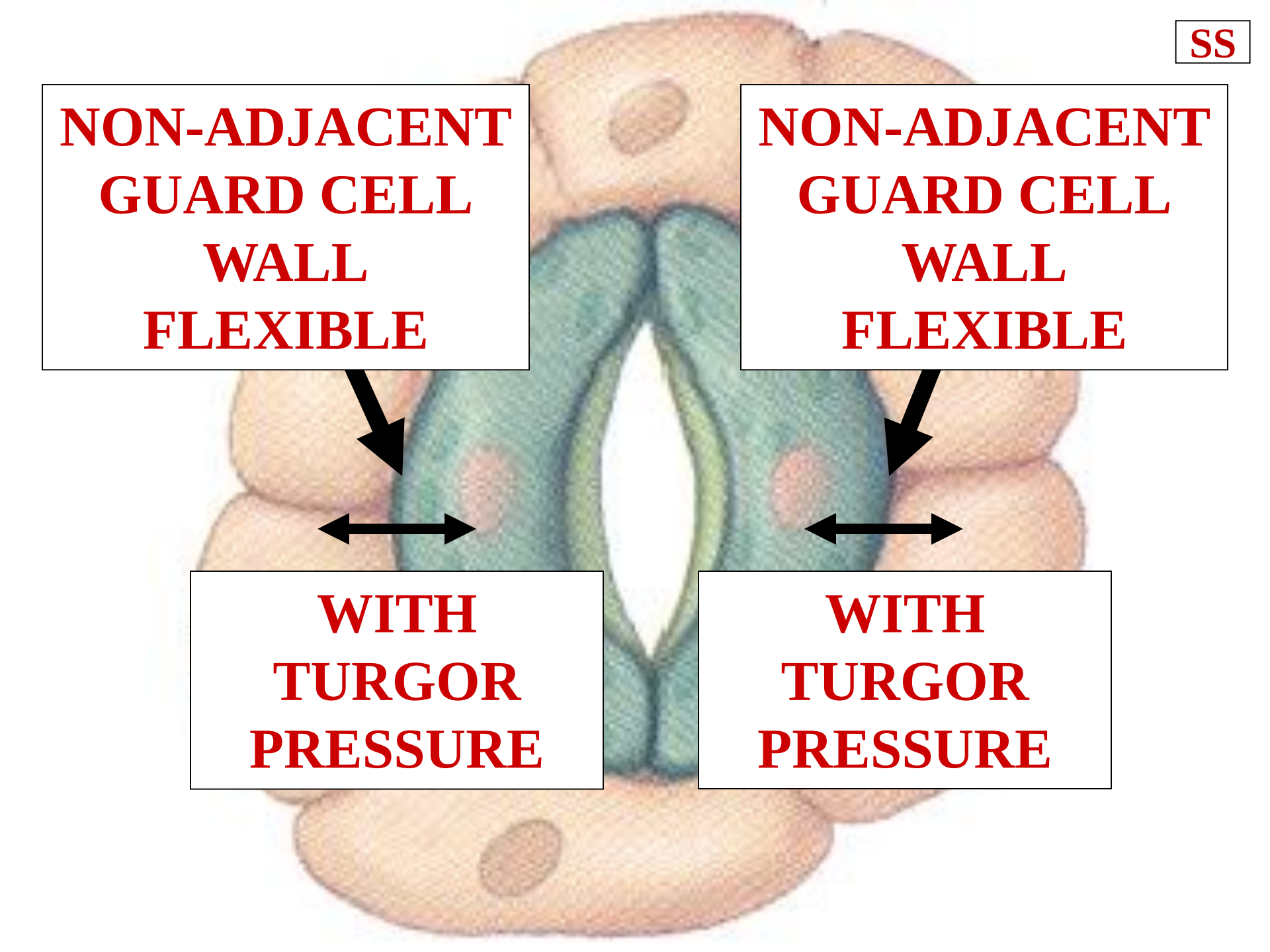
F

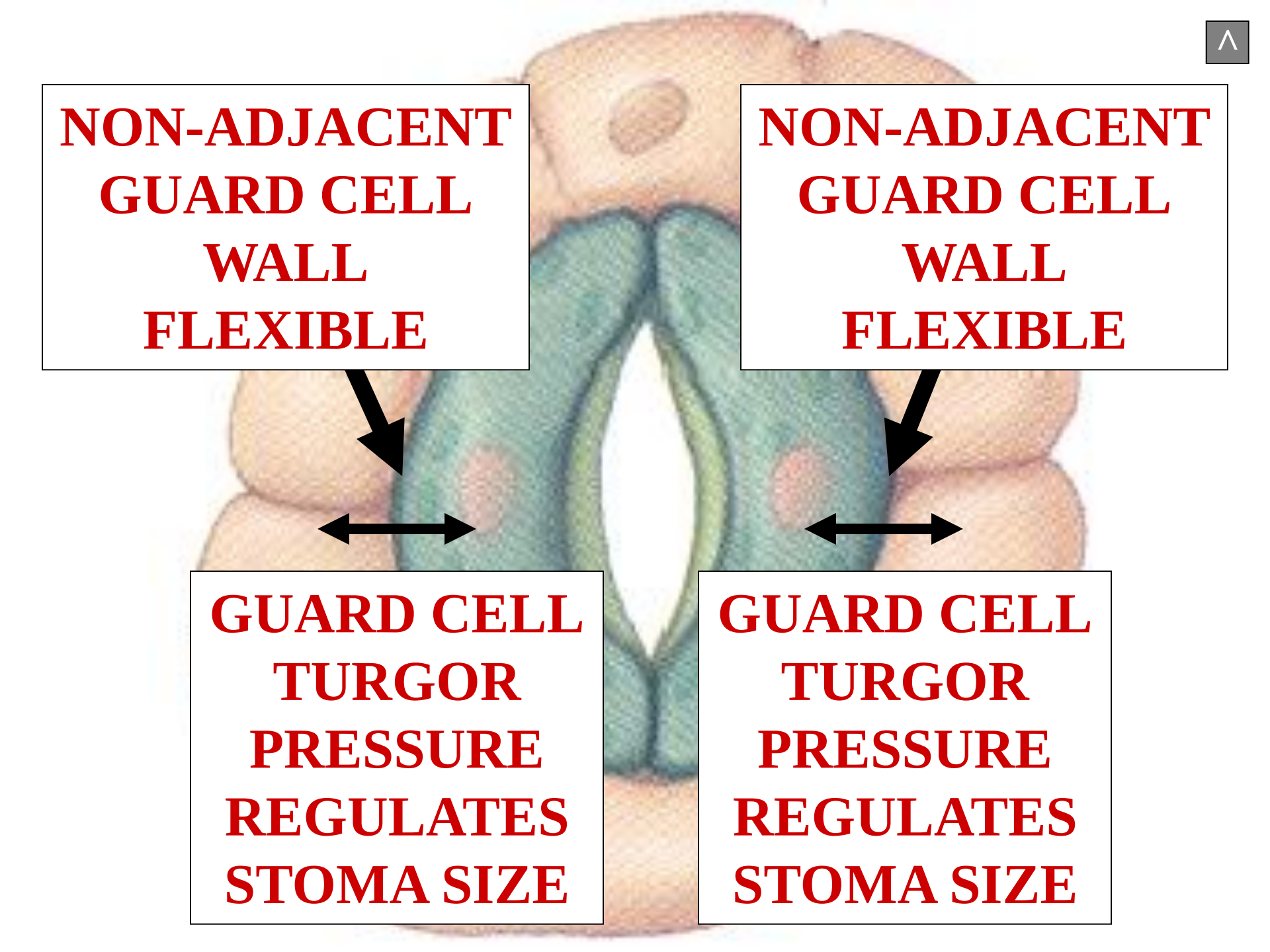

NON-ADJACENT
GUARD CELL
WALL
THIN
NON-ADJACENT
GUARD CELL
WALL
THIN


NON-ADJACENT GUARD CELL WALL FLEXIBLE
NON-ADJACENT GUARD CELL WALL FLEXIBLE
X

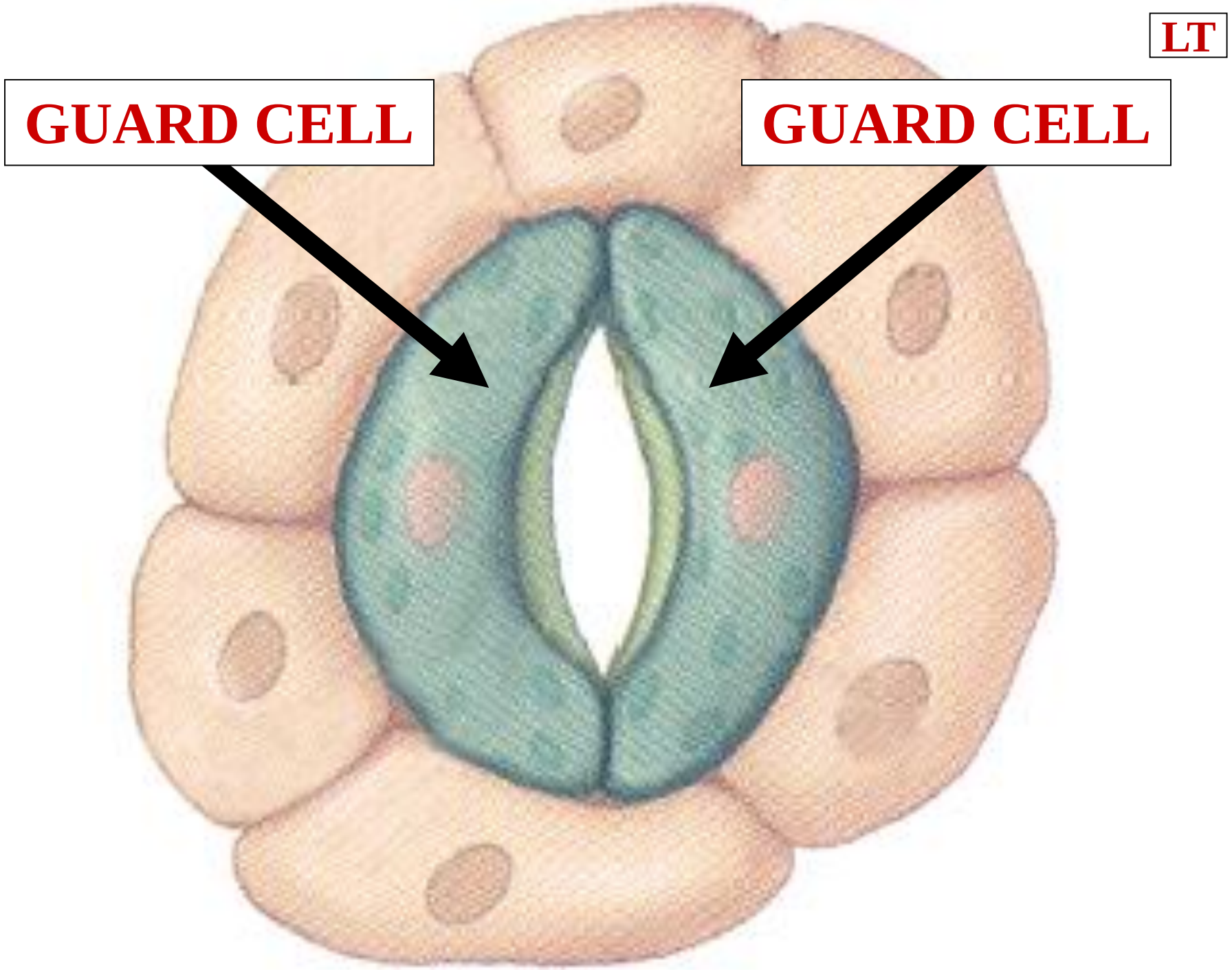
W/

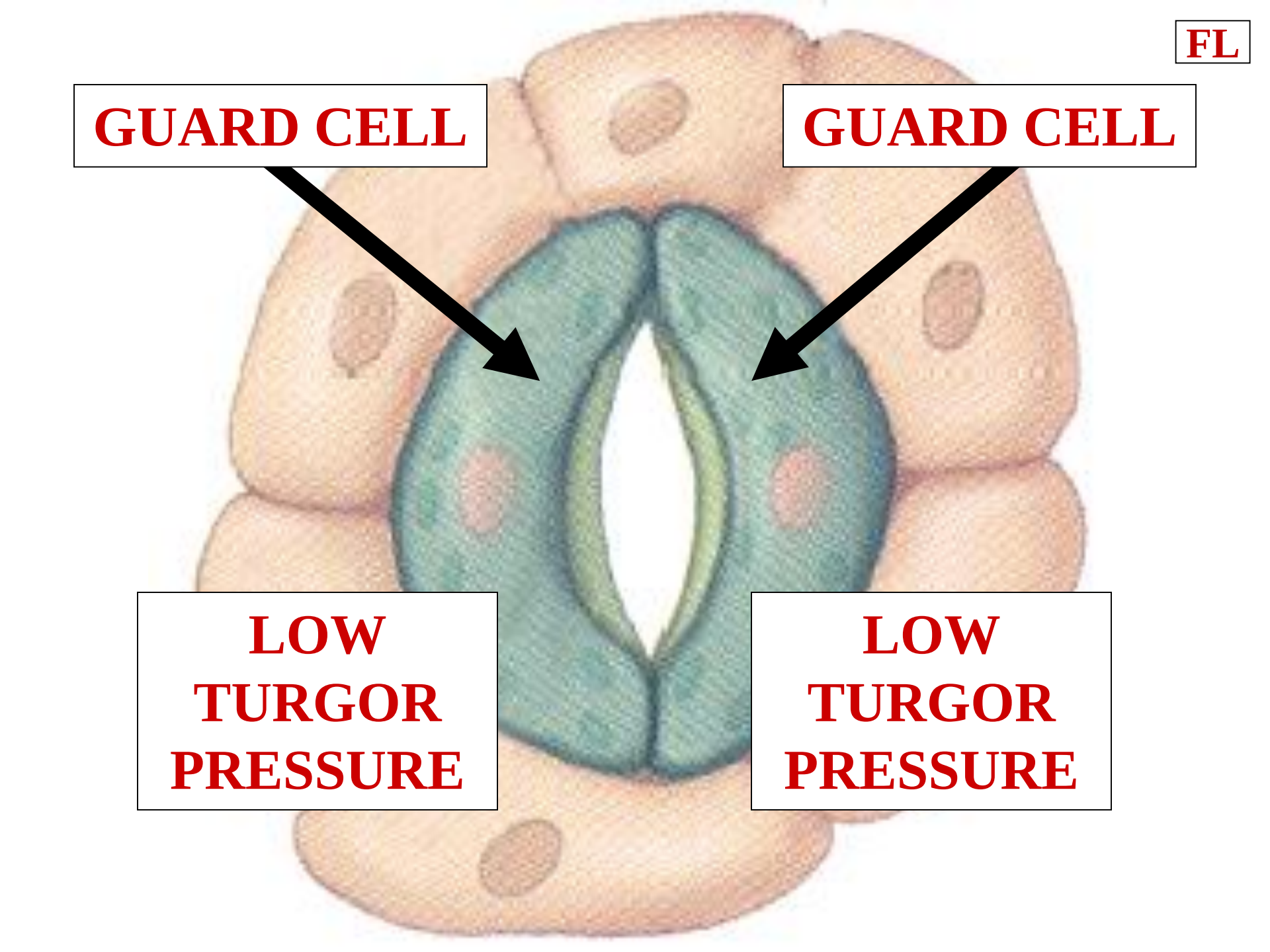

NON-ADJACENT GUARD CELL WALL FLEXIBLE
NON-ADJACENT GUARD CELL WALL FLEXIBLE
EXPAND & CONTRACT
EXPAND & CONTRACT

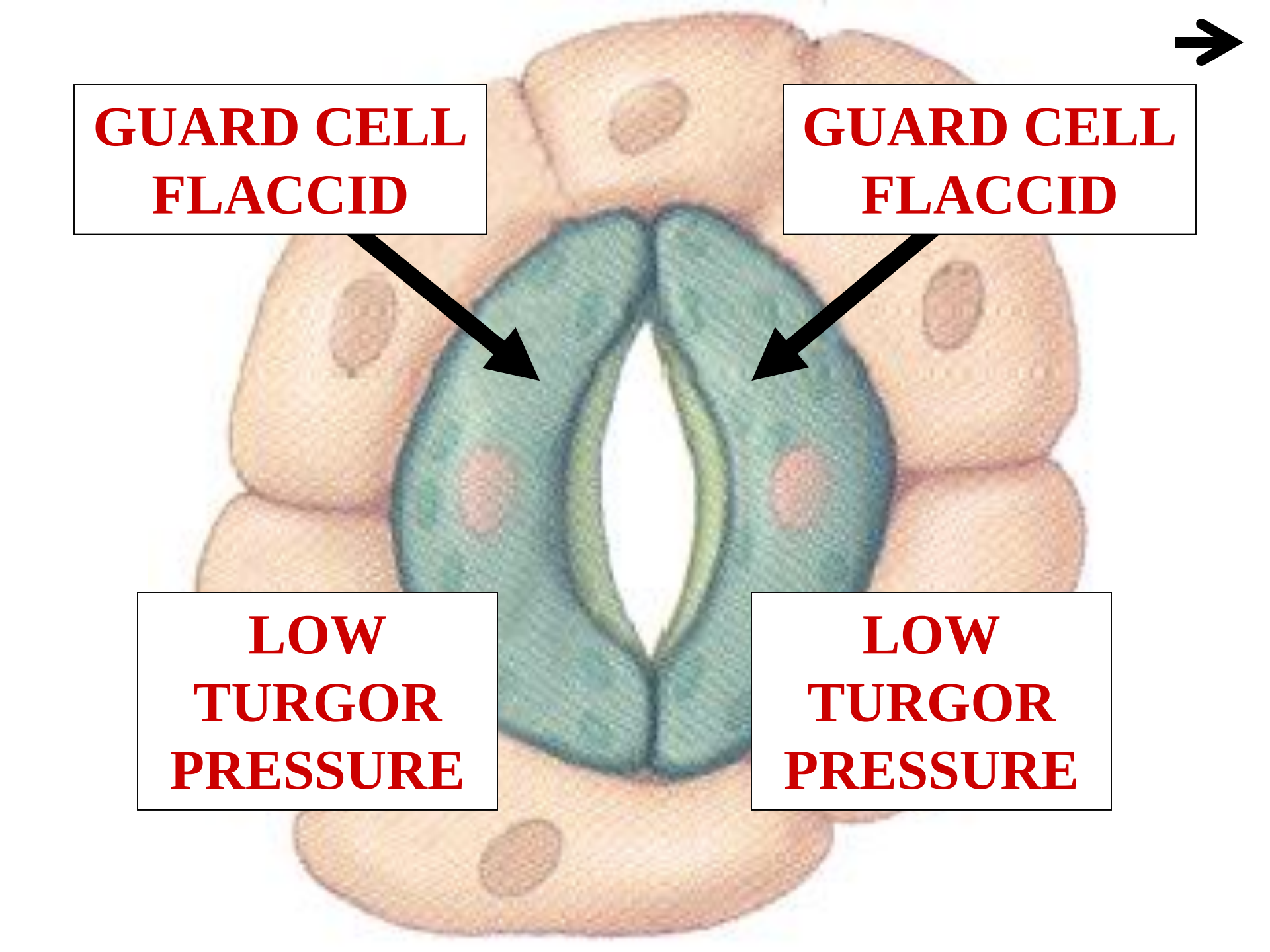

SS
NON-ADJACENT GUARD CELL WALL FLEXIBLE
NON-ADJACENT GUARD CELL WALL FLEXIBLE
WITH TURGOR PRESSURE
WITH TURGOR PRESSURE

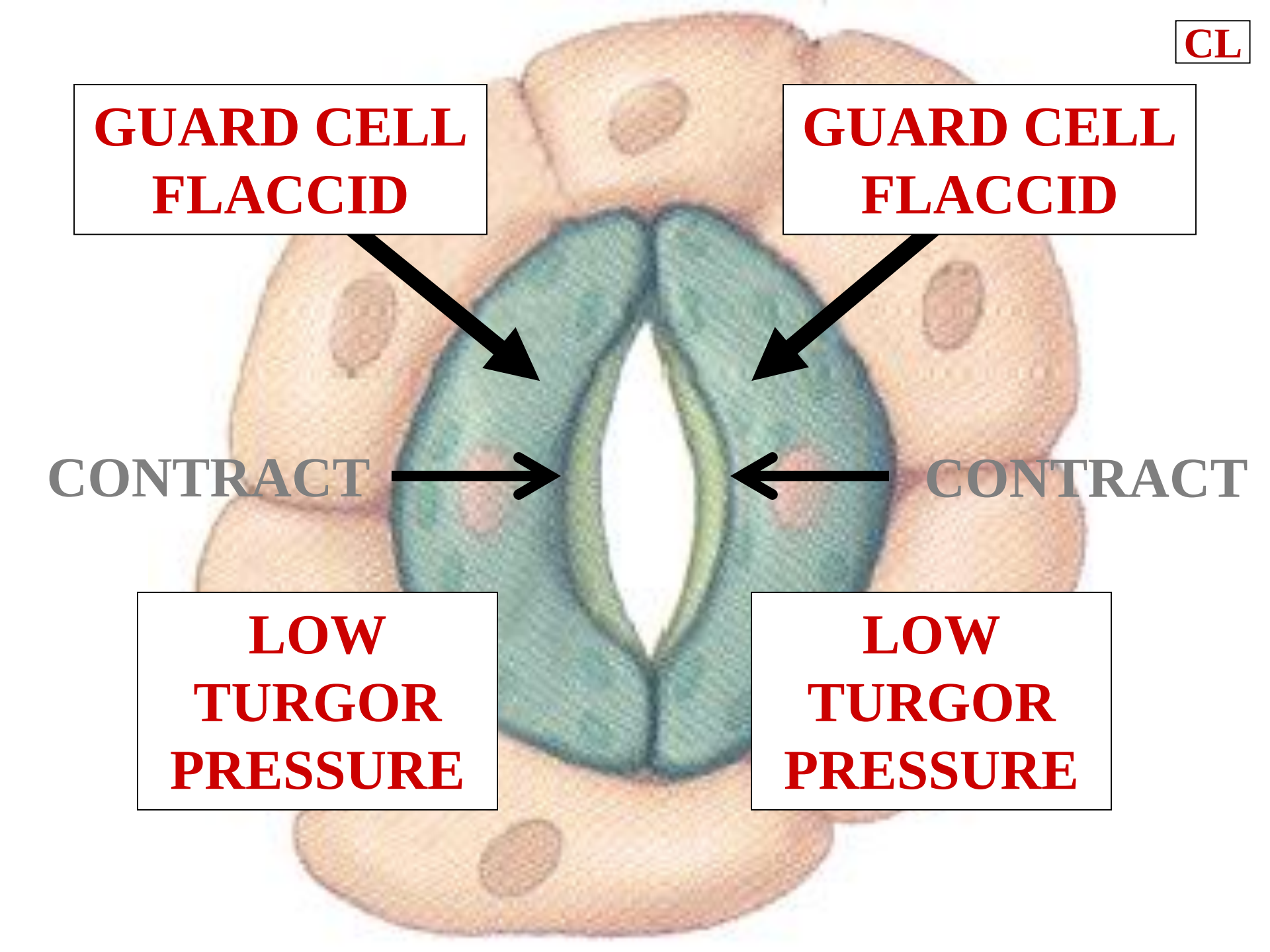

NON-ADJACENT GUARD CELL WALL FLEXIBLE
NON-ADJACENT GUARD CELL WALL FLEXIBLE
GUARD CELL TURGOR PRESSURE REGULATES STOMA SIZE
GUARD CELL TURGOR PRESSURE REGULATES STOMA SIZE

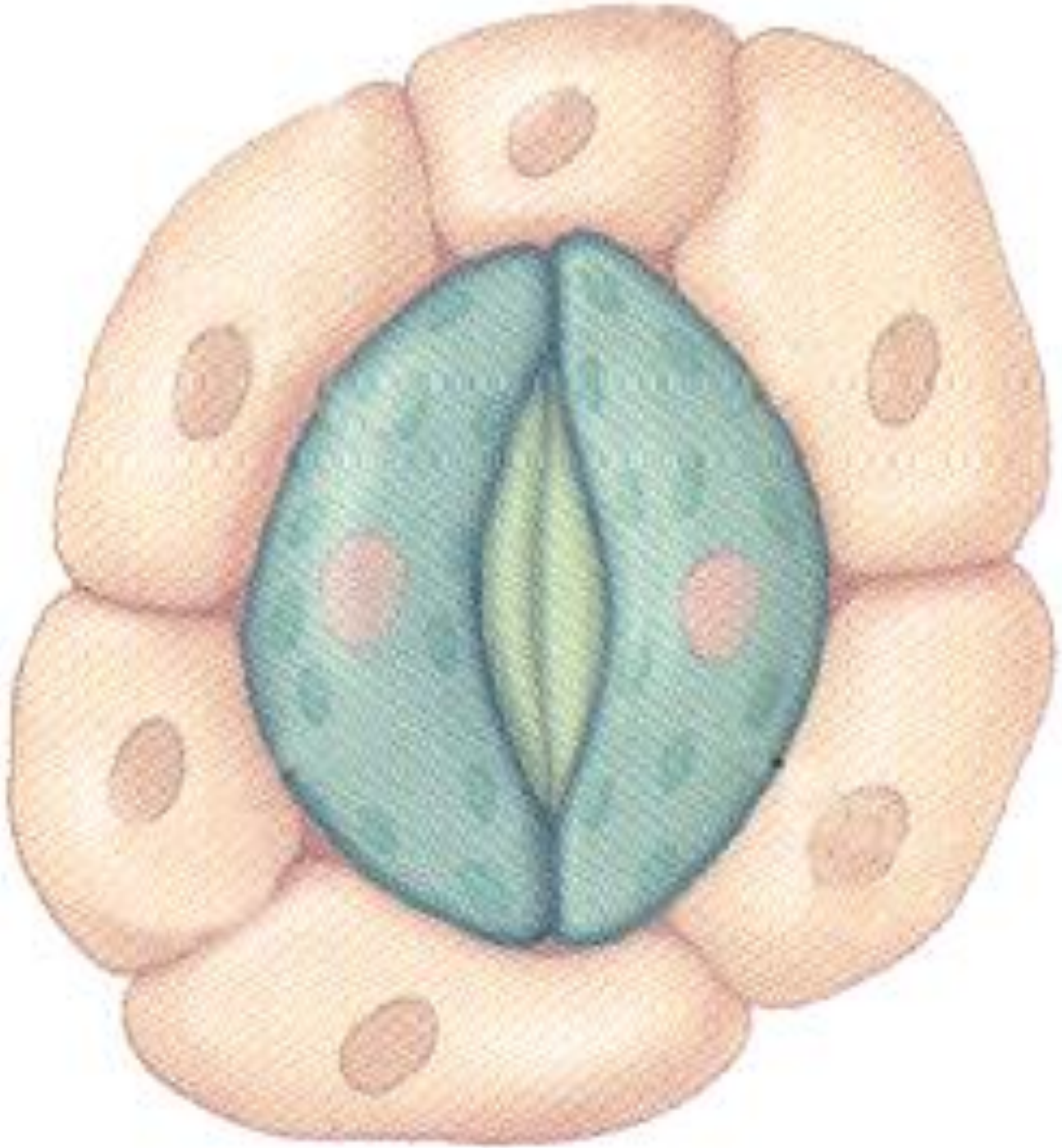
GUARD CELL TURGOR PRESSURE

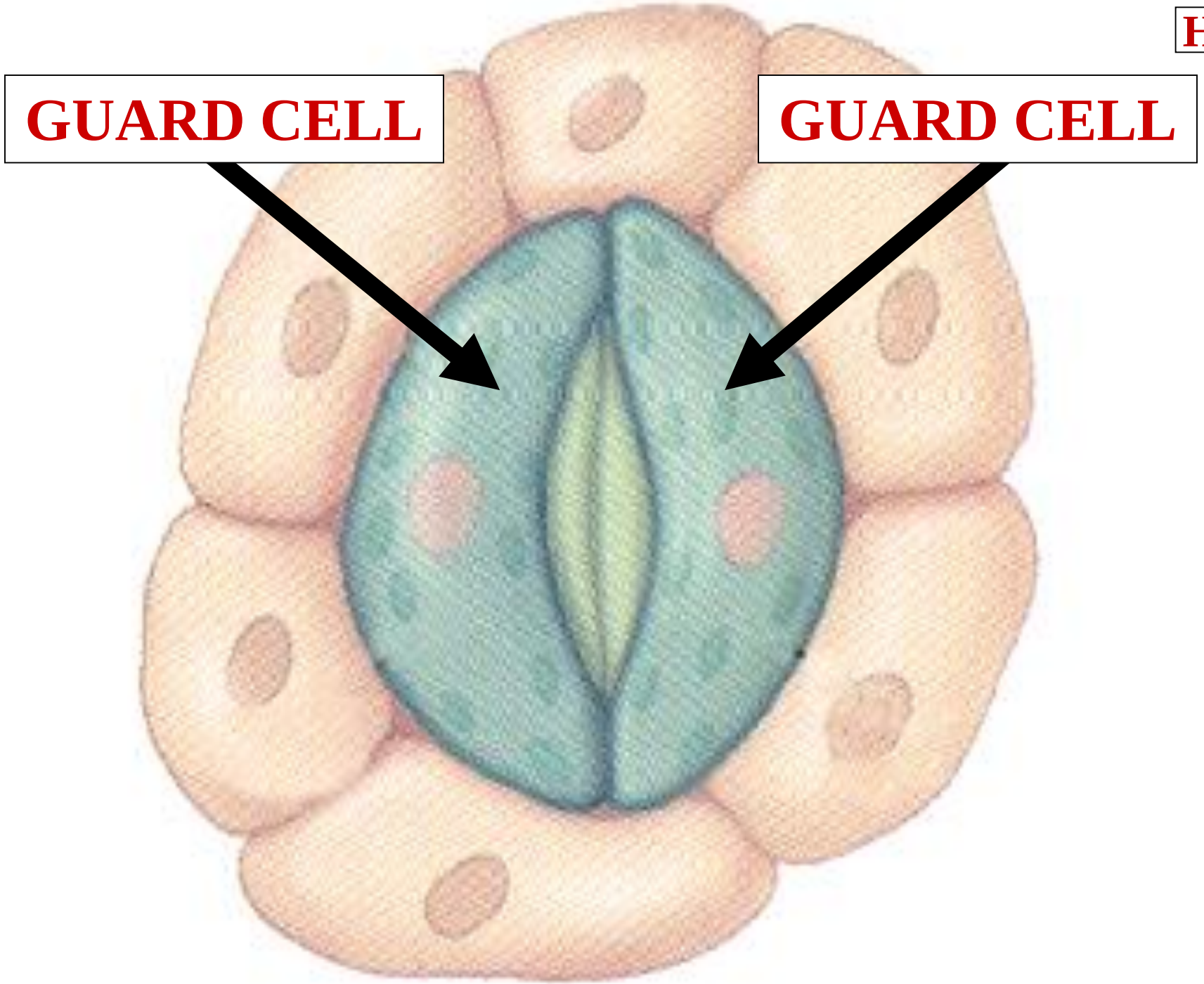

LT
GUARD CELL
GUARD CELL

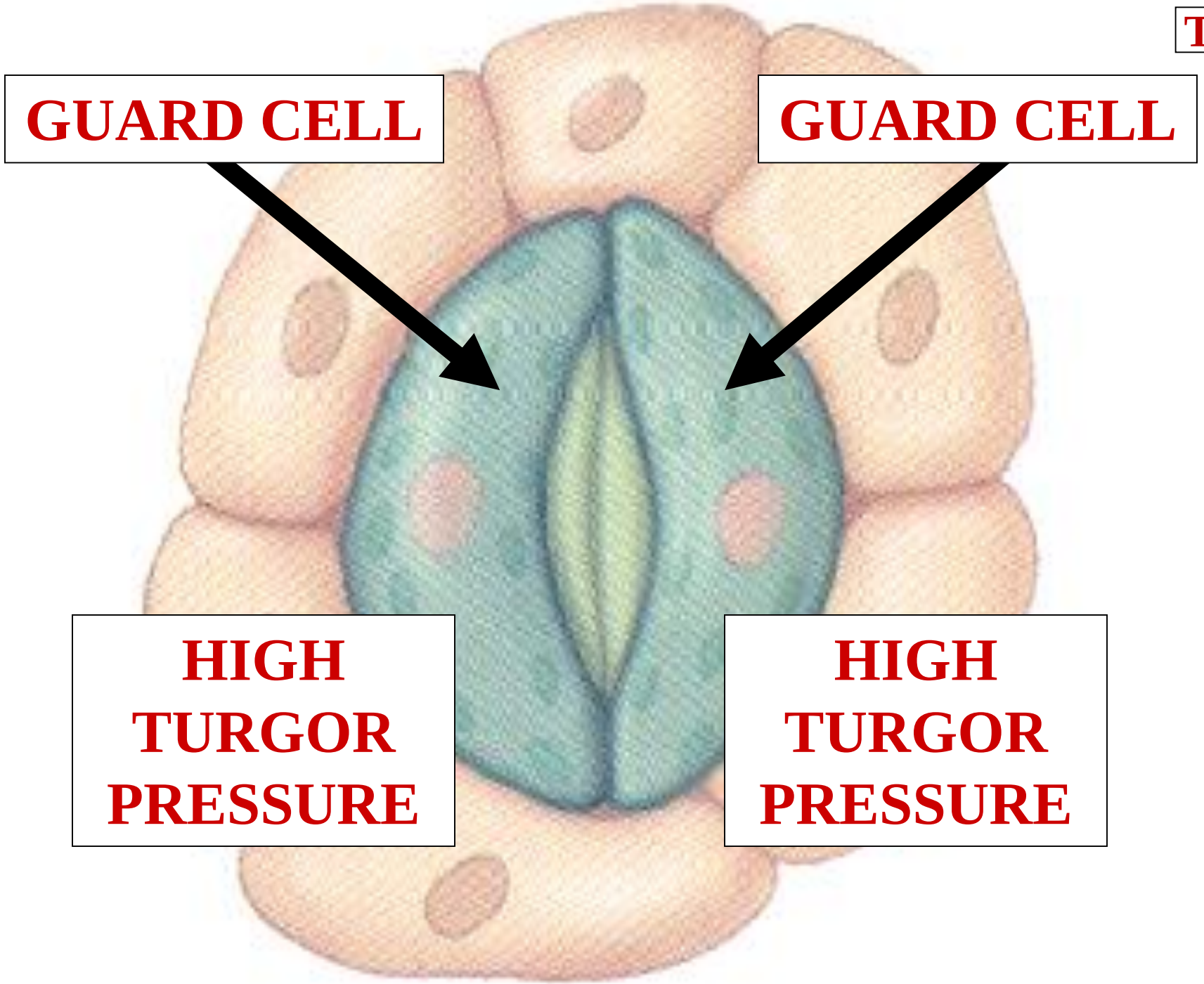

FL
GUARD CELL
GUARD CELL
LOW TURGOR PRESSURE
LOW TURGOR PRESSURE

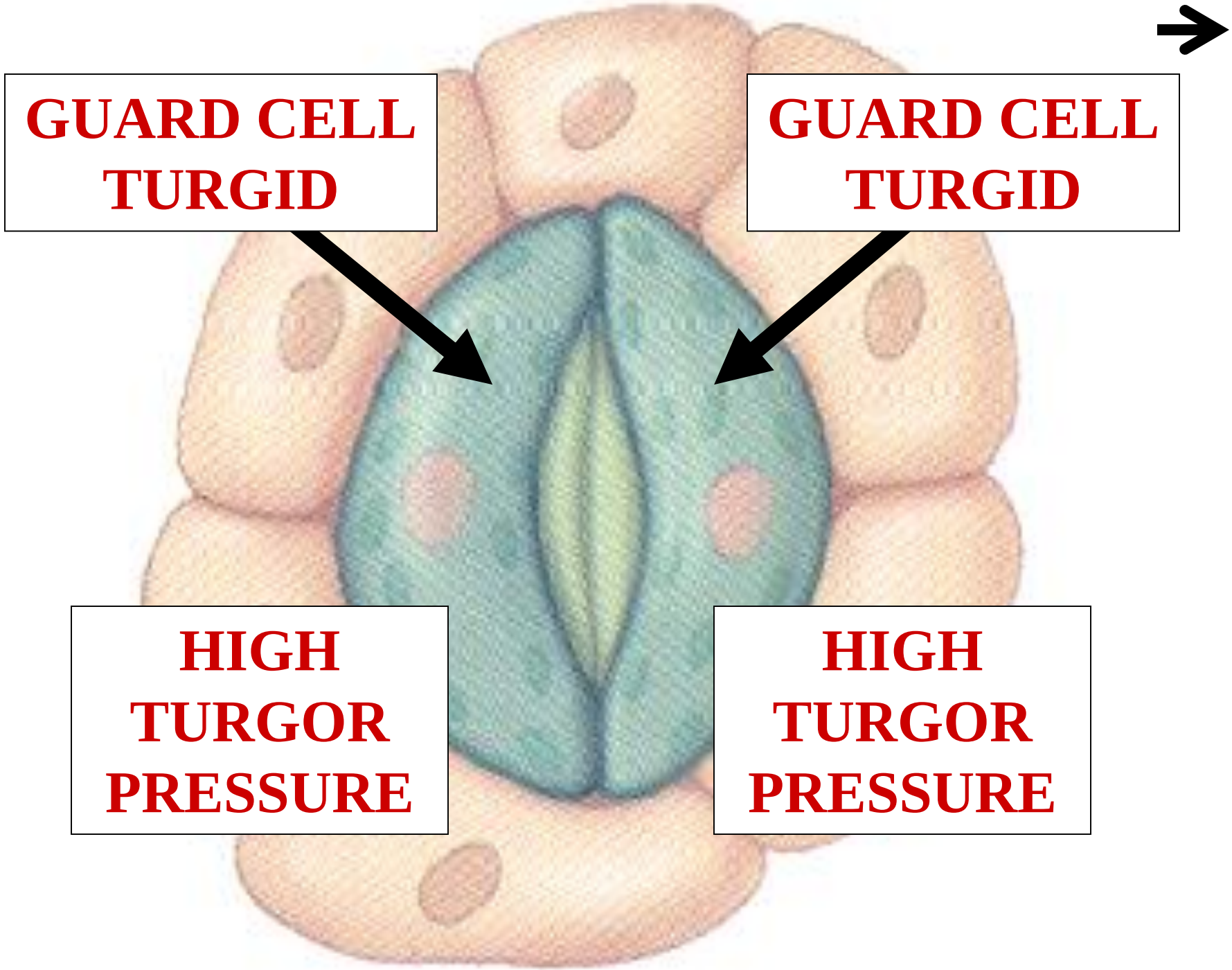

GUARD CELL FLACCID
GUARD CELL FLACCID
LOW TURGOR PRESSURE
LOW TURGOR PRESSURE

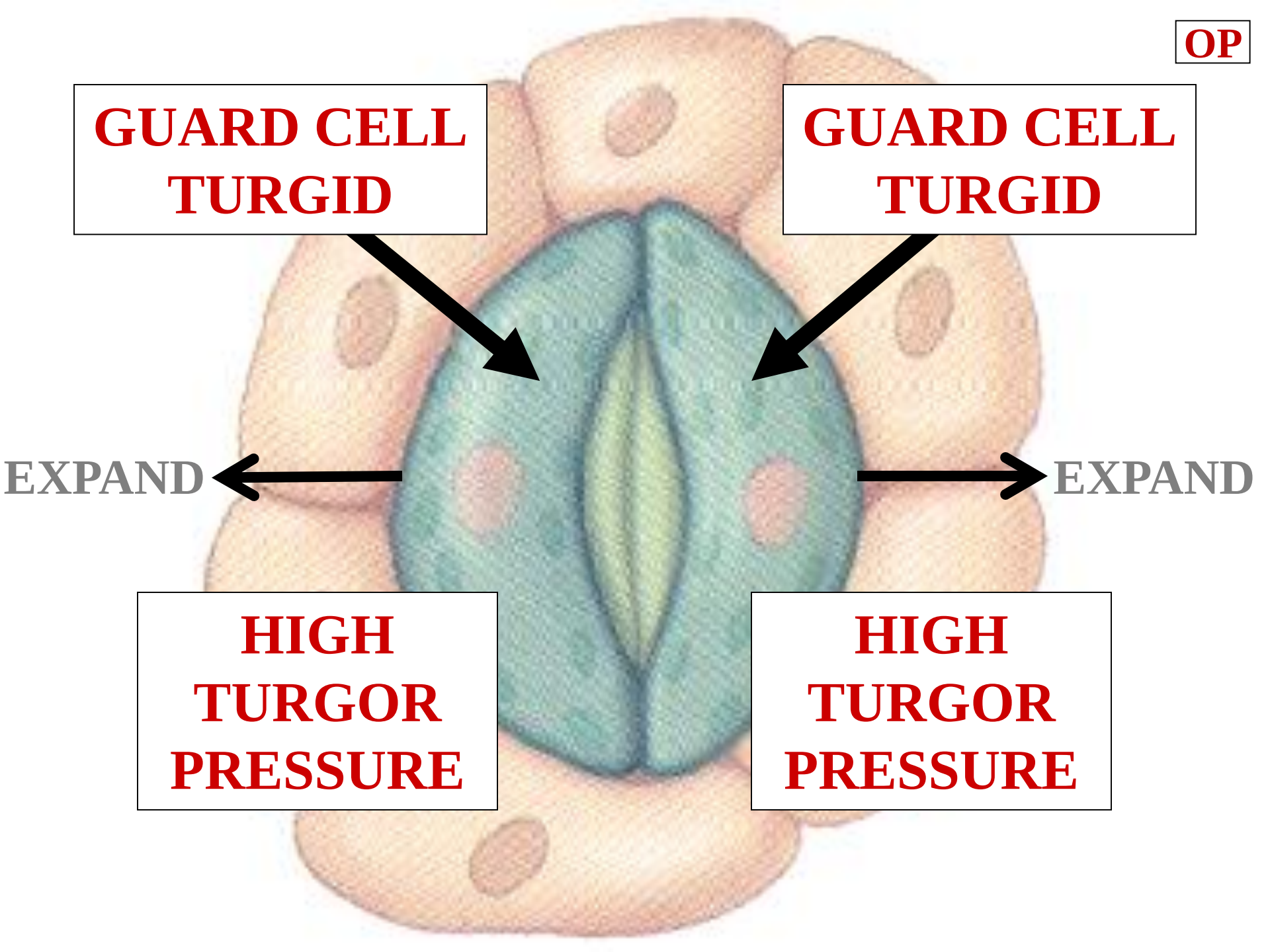

CL
GUARD CELL FLACCID
GUARD CELL FLACCID
CONTRACT
CONTRACT
LOW TURGOR PRESSURE
LOW TURGOR PRESSURE

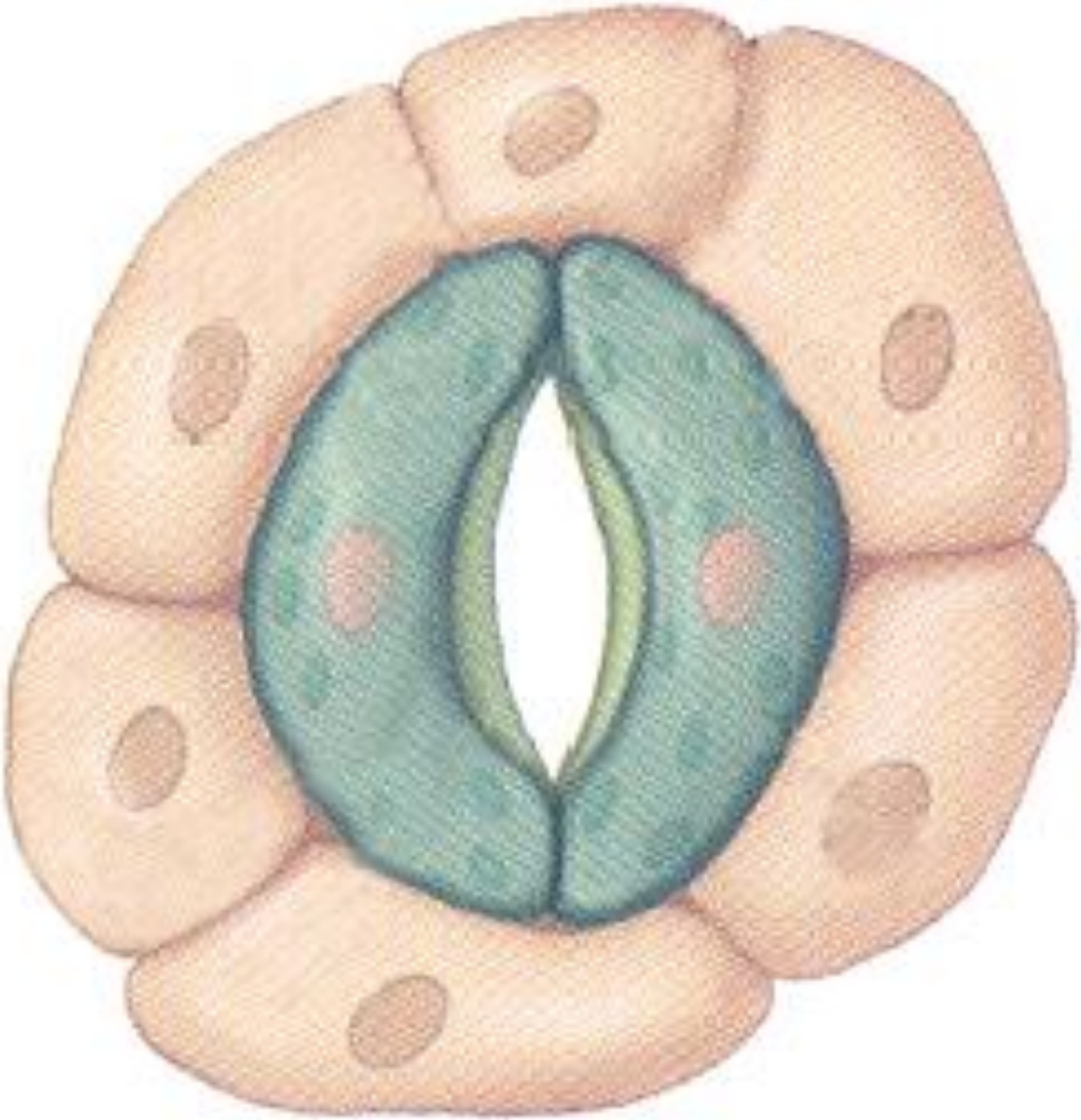



GUARD CELL
GUARD CELL
HT


GUARD CELL
GUARD CELL
HIGH TURGOR PRESSURE
HIGH TURGOR PRESSURE


GUARD CELL TURGID
GUARD CELL TURGID
HIGH TURGOR PRESSURE
HIGH TURGOR PRESSURE


OP
GUARD CELL TURGID
GUARD CELL TURGID
EXPAND
EXPAND
HIGH TURGOR PRESSURE
HIGH TURGOR PRESSURE

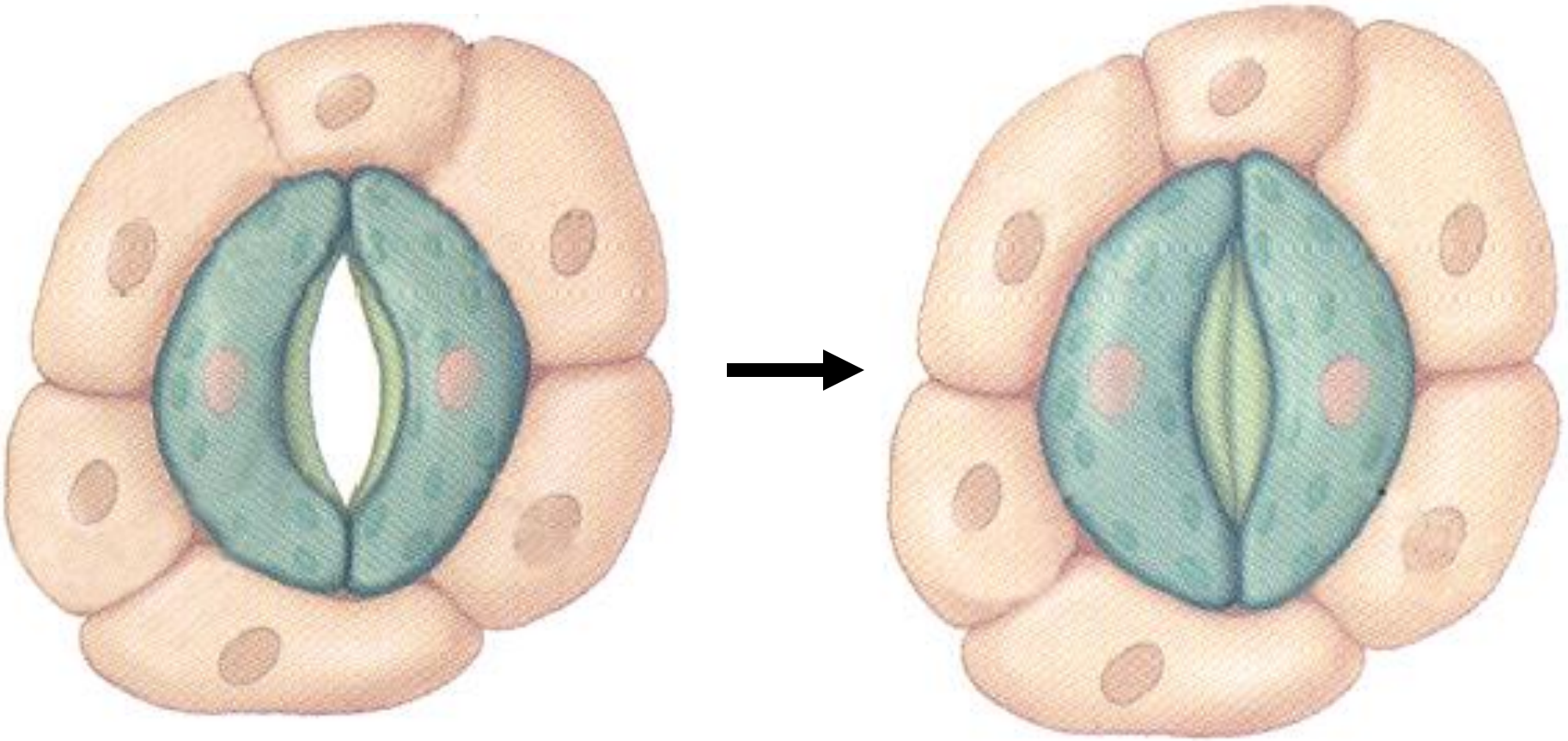


OPEN STOMATE

→

CLOSED STOMATE

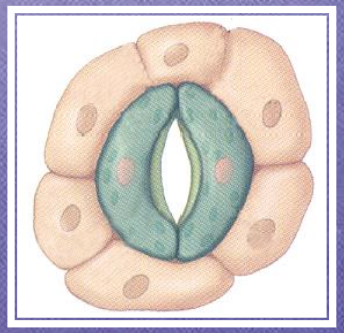
OPEN STOMATE → CLOSED STOMATE



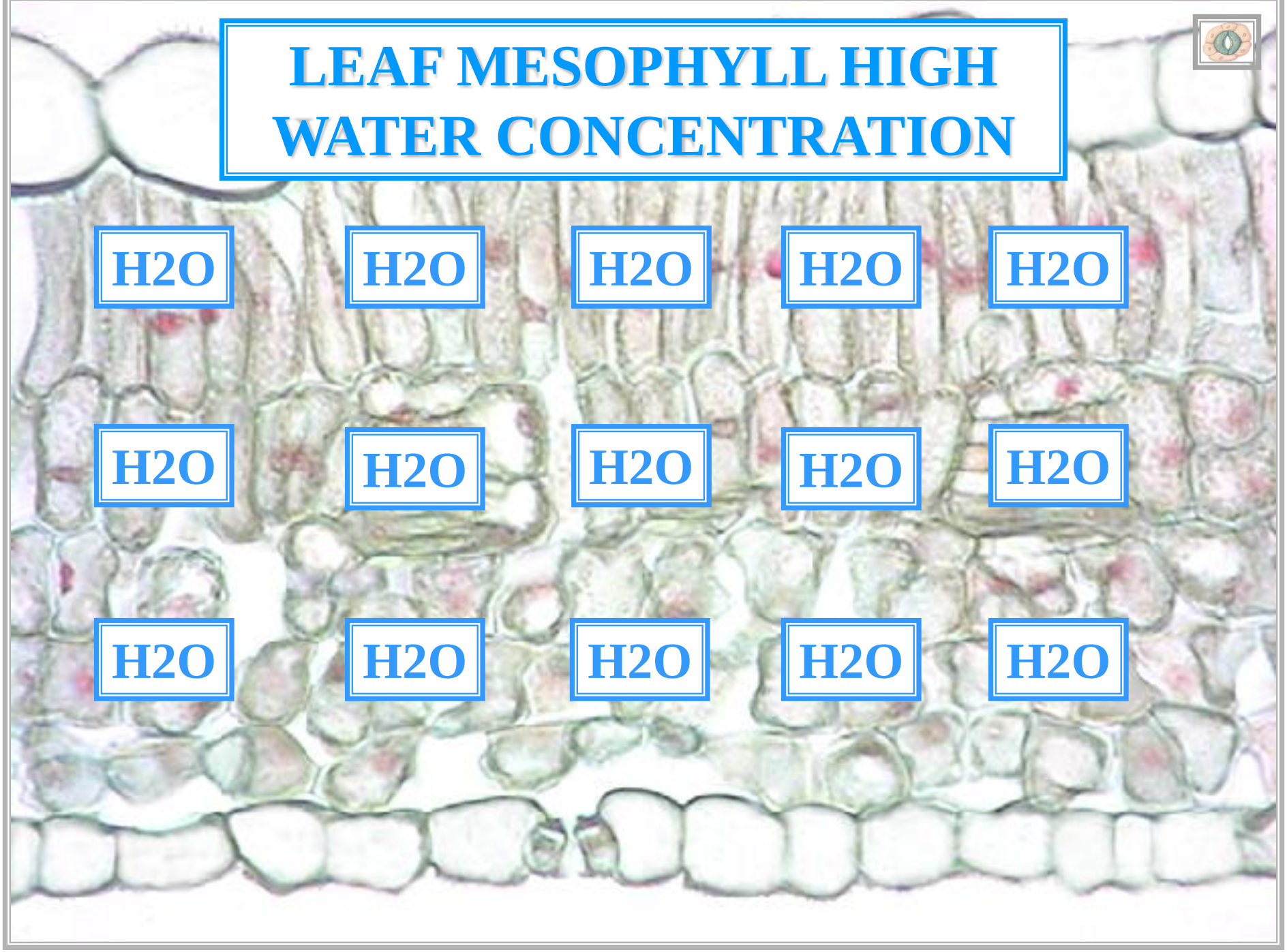
OPEN STOMATE → CLOSED STOMATE

PHOTOSYNTHESIS

LEAF
MESOPHYLL
HIGH WATER
CONCENTRATION



LEAF MESOPHYLL HIGH WATER CONCENTRATION



D

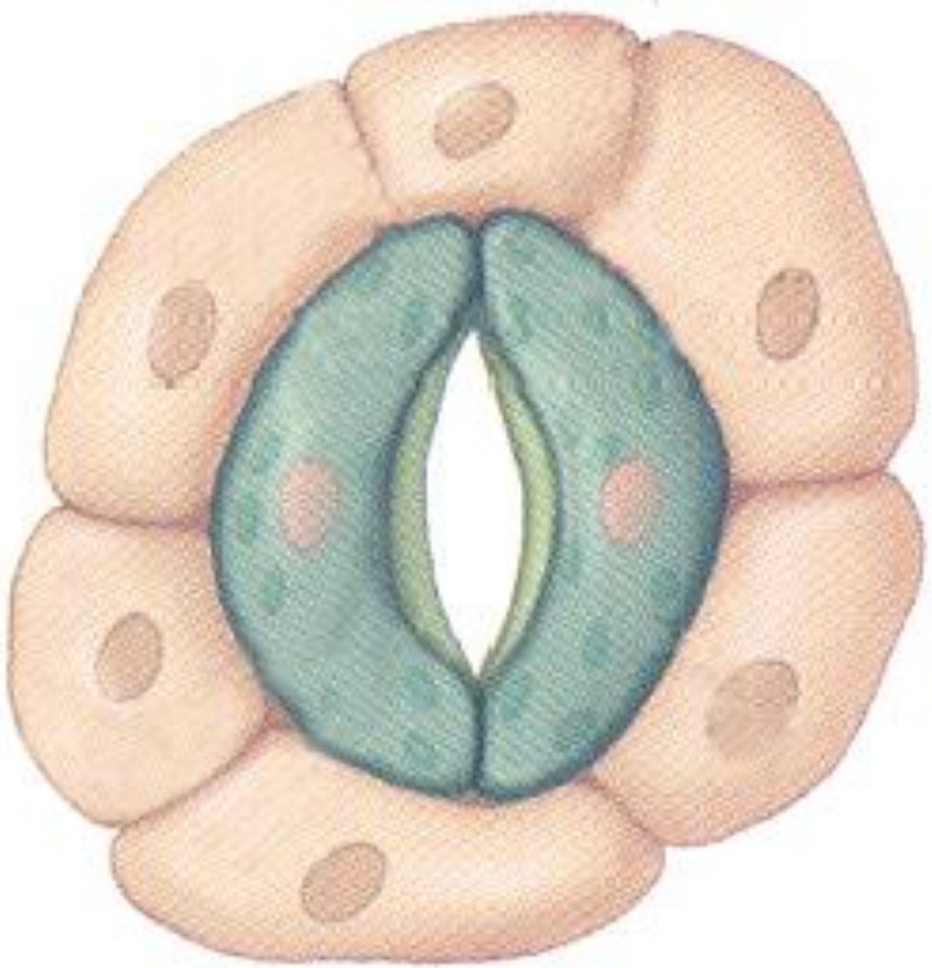
LEAF STOMATE

ATMOSPHERE

ATMOSPHERE

CO2

CO2



CO2

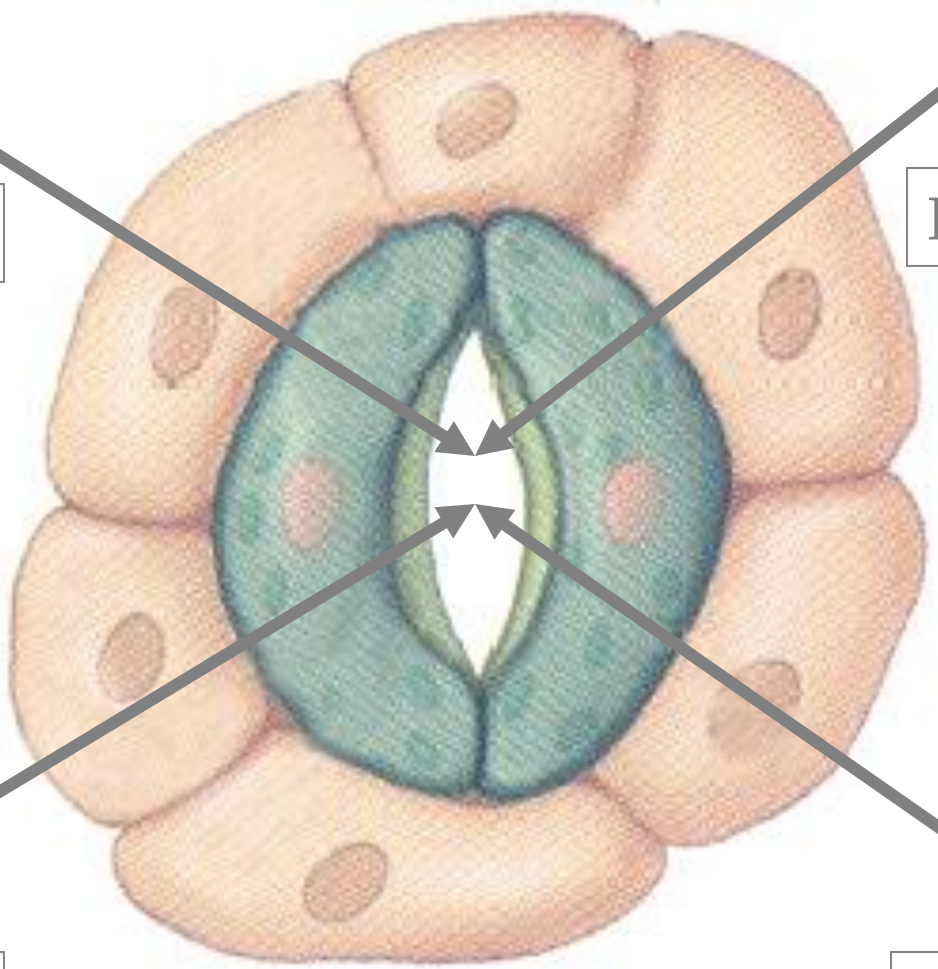
CO2

D

LEAF STOMATE

ATMOSPHERE

ATMOSPHERE



CO2

DIFFUSION

CO2

DIFFUSION

CO2

DIFFUSION

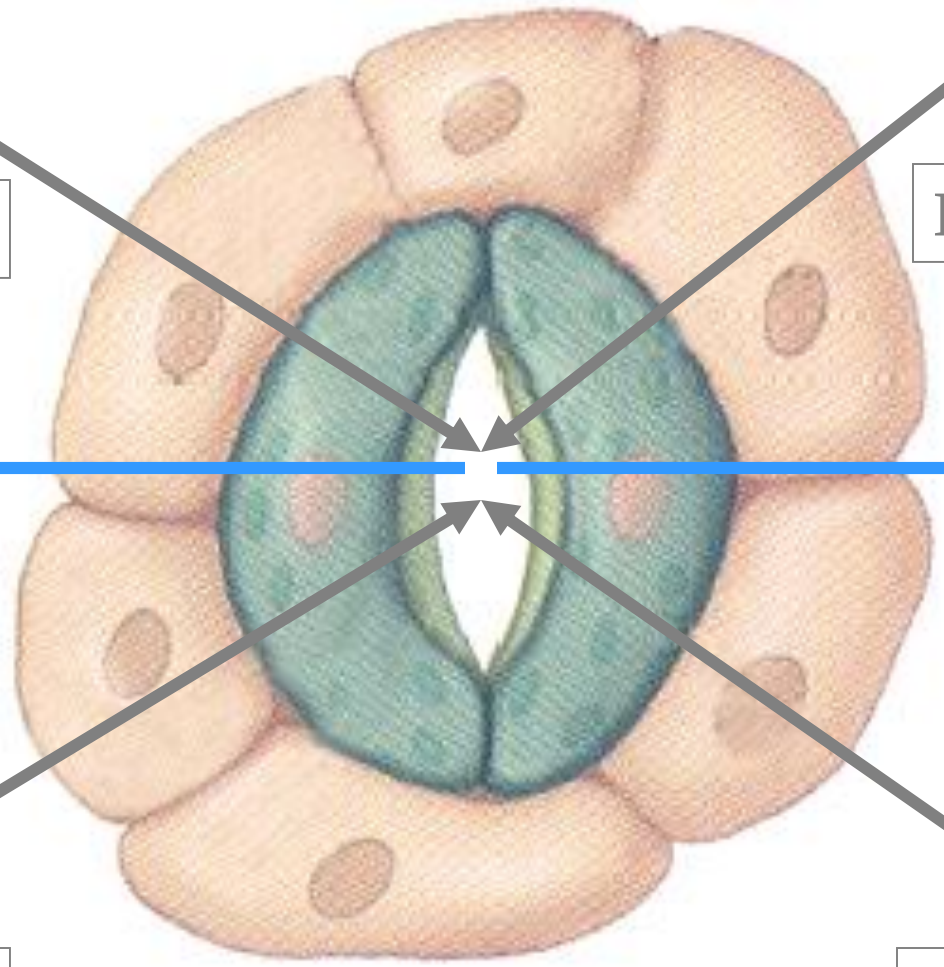
CO2

DIFFUSION

LEAF STOMATE

ATMOSPHERE

ATMOSPHERE



CO2

DIFFUSION

CO2

DIFFUSION

H2O

DIFFUSION

H2O

DIFFUSION

CO2

DIFFUSION

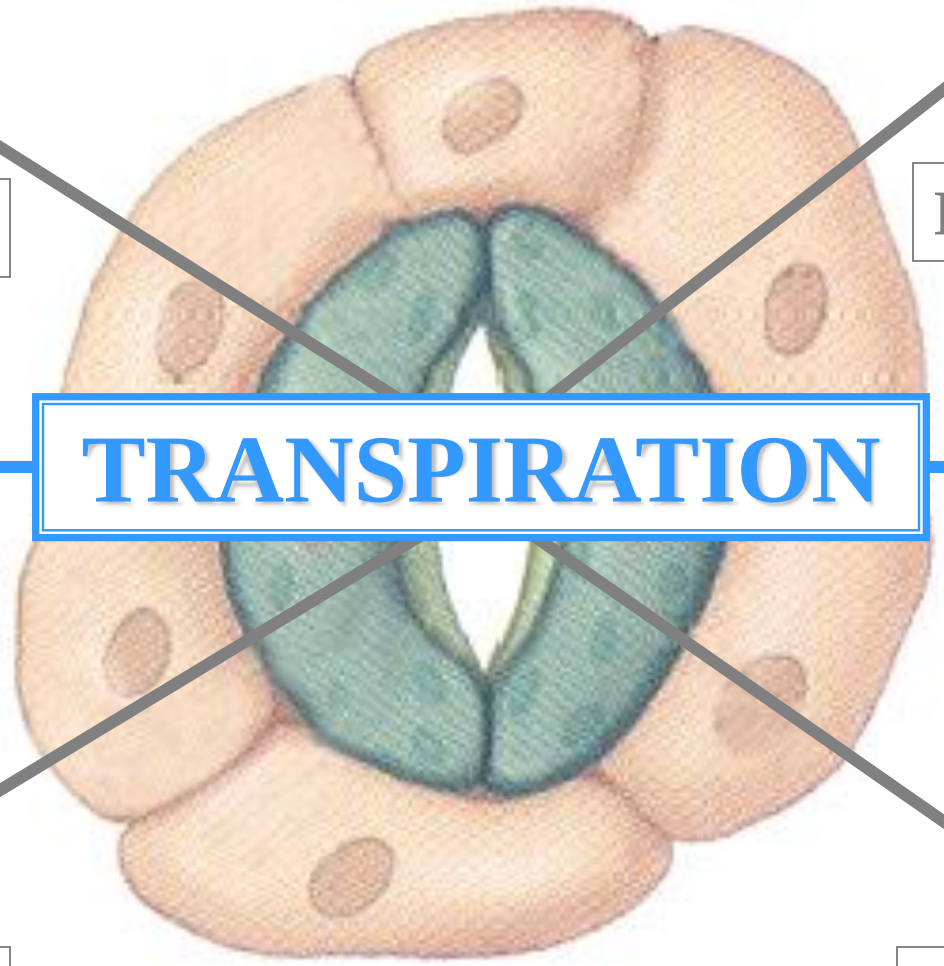
CO2

DIFFUSION

LEAF STOMATE

ATMOSPHERE

ATMOSPHERE



CO2

DIFFUSION

CO2

DIFFUSION

H2O

TRANSPIRATION

H2O

DIFFUSION

DIFFUSION

CO2

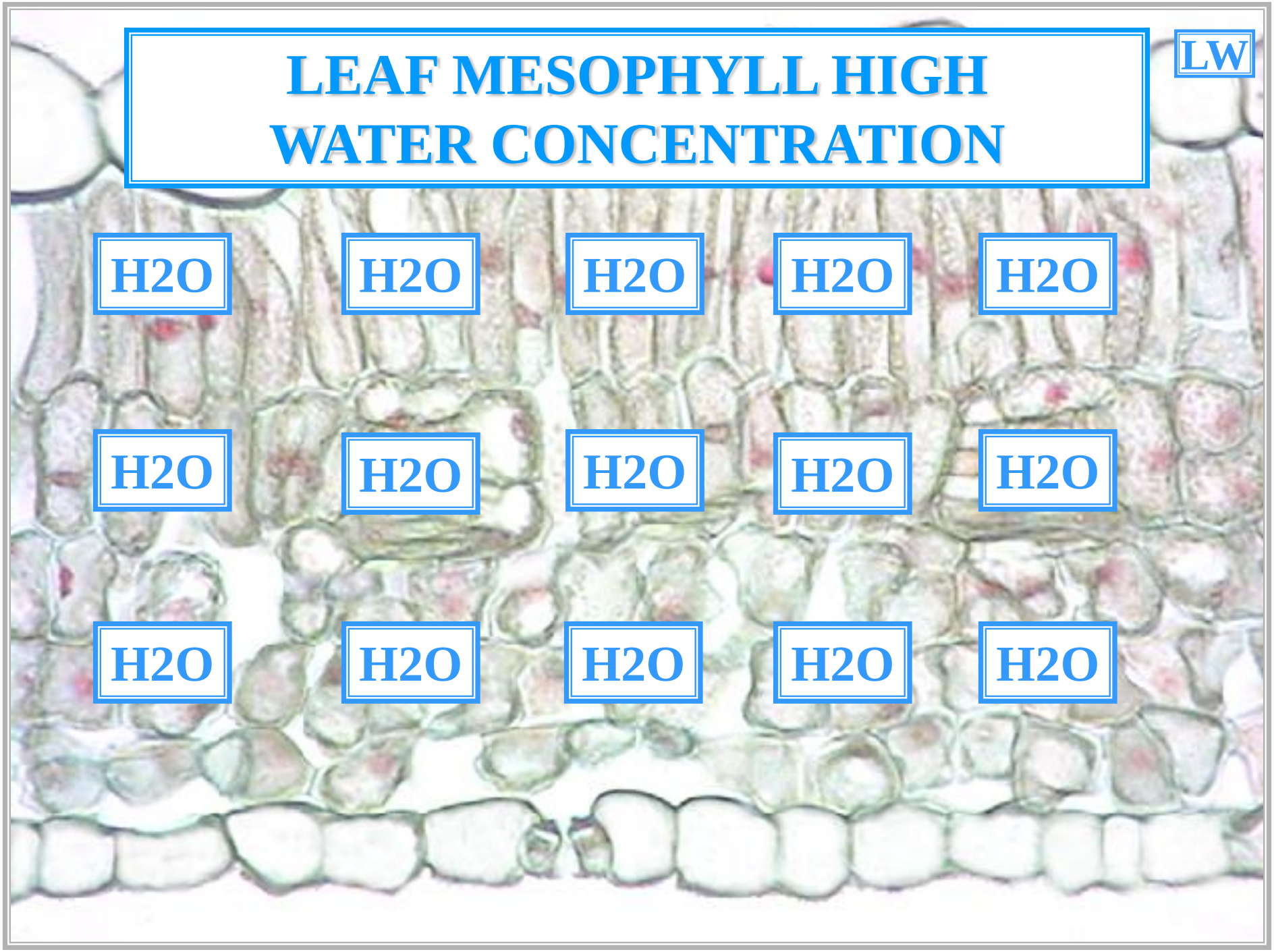
DIFFUSION

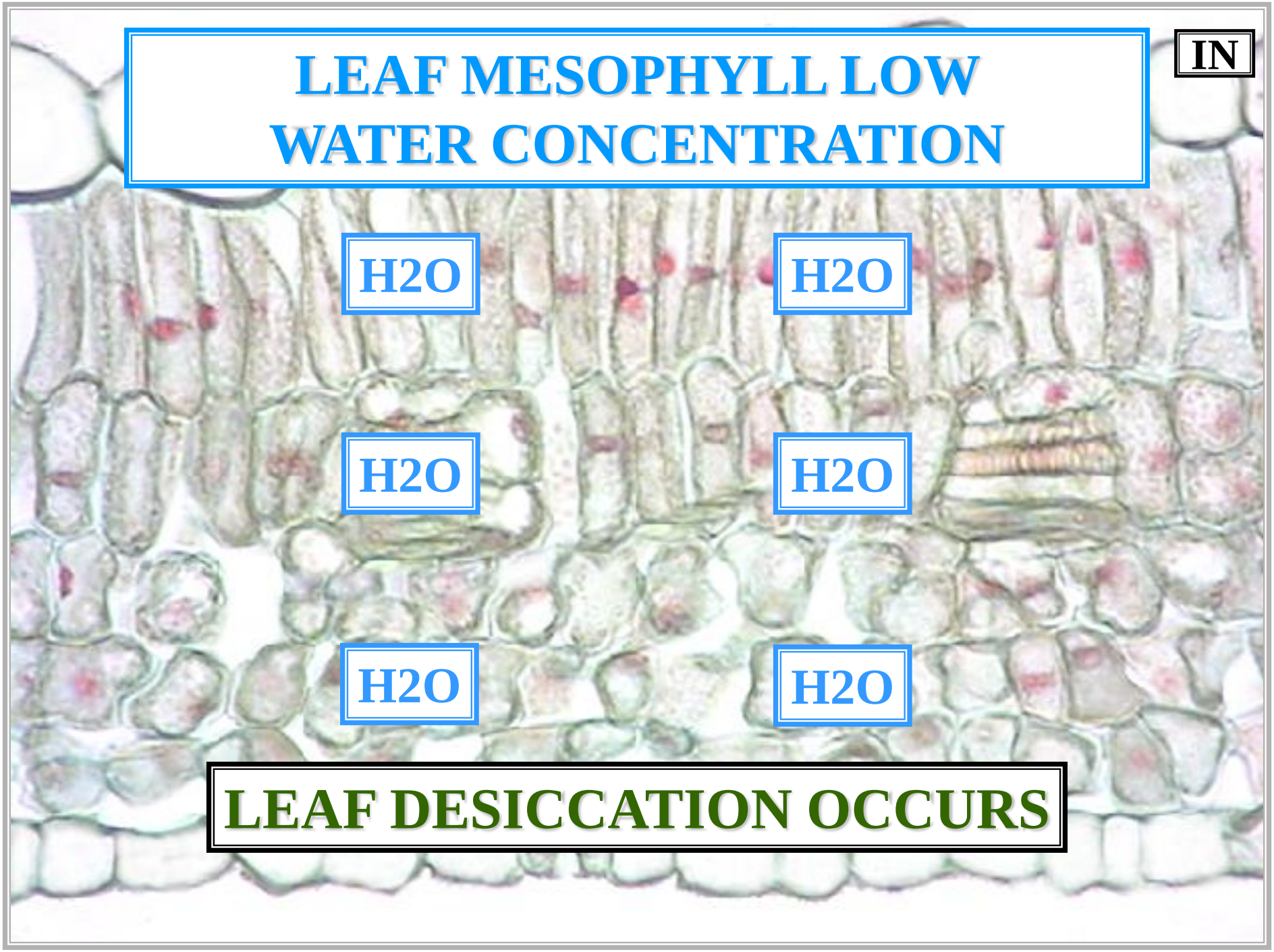
CO2

DIFFUSION

LEAF MESOPHYLL HIGH WATER CONCENTRATION

LW




LEAF MESOPHYLL LOW WATER CONCENTRATION
IN
H2O
H2O
H2O
H2O
H2O
H2O
LEAF DESICCATION OCCURS

LEAF MESOPHYLL ABSCISIC ACID INCREASES

HI

ABA H2O ABA H2O ABA

ABA H2O ABA H2O ABA

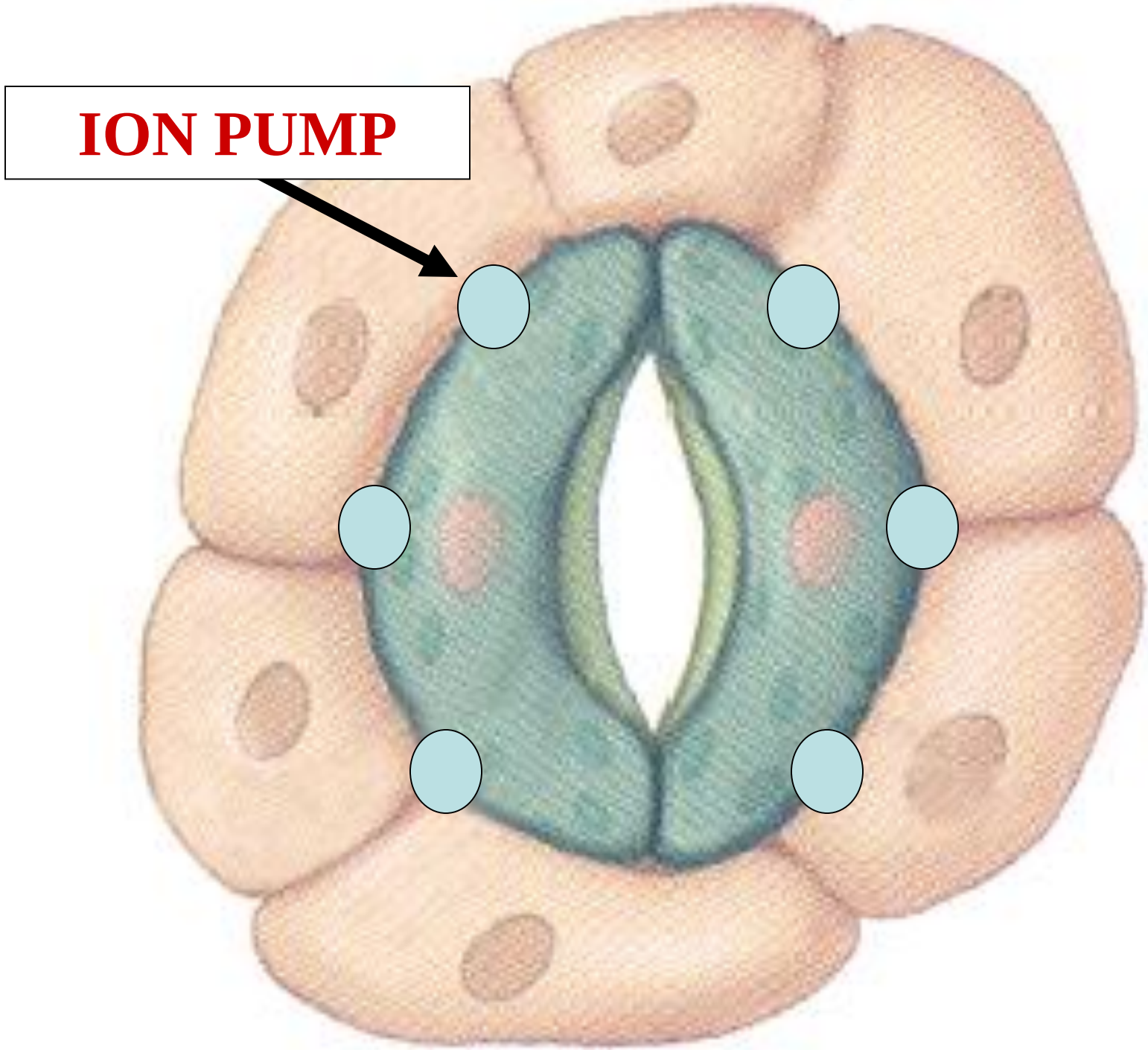
ABA H2O ABA H2O ABA

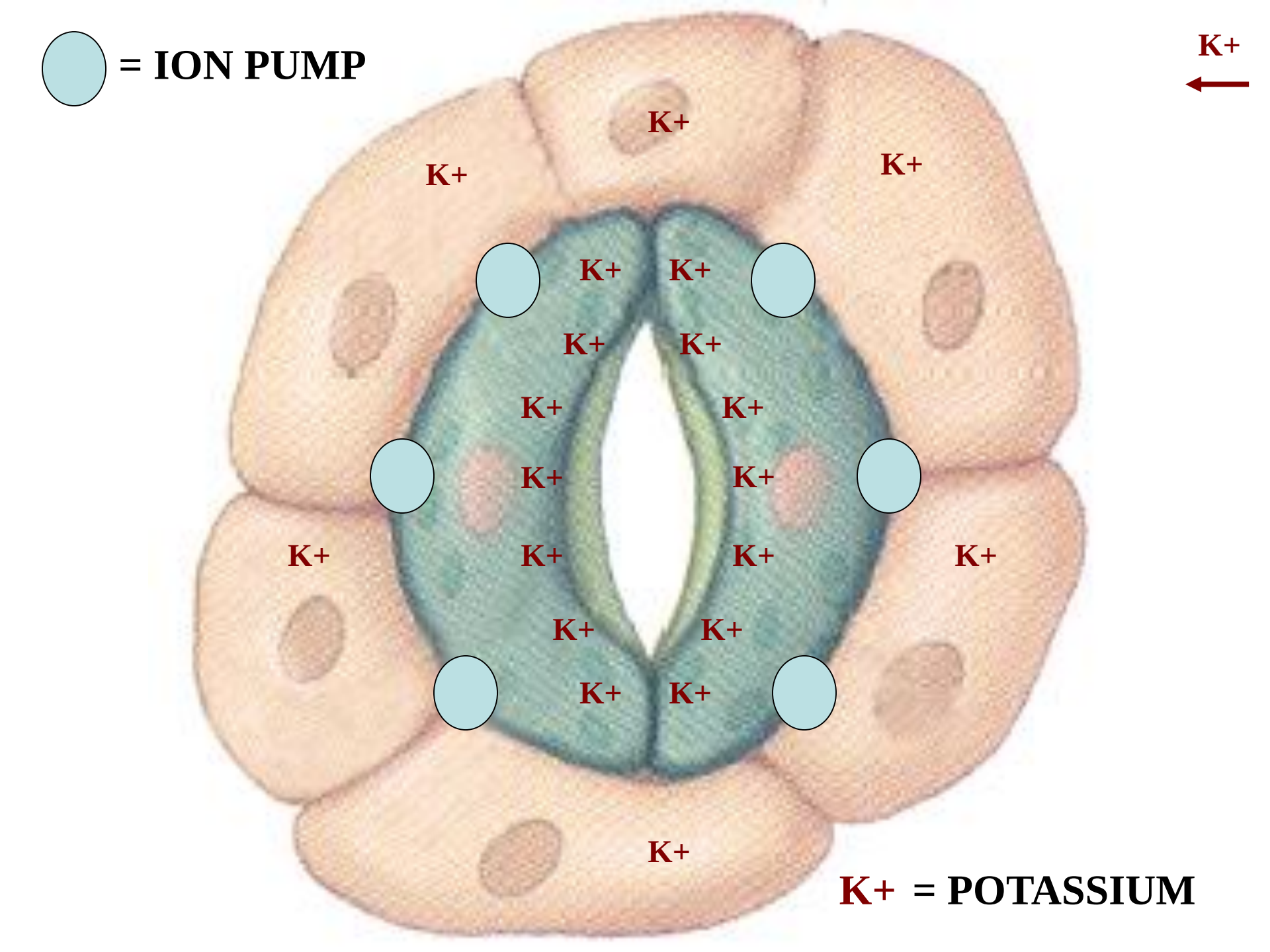
LEAF DESICCATION OCCURS

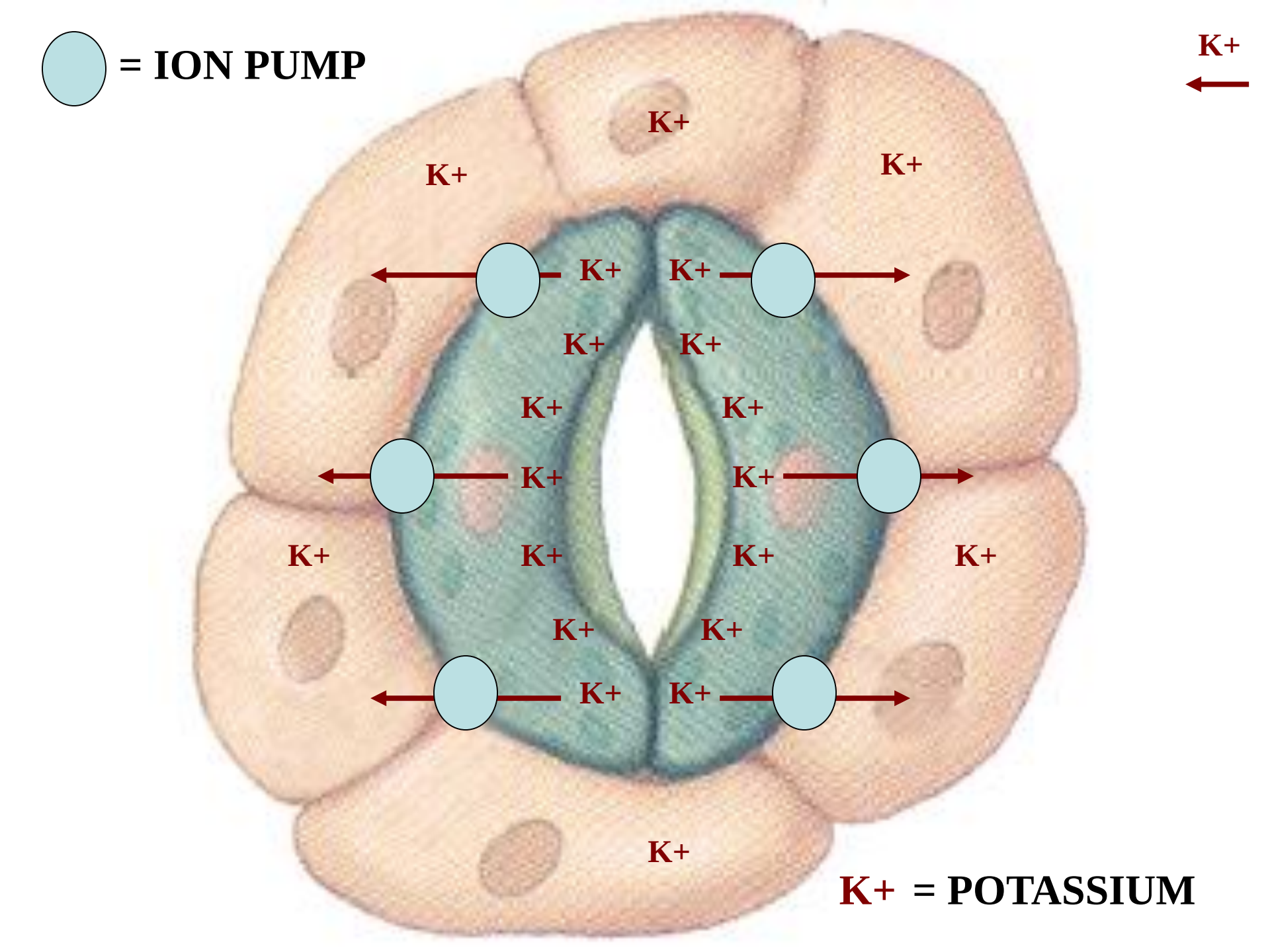
HIGH ABSCISIC ACID ACTIVATES GUARD CELL ION PUMPS

ABA	H2O	ABA	H2O	ABA
ABA	H2O	ABA	H2O	ABA
ABA	H2O	ABA	H2O	ABA

LEAF DESICCATION OCCURS

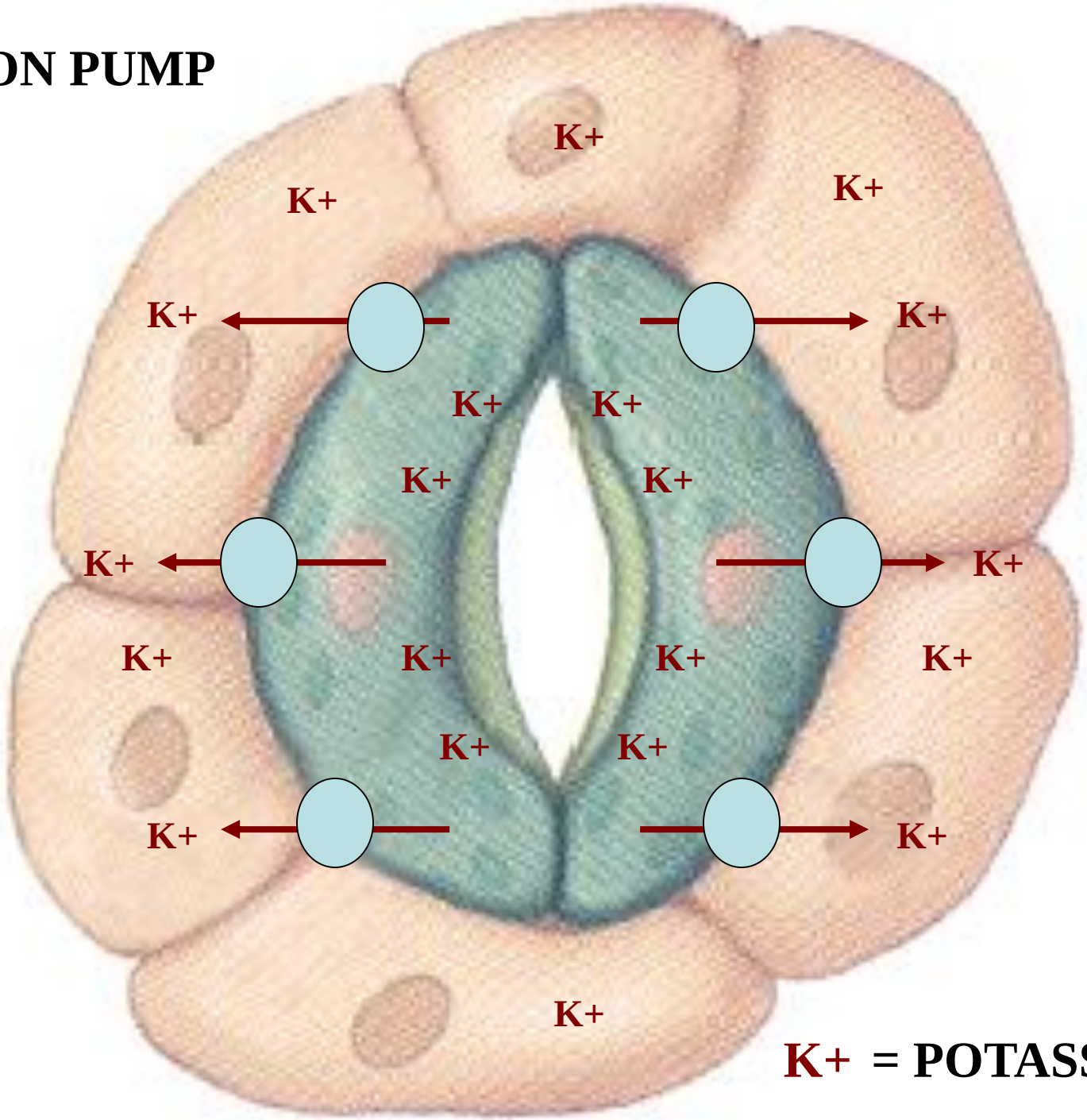

ION PUMP
K+


= ION PUMP
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+ = POTASSIUM

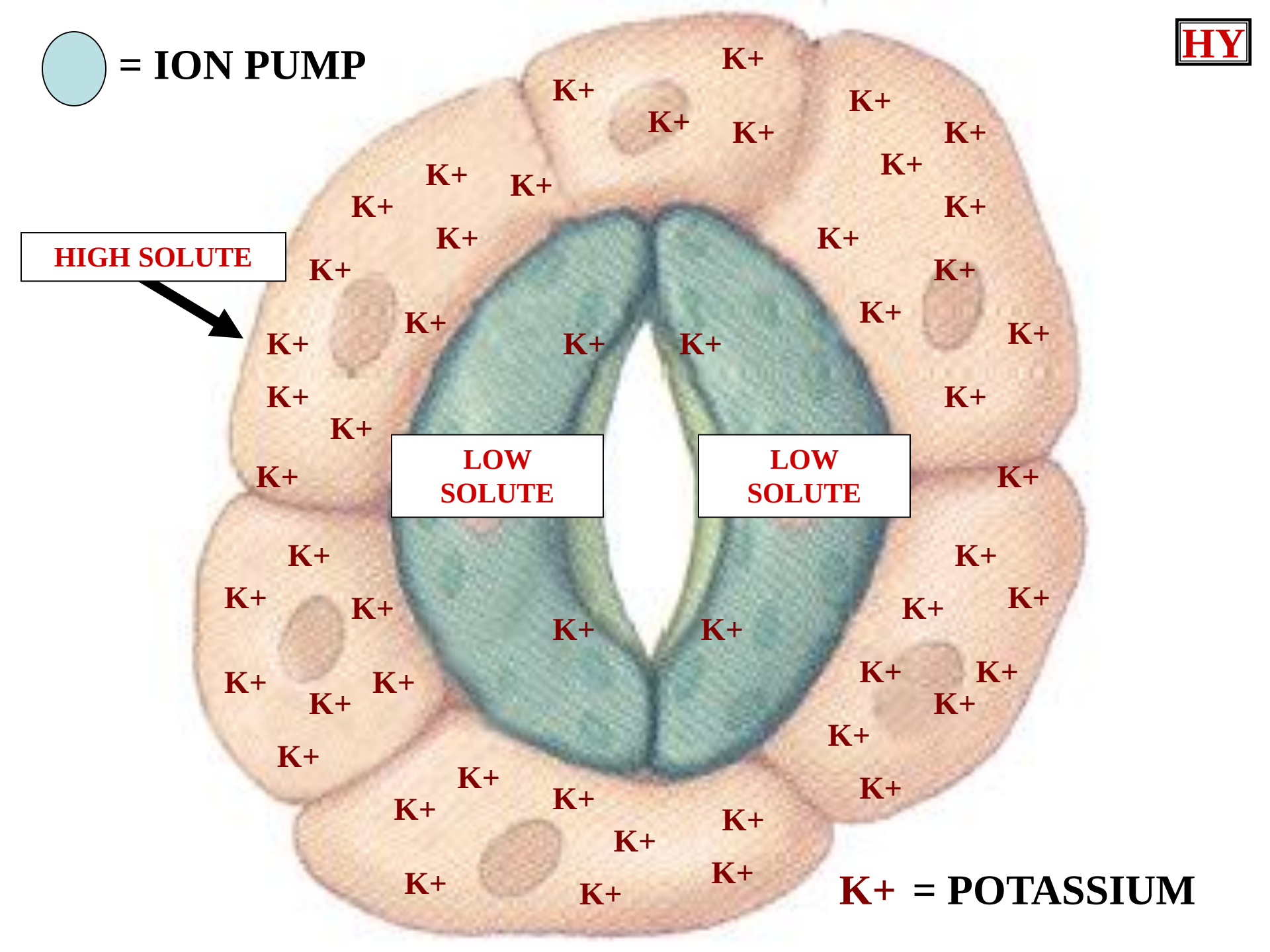

= ION PUMP
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+ = POTASSIUM

= ION PUMP

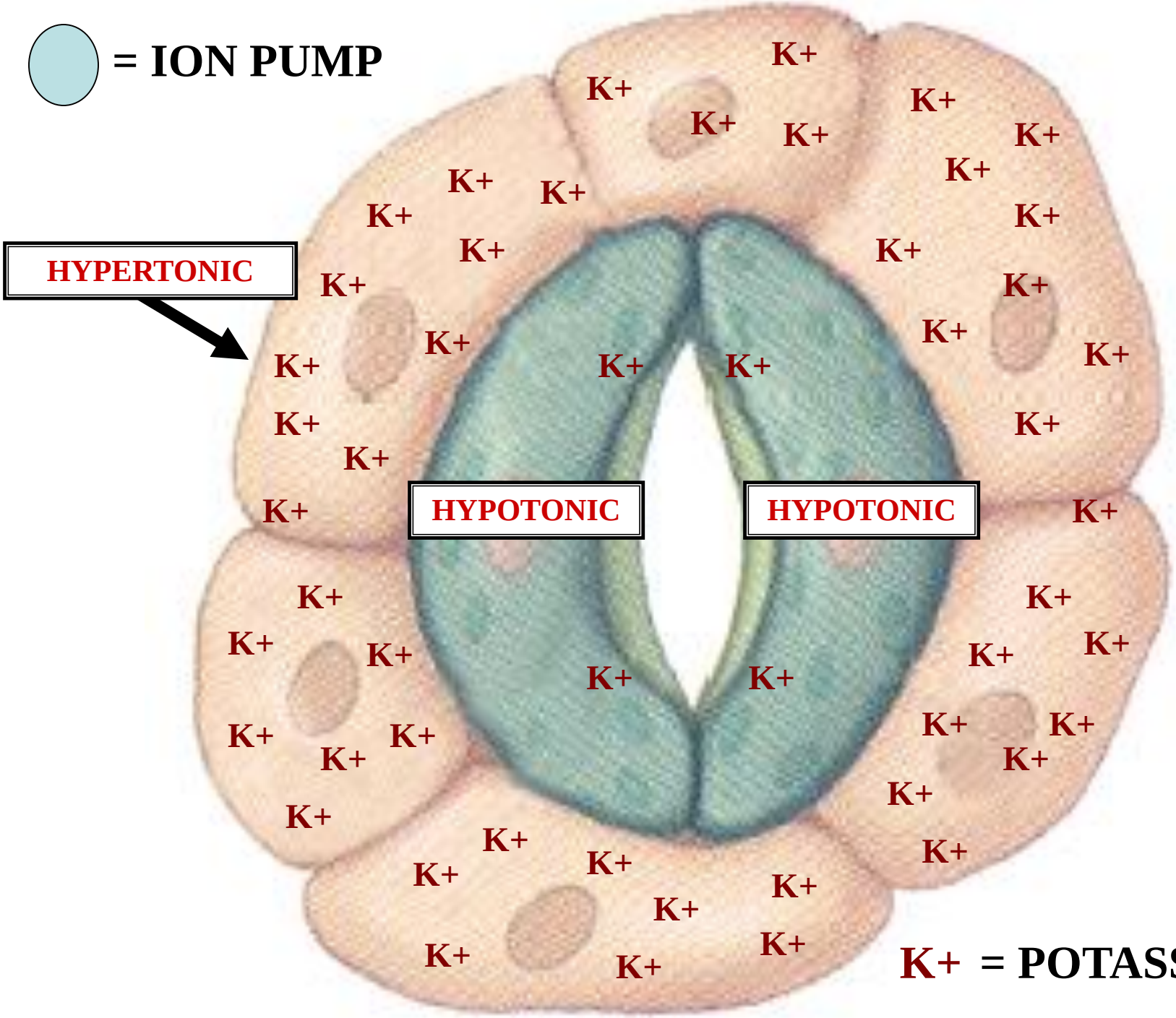
K+



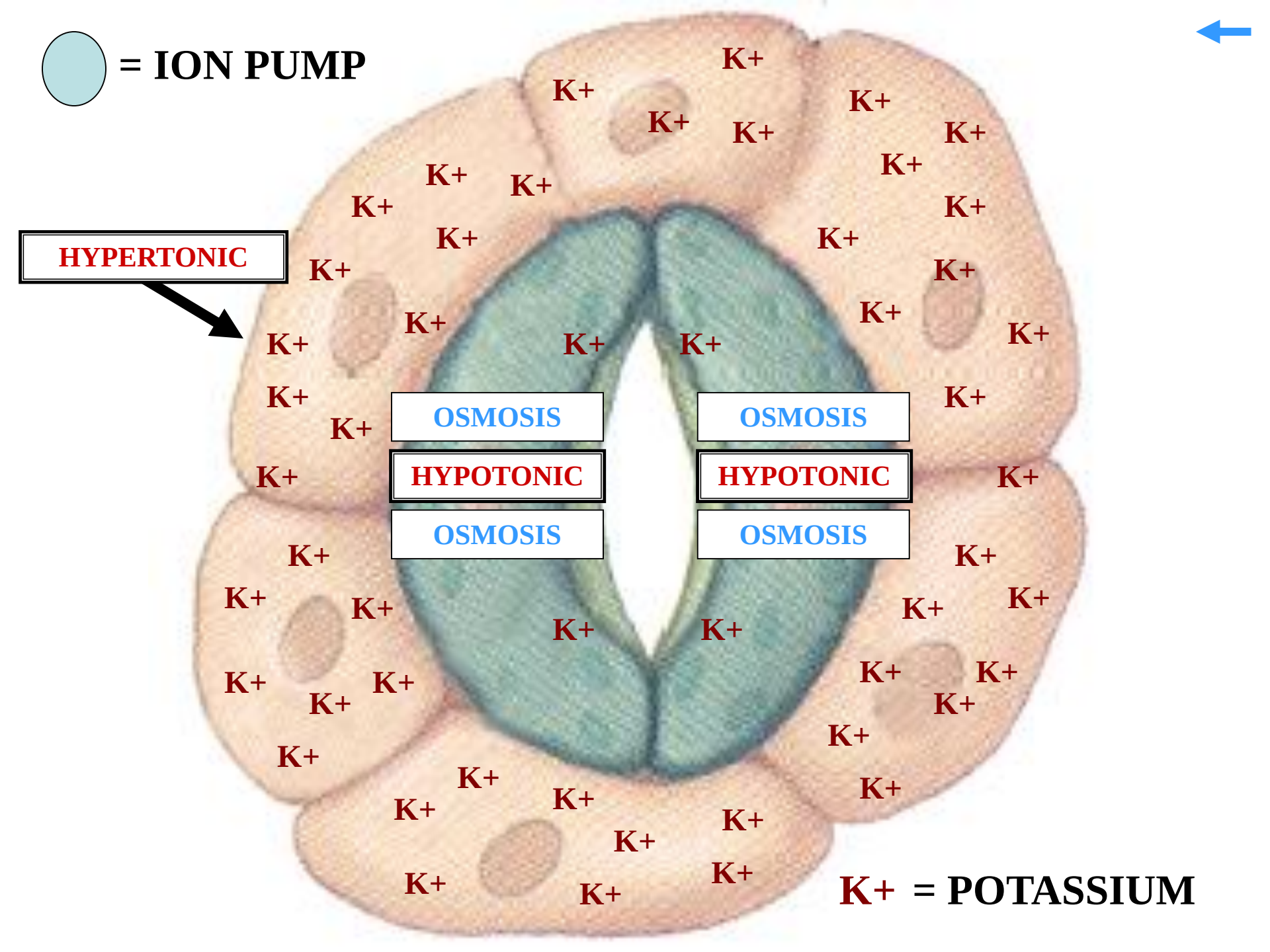
K+ = POTASSIUM


= ION PUMP
HY
HIGH SOLUTE
LOW SOLUTE
LOW SOLUTE
K+
K+ = POTASSIUM

= ION PUMP

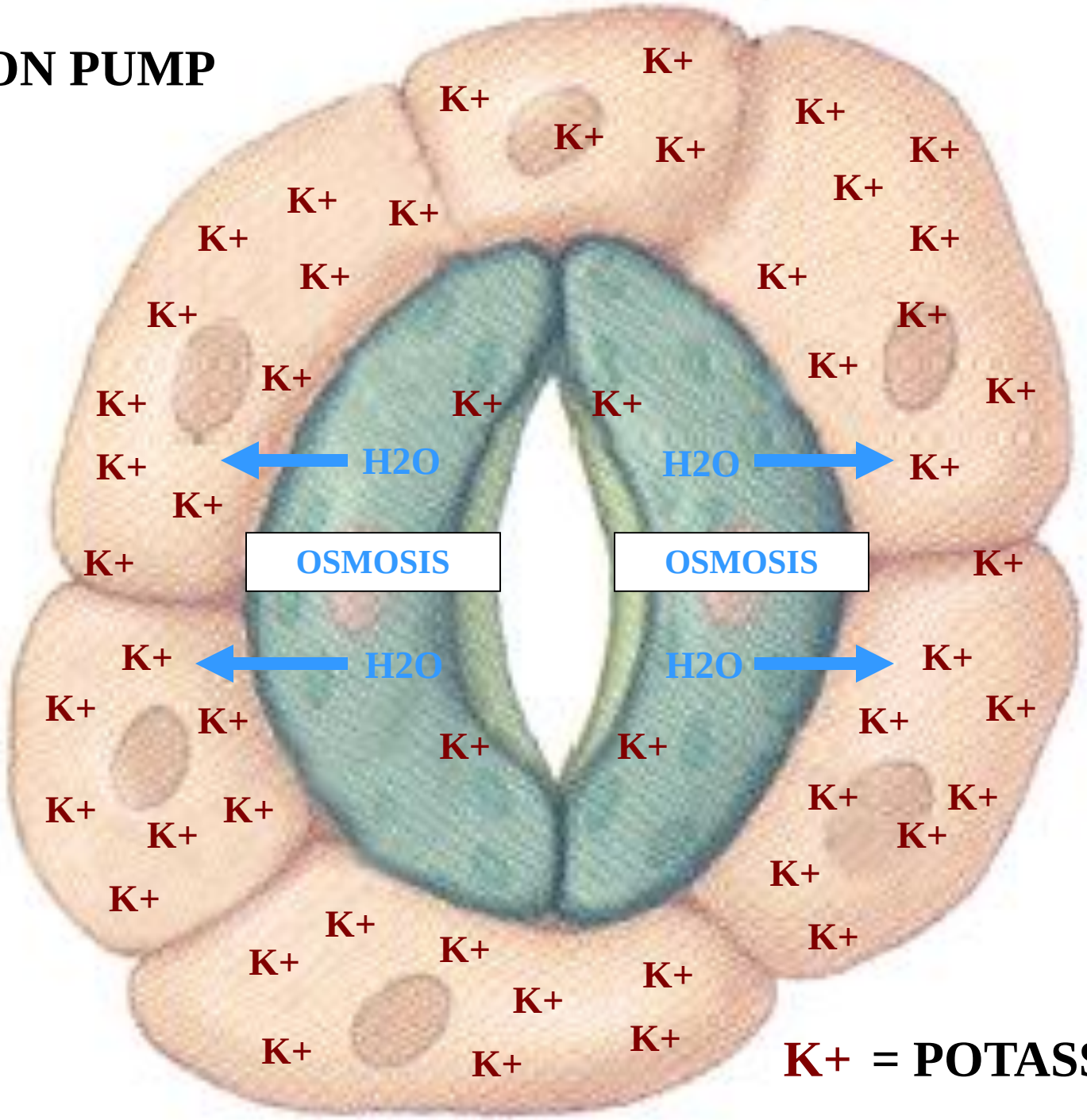


K+ = POTASSIUM

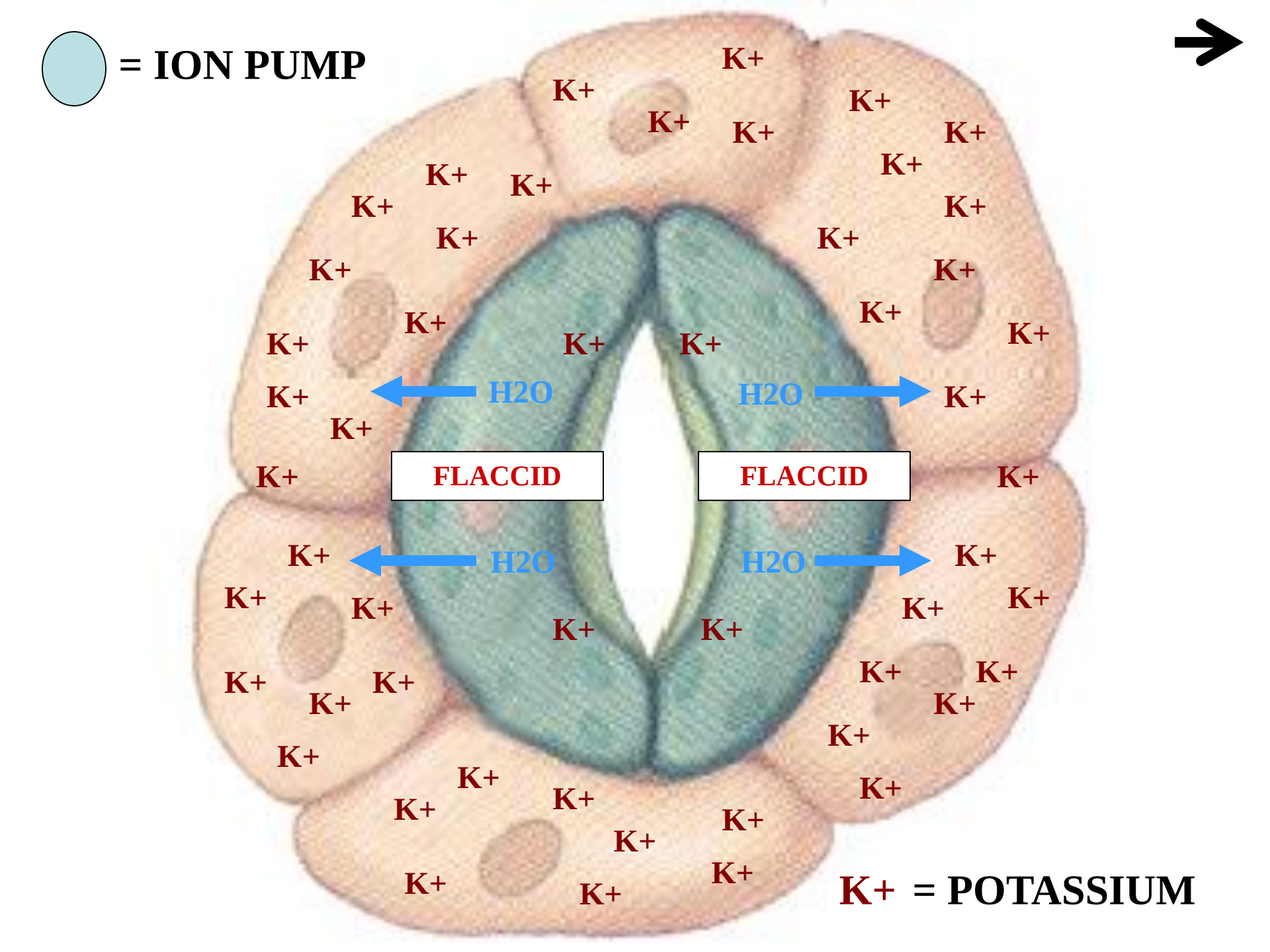

= ION PUMP
HYPERTONIC
OSMOSIS
HYPOTONIC
OSMOSIS
OSMOSIS
HYPOTONIC
OSMOSIS
K+
K+ = POTASSIUM

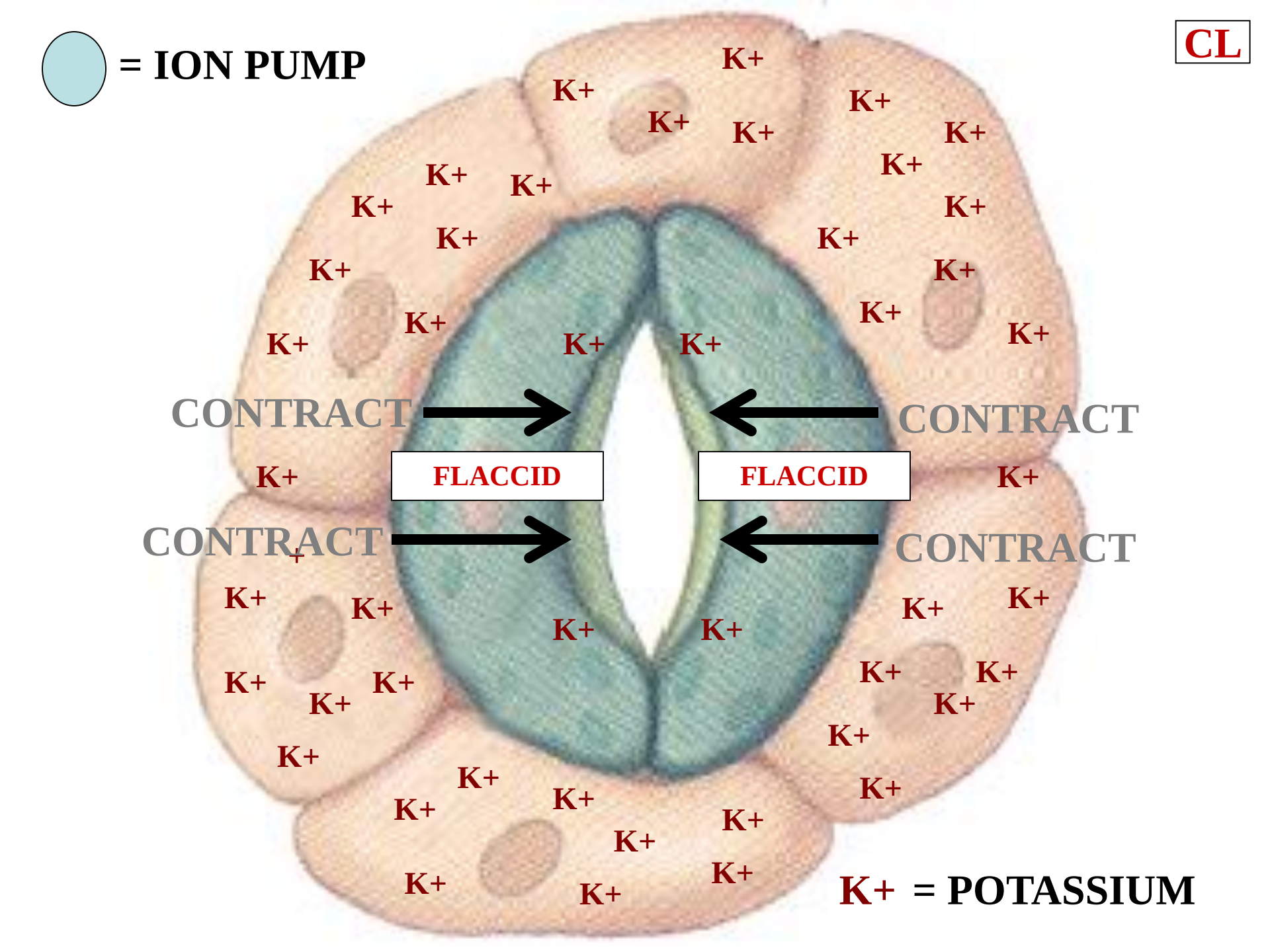
= ION PUMP

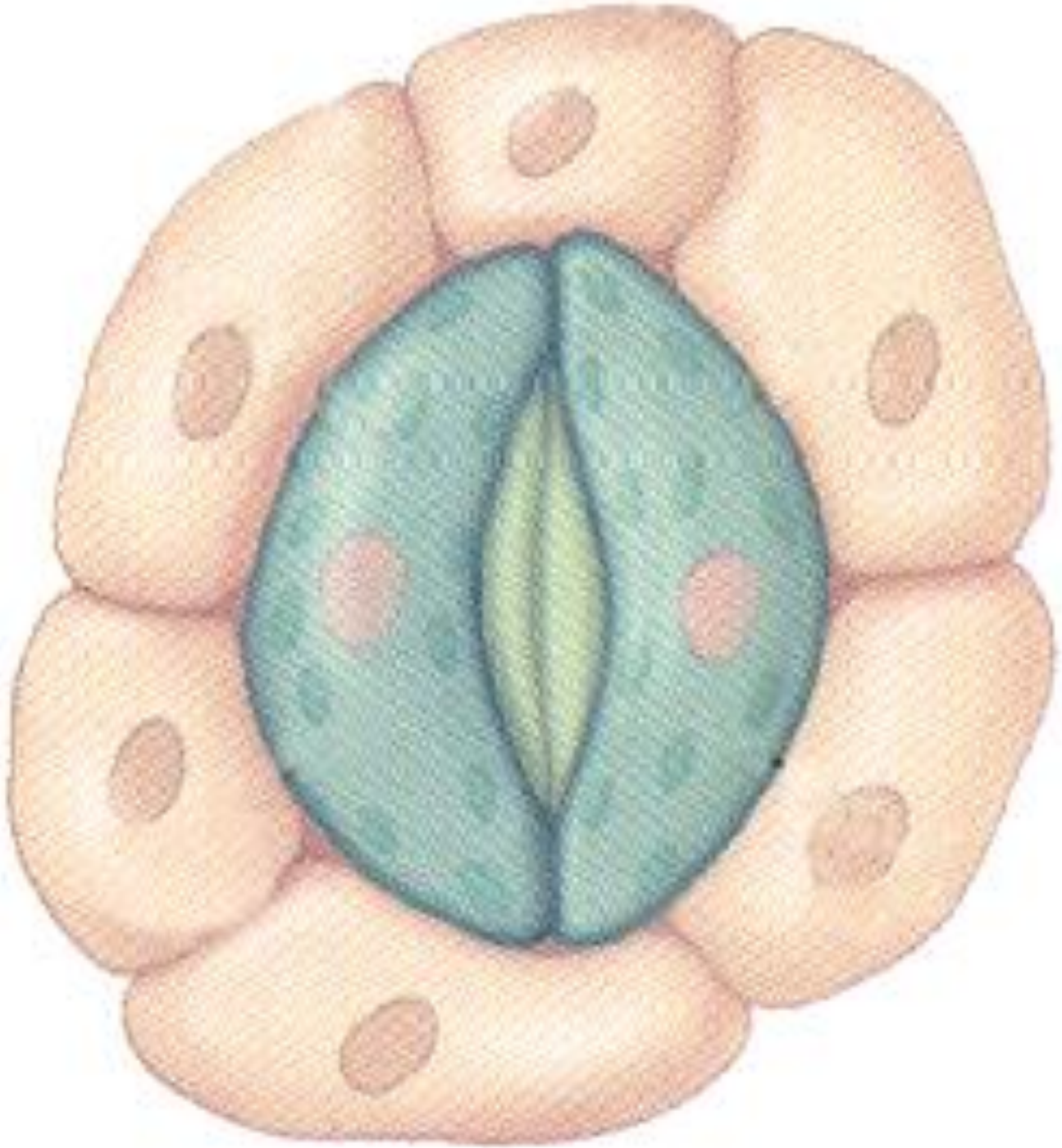
FL



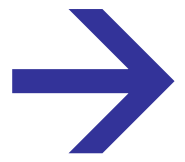
K+ = POTASSIUM


= ION PUMP
K+
H2O
H2O
FLACCID
FLACCID
H2O
H2O
K+ = POTASSIUM


= ION PUMP
CL
K+
CONTRACT
CONTRACT
FLACCID
FLACCID
CONTRACT
CONTRACT
K+ = POTASSIUM

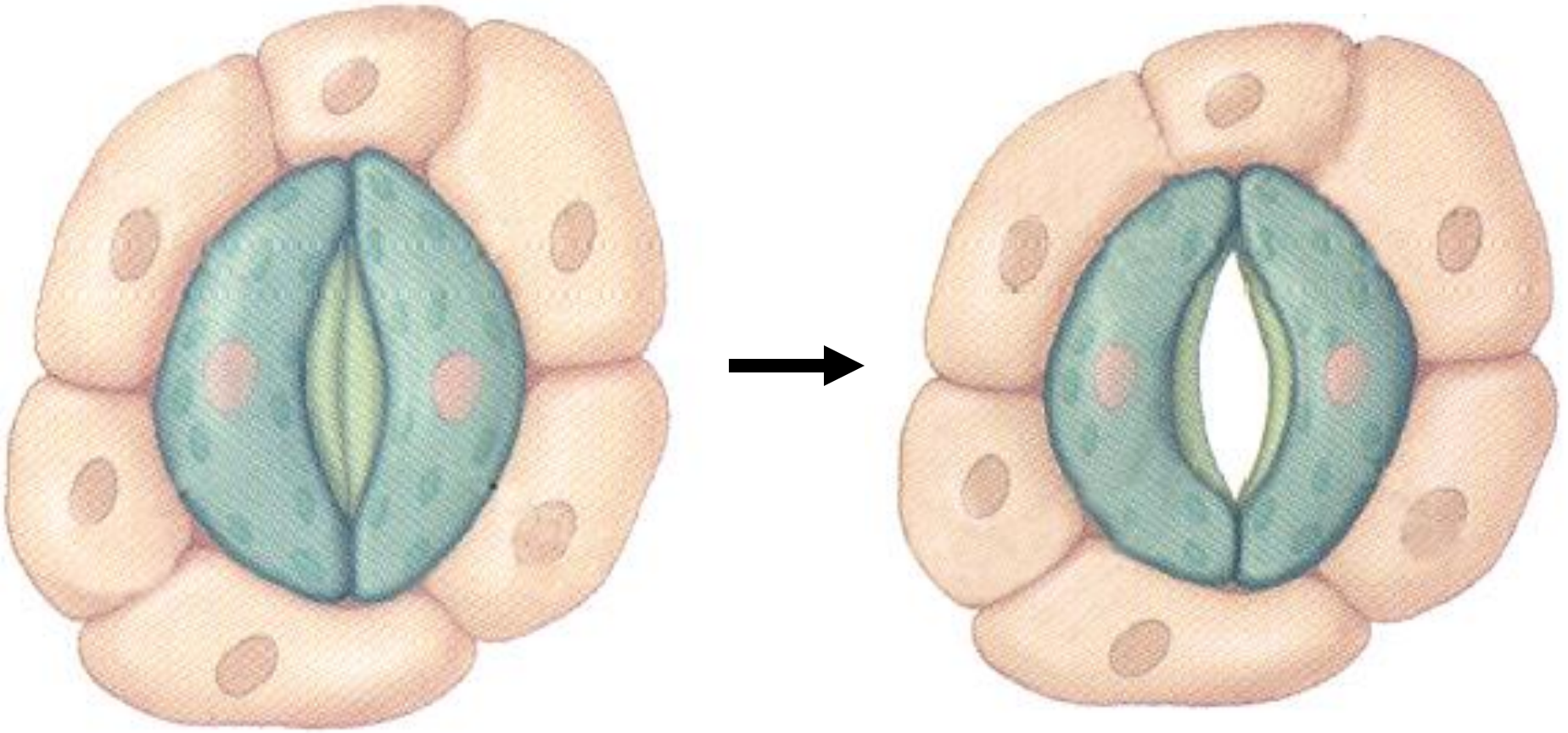


CLOSED STOMATE



OPEN STOMATE

CLOSED STOMATE → OPEN STOMATE

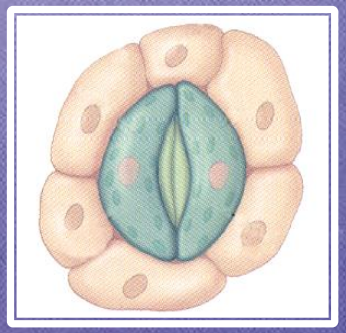


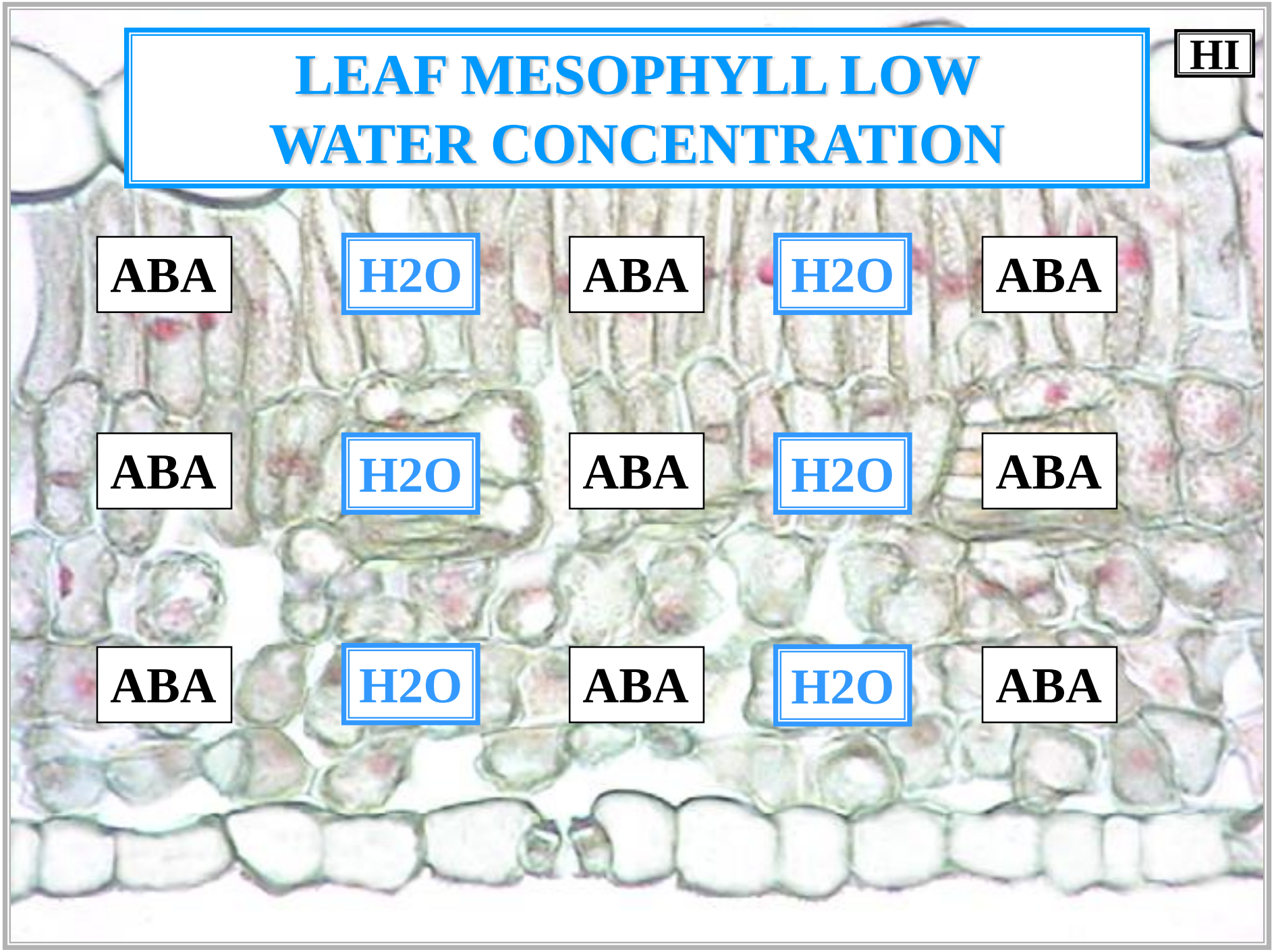
CLOSED STOMATE → OPEN STOMATE

PHOTOSYNTHESIS

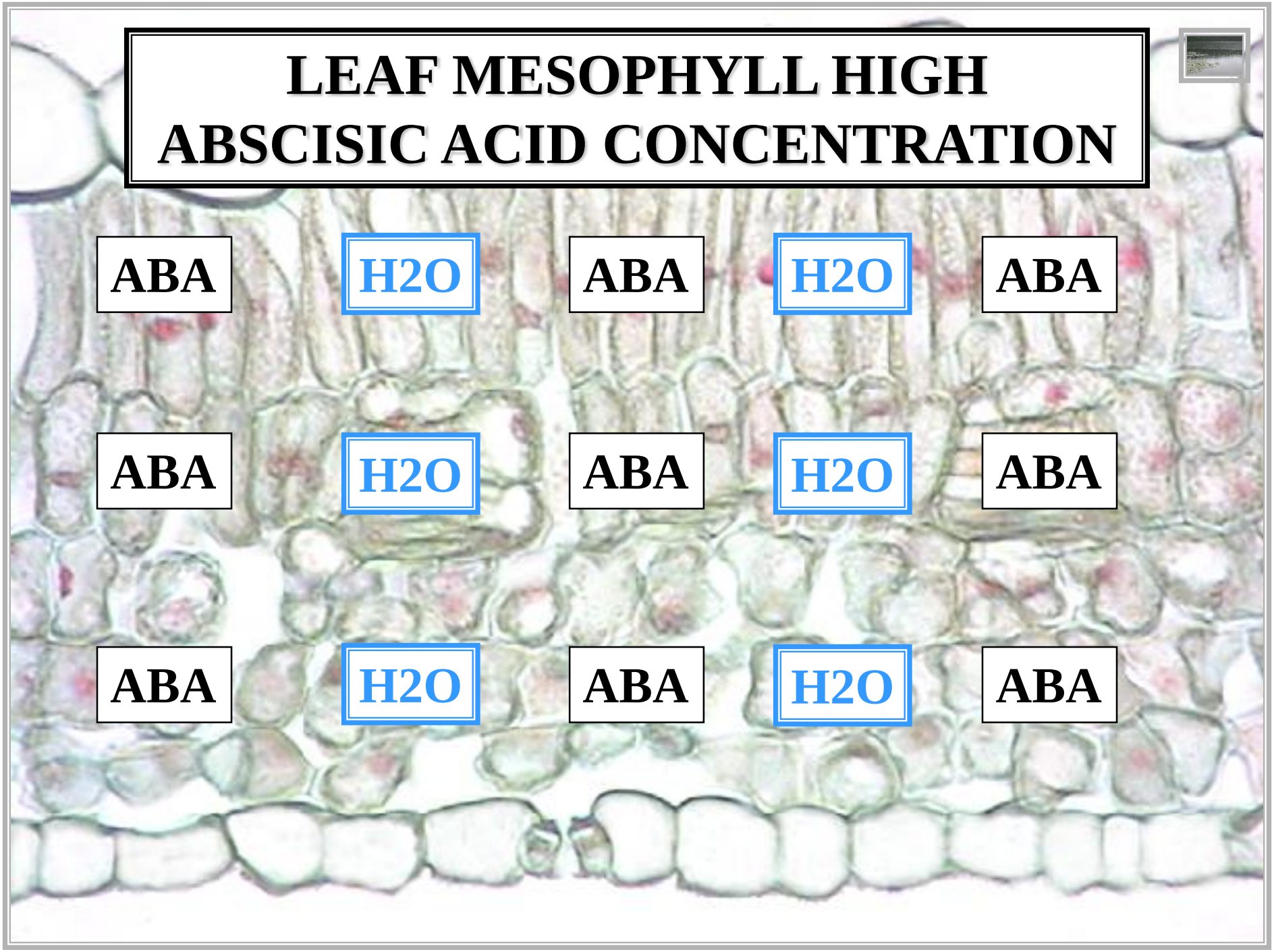
LW

LEAF
MESOPHYLL
LOW WATER
CONCENTRATION




LEAF MESOPHYLL LOW WATER CONCENTRATION
HI
ABA
H2O
ABA
H2O
ABA
ABA
H2O
ABA
H2O
ABA
ABA
H2O
ABA
H2O
ABA

LEAF MESOPHYLL HIGH ABSCISIC ACID CONCENTRATION




LW

LEAF MESOPHYLL LOW WATER CONCENTRATION

HW

ABA H2O ABA H2O ABA

ABA H2O ABA H2O ABA

ABA H2O ABA H2O ABA

LEAF MESOPHYLL HIGH WATER CONCENTRATION

DE

H2O H2O H2O H2O H2O

H2O H2O H2O H2O H2O

H2O H2O H2O H2O H2O

LEAF HYDRATION OCCURS

LEAF MESOPHYLL ABSCISIC ACID DECREASES

LO

H2O H2O H2O H2O H2O

H2O H2O H2O H2O H2O

H2O H2O H2O H2O H2O

LEAF HYDRATION OCCURS

LOW ABSCISIC ACID ACTIVATES GUARD CELL ION PUMPS

H2O H2O H2O H2O H2O

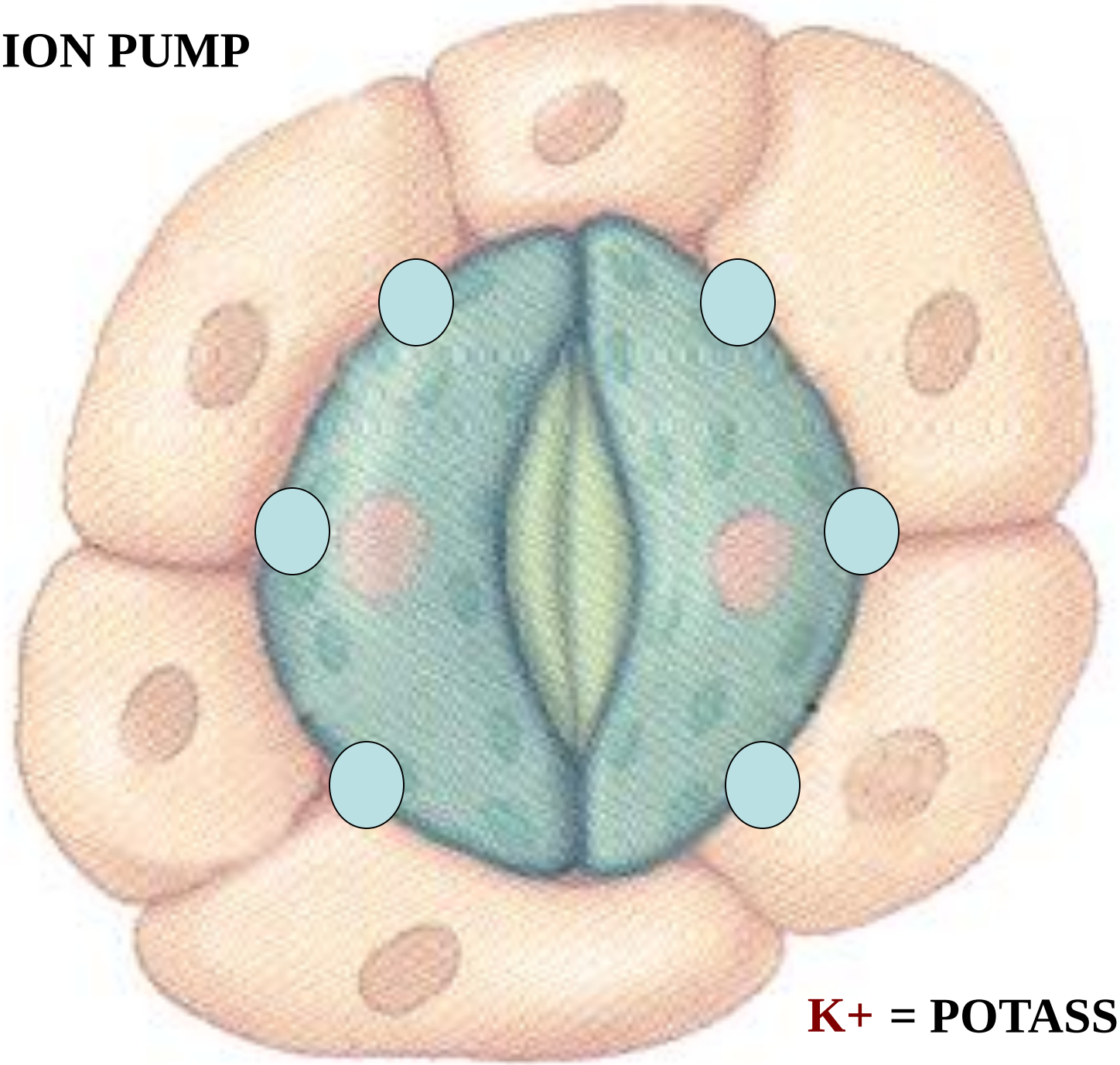
H2O H2O H2O H2O H2O

H2O H2O H2O H2O H2O

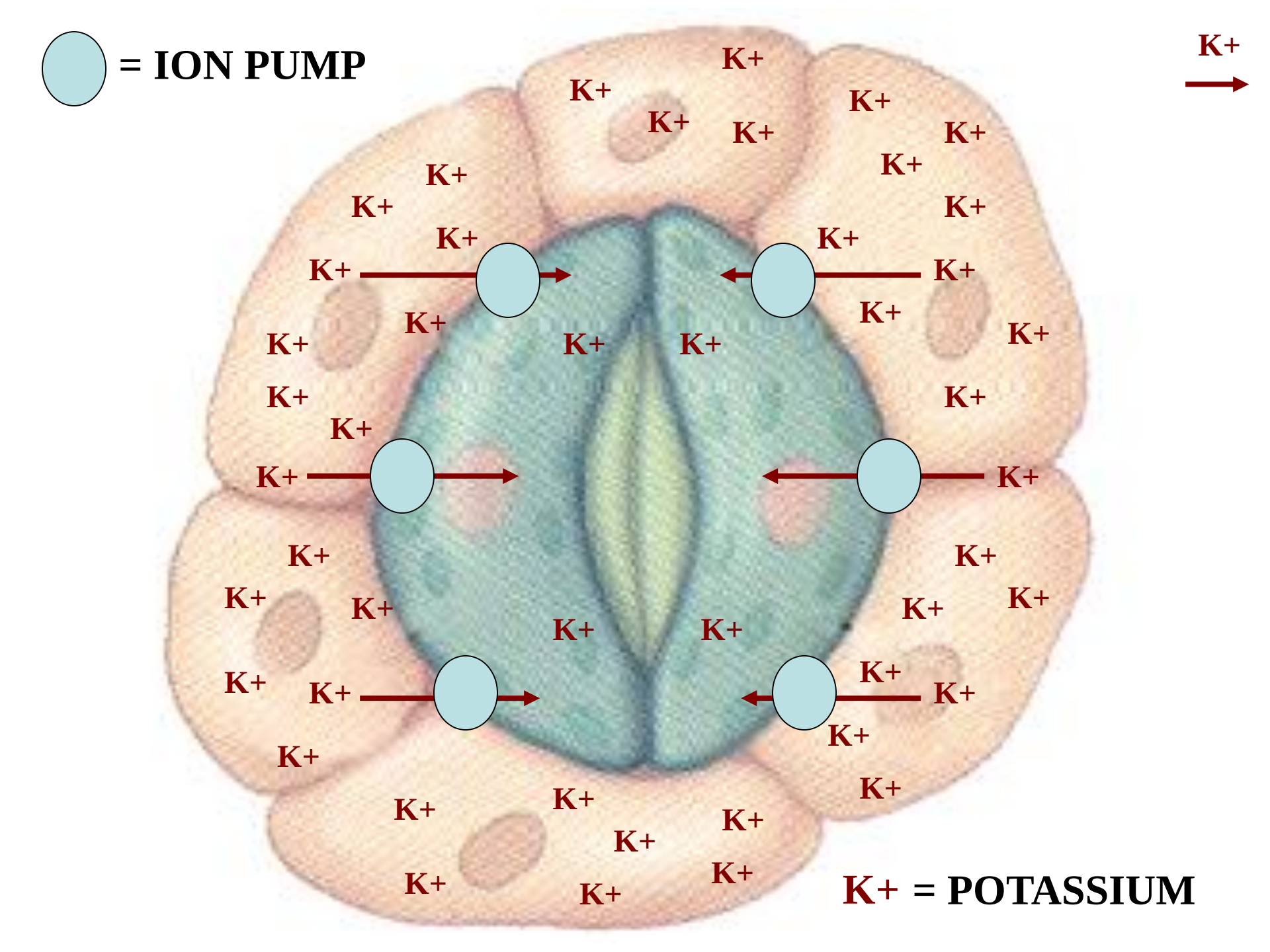
LEAF HYDRATION OCCURS

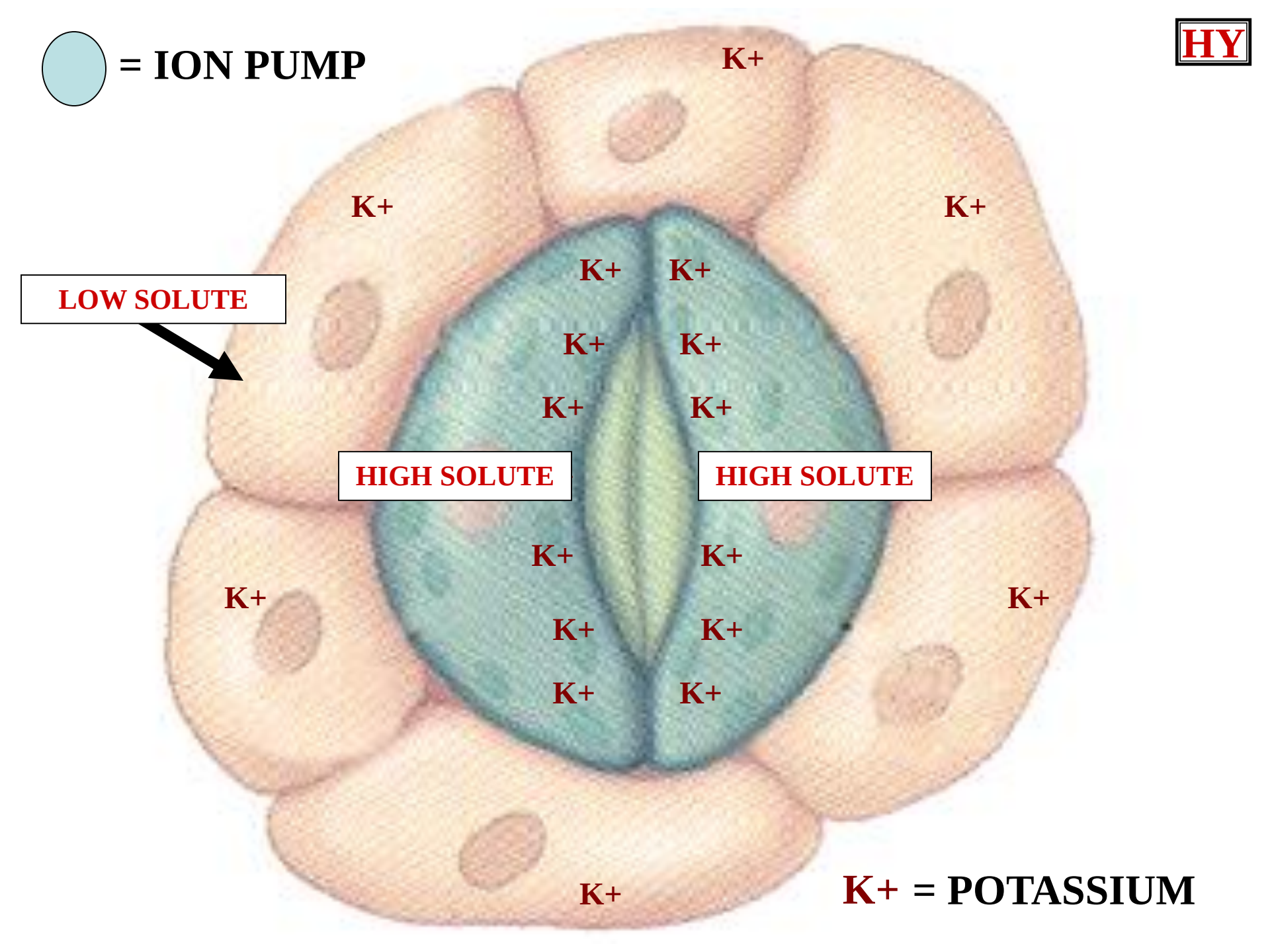
= ION PUMP

K+

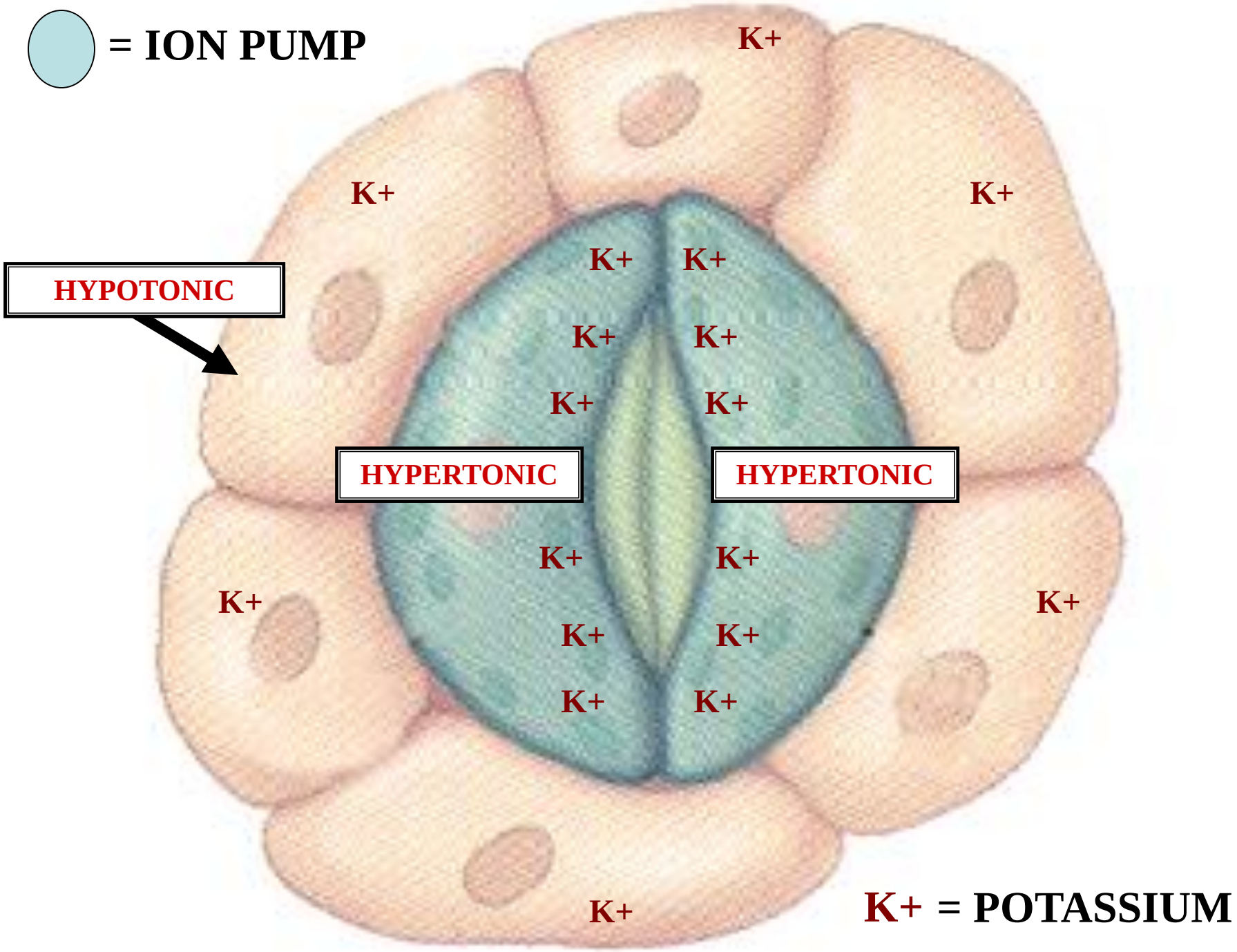


K+ = POTASSIUM

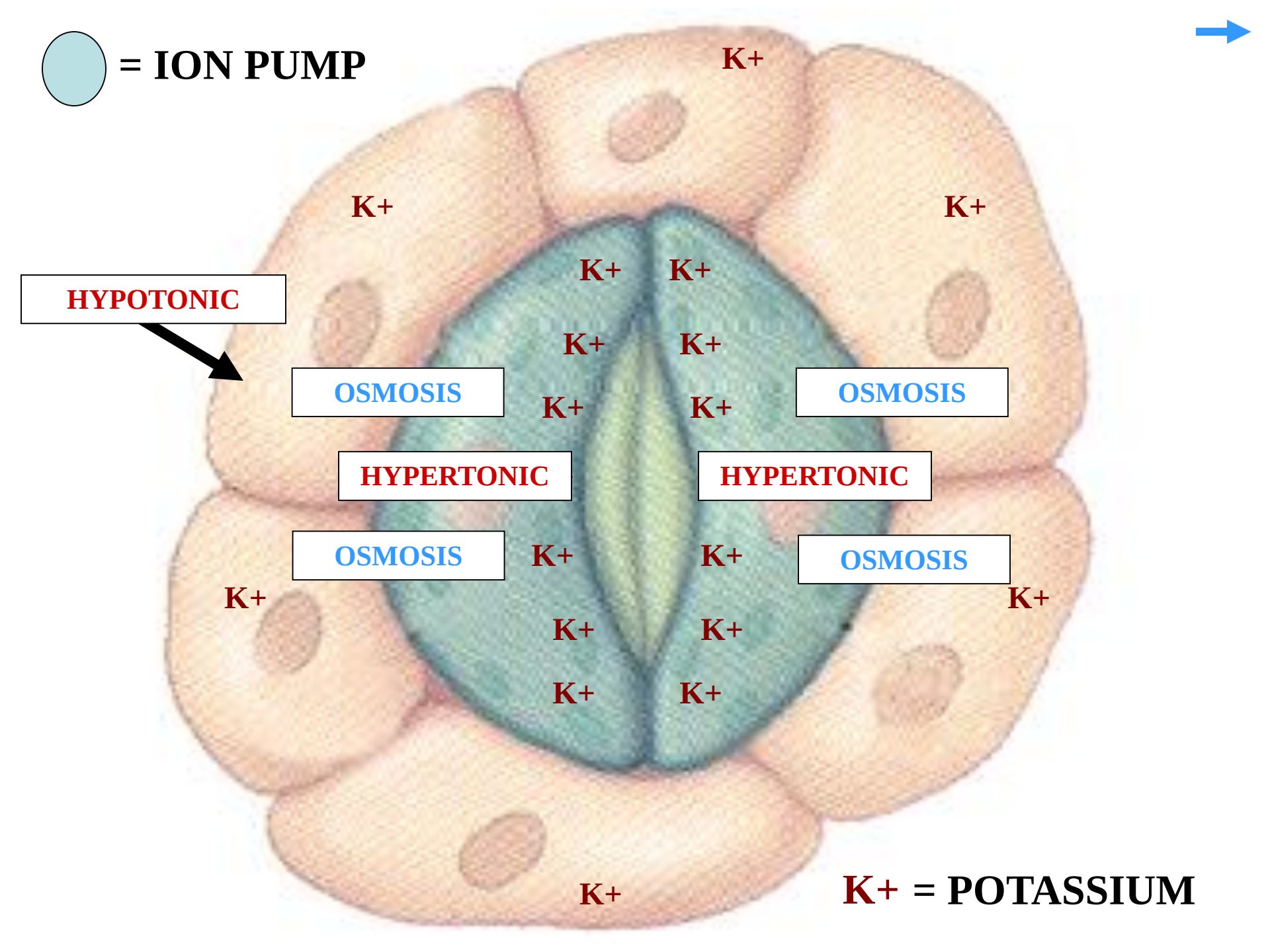

= ION PUMP
K+
K+ = POTASSIUM


= ION PUMP
HY
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
LOW SOLUTE
HIGH SOLUTE
HIGH SOLUTE
K+ = POTASSIUM

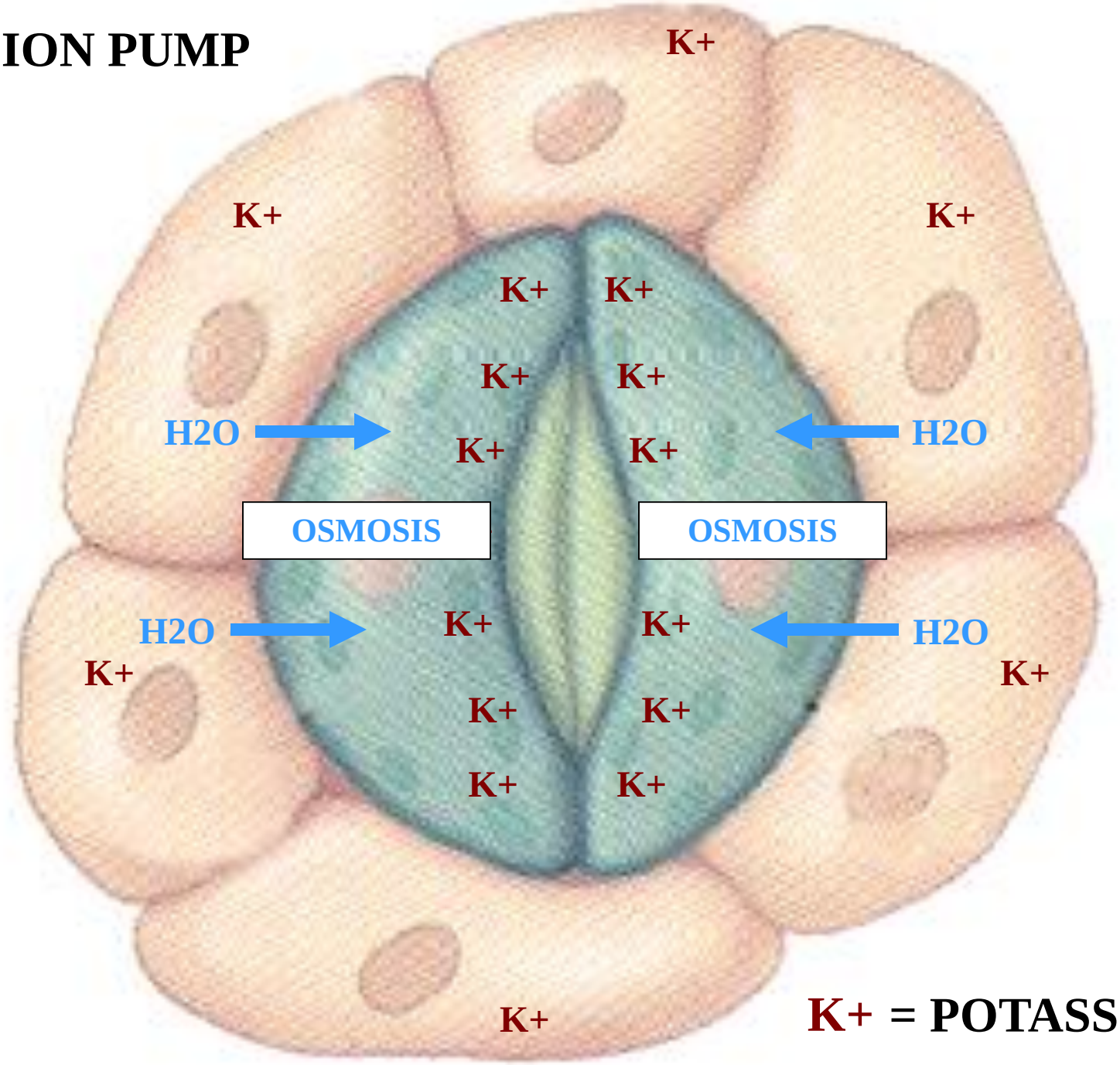
= ION PUMP



K+ = POTASSIUM

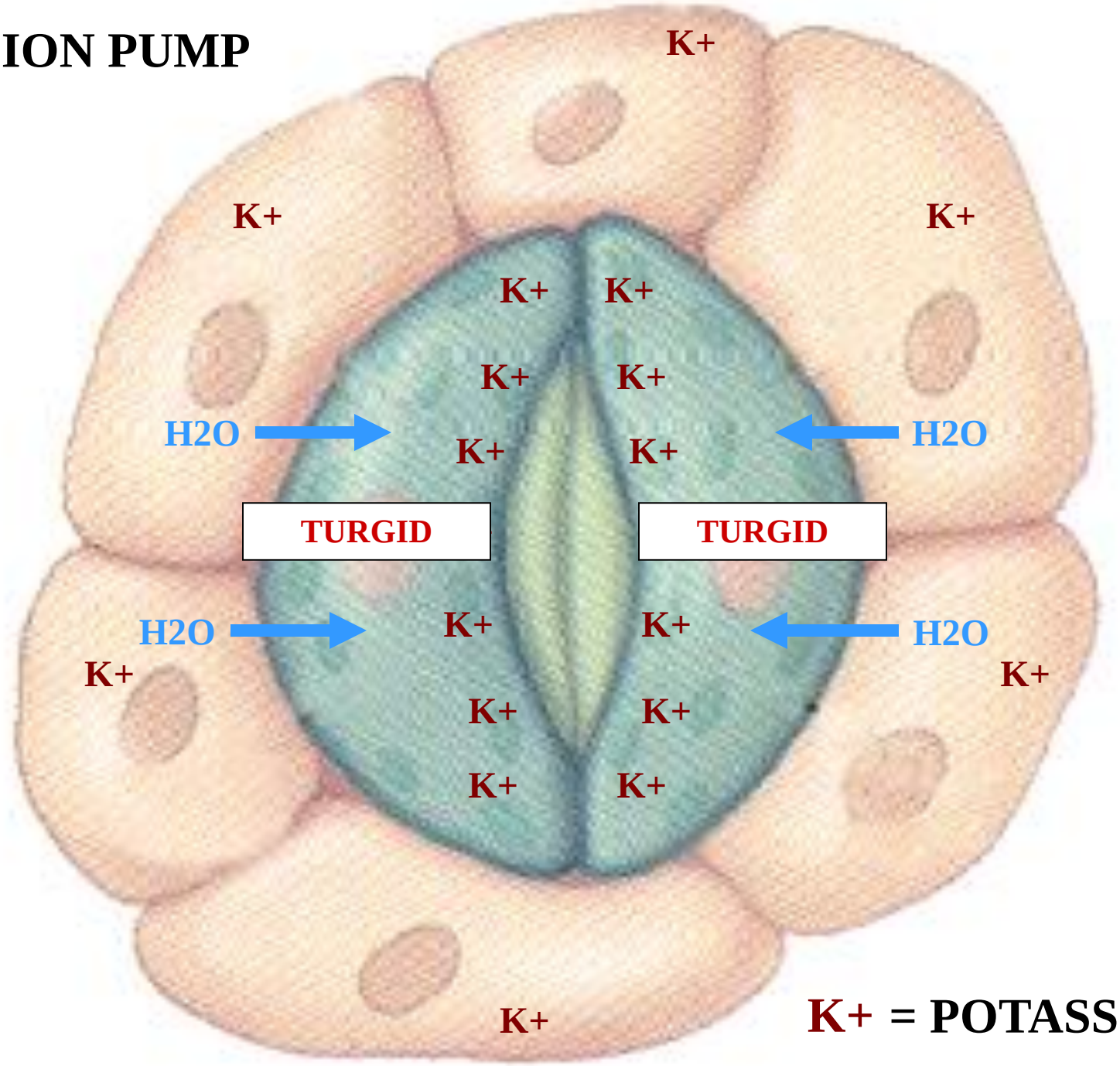

= ION PUMP
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
K+
HYPOTONIC
OSMOSIS
OSMOSIS
HYPERTONIC
HYPERTONIC
OSMOSIS
OSMOSIS
K+ = POTASSIUM

= ION PUMP



K+ = POTASSIUM

= ION PUMP



K+ = POTASSIUM