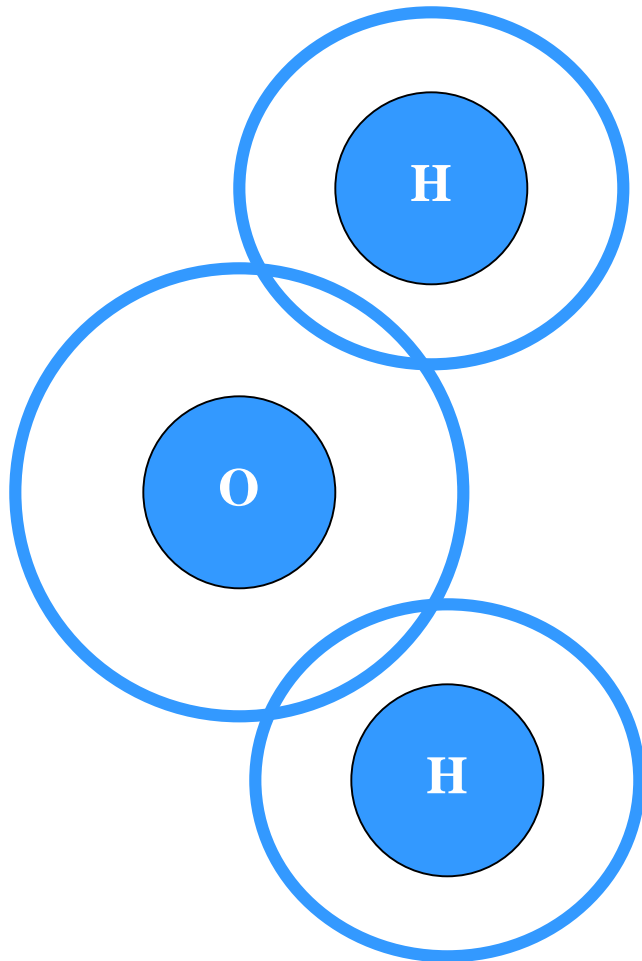


POLAR SOLUTE

+

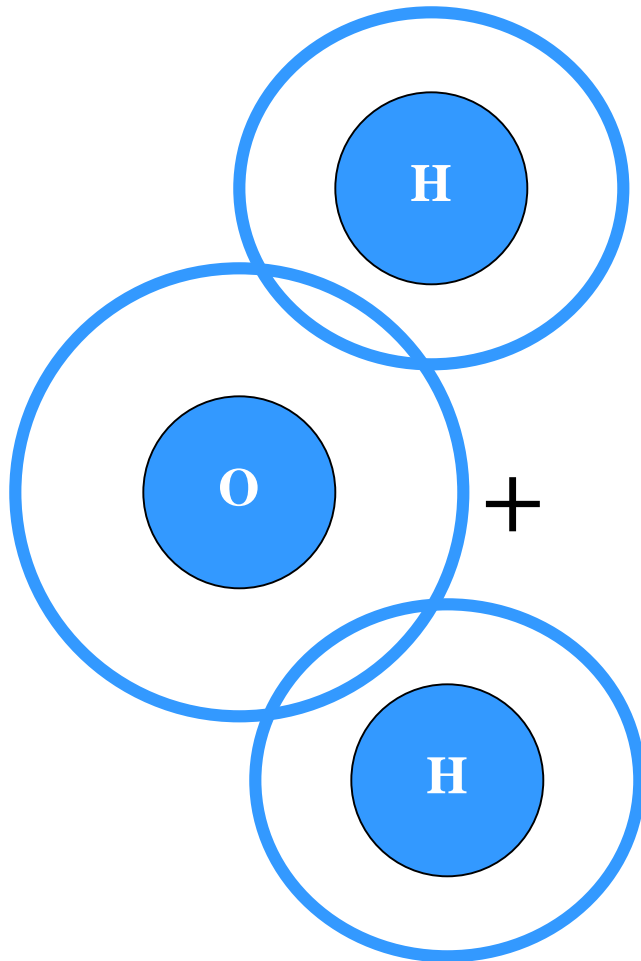


WATER MOLECULE

HIGHLY POLAR

POLAR SOLUTE

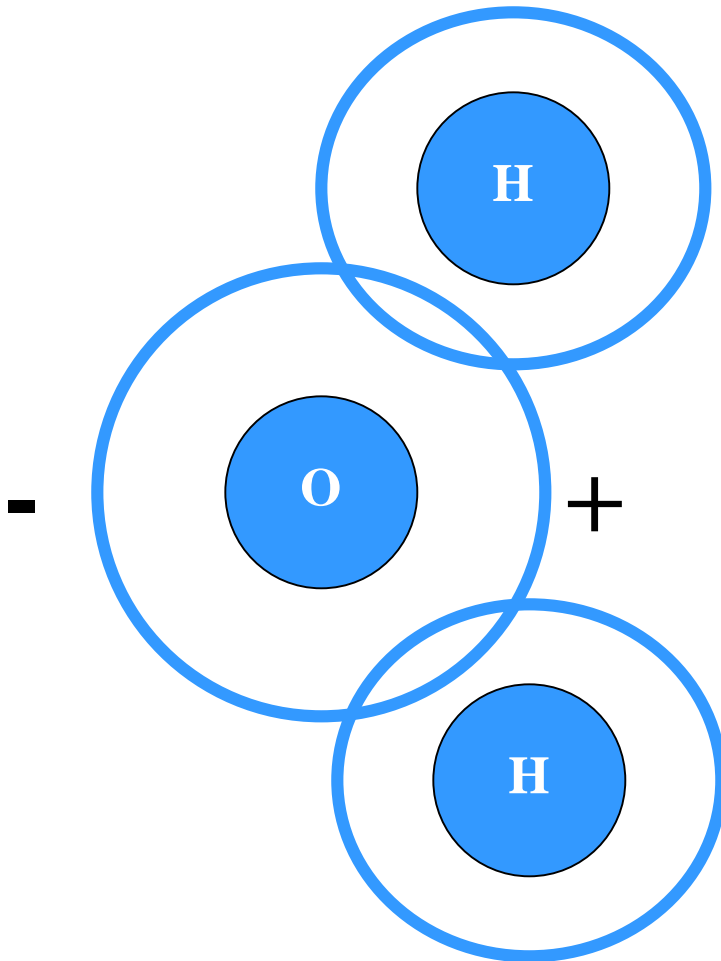
-



+ POSITIVE CHARGE

POLAR WATER MOLECULE

POLAR SOLUTE

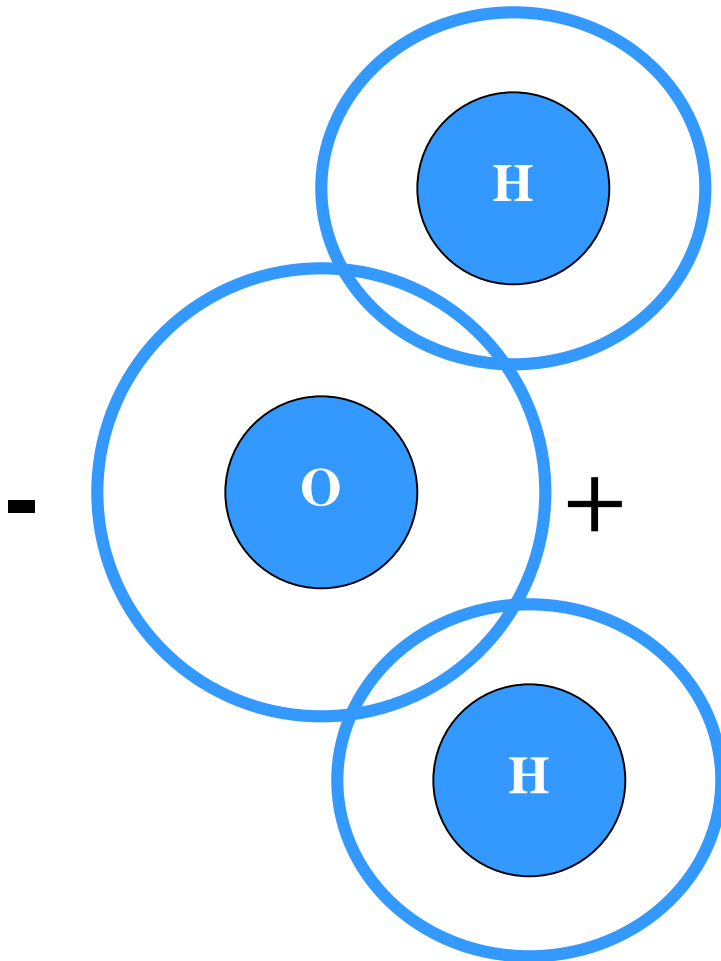
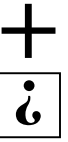


POLAR WATER MOLECULE

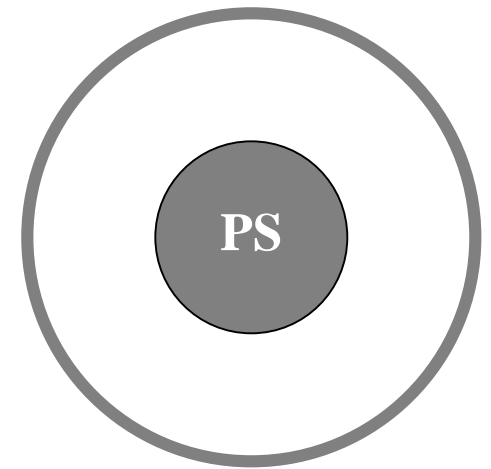
+ POSITIVE CHARGE

- NEGATIVE CHARGE

POLAR SOLUTE



POLAR WATER MOLECULE

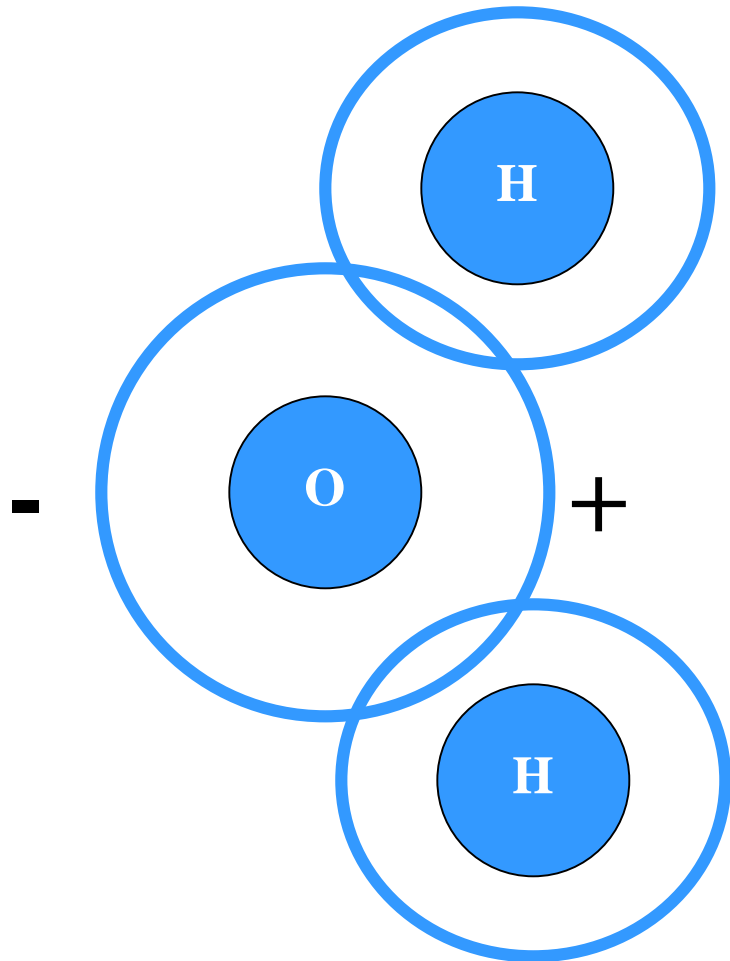


POLAR SOLUTE

+ POSITIVE CHARGE

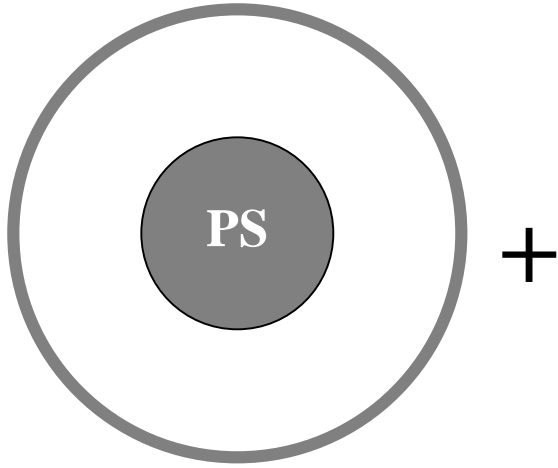
- NEGATIVE CHARGE

POLAR SOLUTE



POLAR WATER MOLECULE

+ POSITIVE CHARGE

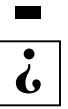


POLAR SOLUTE

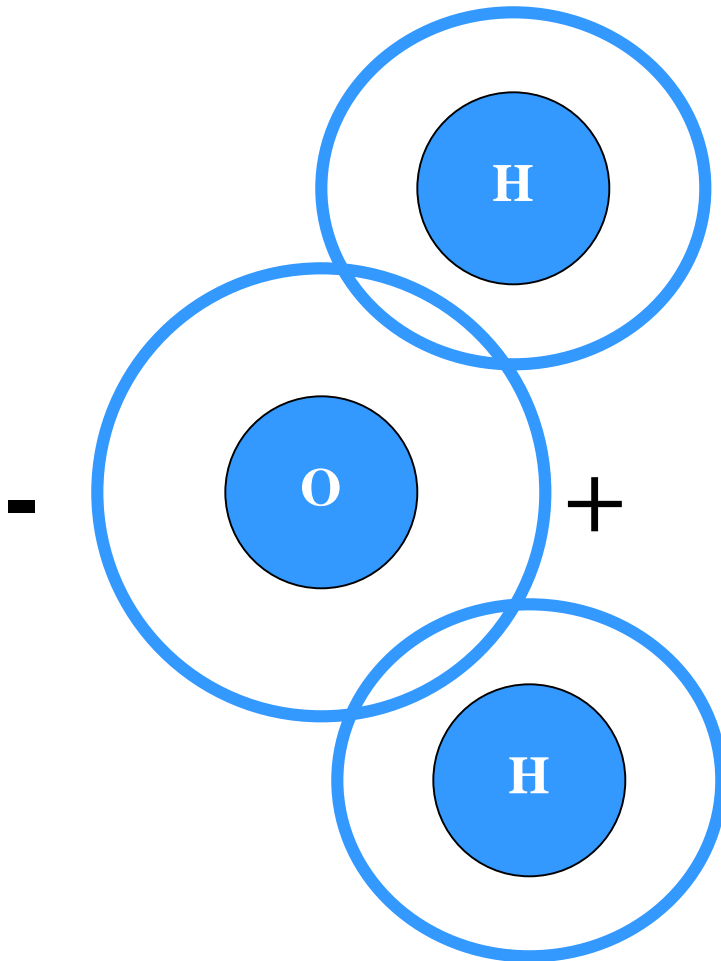
+ POSITIVE CHARGE

- NEGATIVE CHARGE

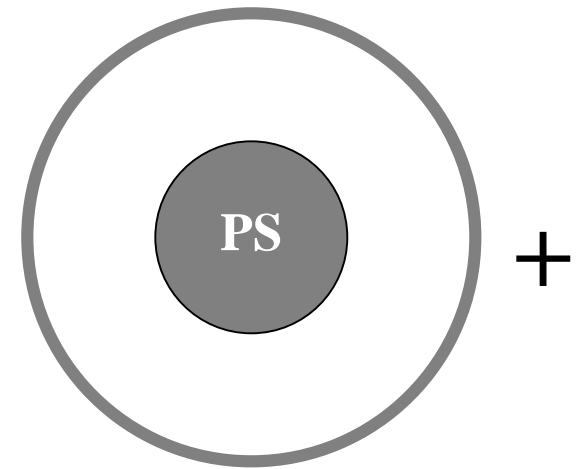
POLAR SOLUTE



+ POSITIVE CHARGE: **PRESENT**



POLAR WATER MOLECULE

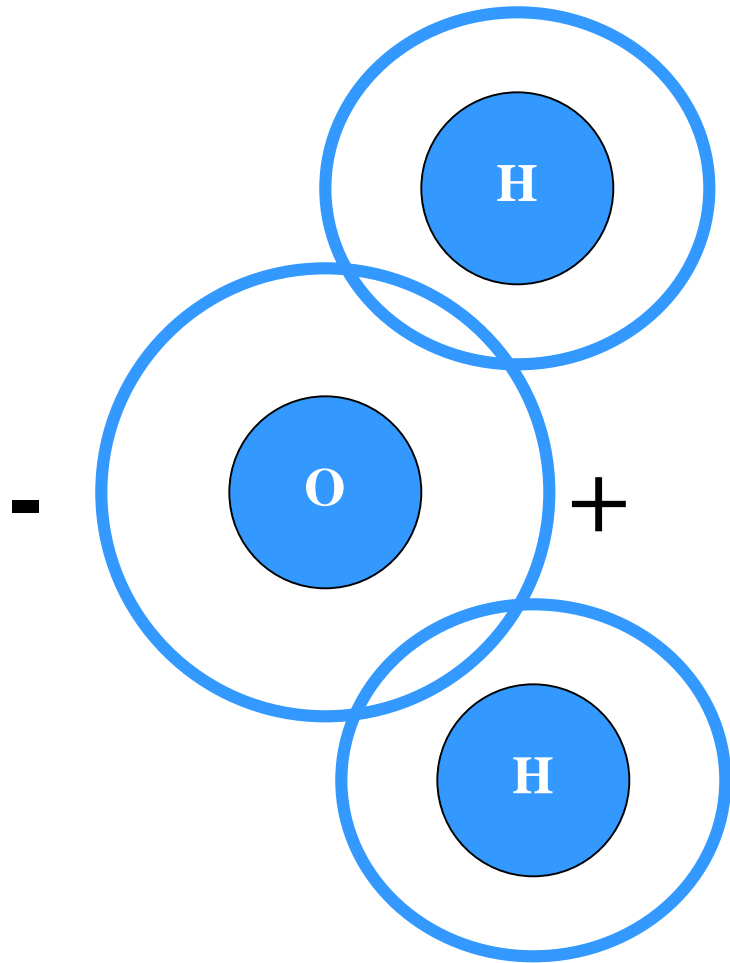


POLAR SOLUTE

+ POSITIVE CHARGE

- NEGATIVE CHARGE

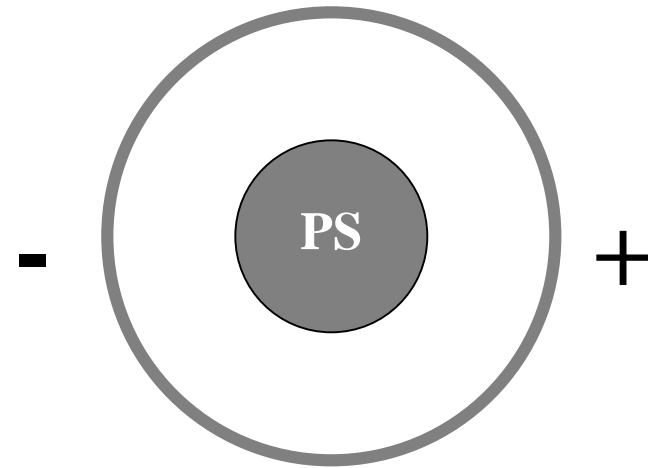
POLAR SOLUTE



POLAR WATER MOLECULE

+ POSITIVE CHARGE: PRESENT

- NEGATIVE CHARGE

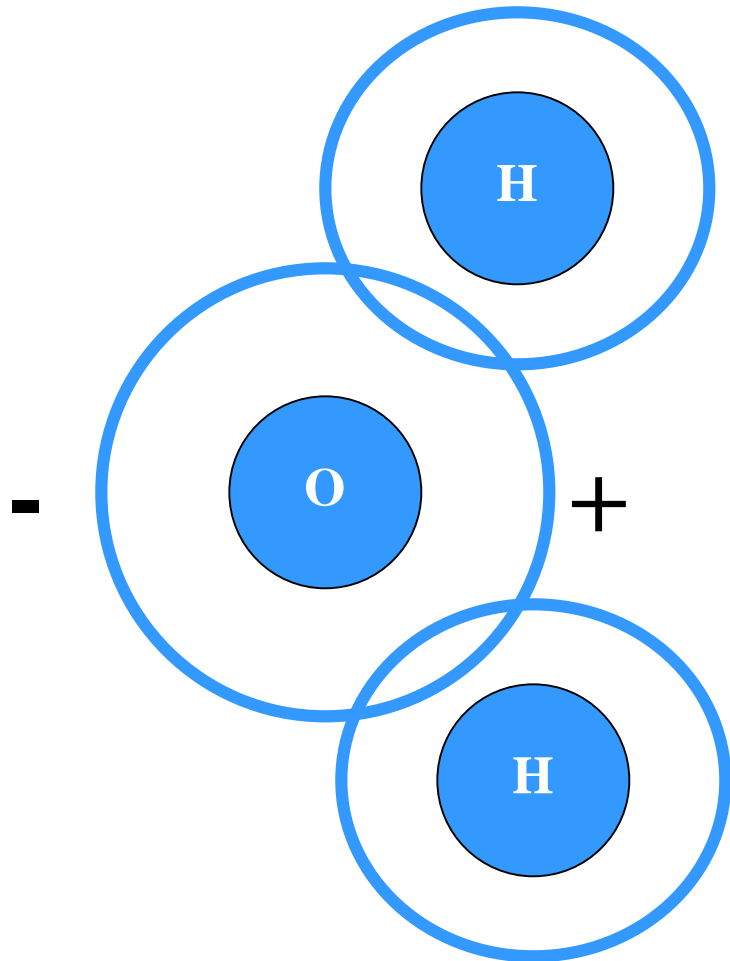


POLAR SOLUTE

+ POSITIVE CHARGE

- NEGATIVE CHARGE

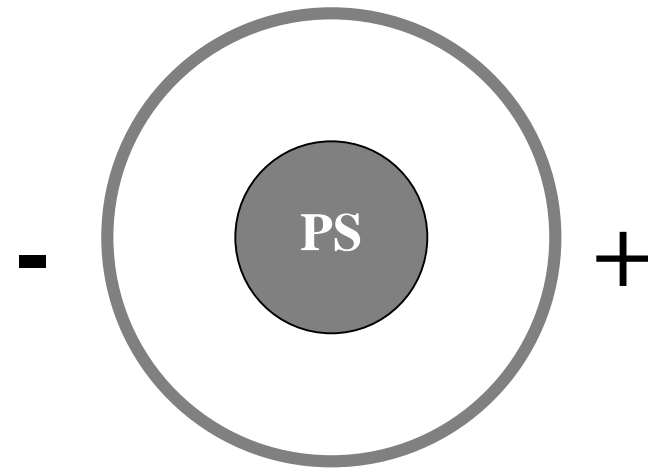
POLAR SOLUTE



POLAR WATER MOLECULE

+ POSITIVE CHARGE: PRESENT

- NEGATIVE CHARGE: PRESENT



POLAR SOLUTE

+ POSITIVE CHARGE

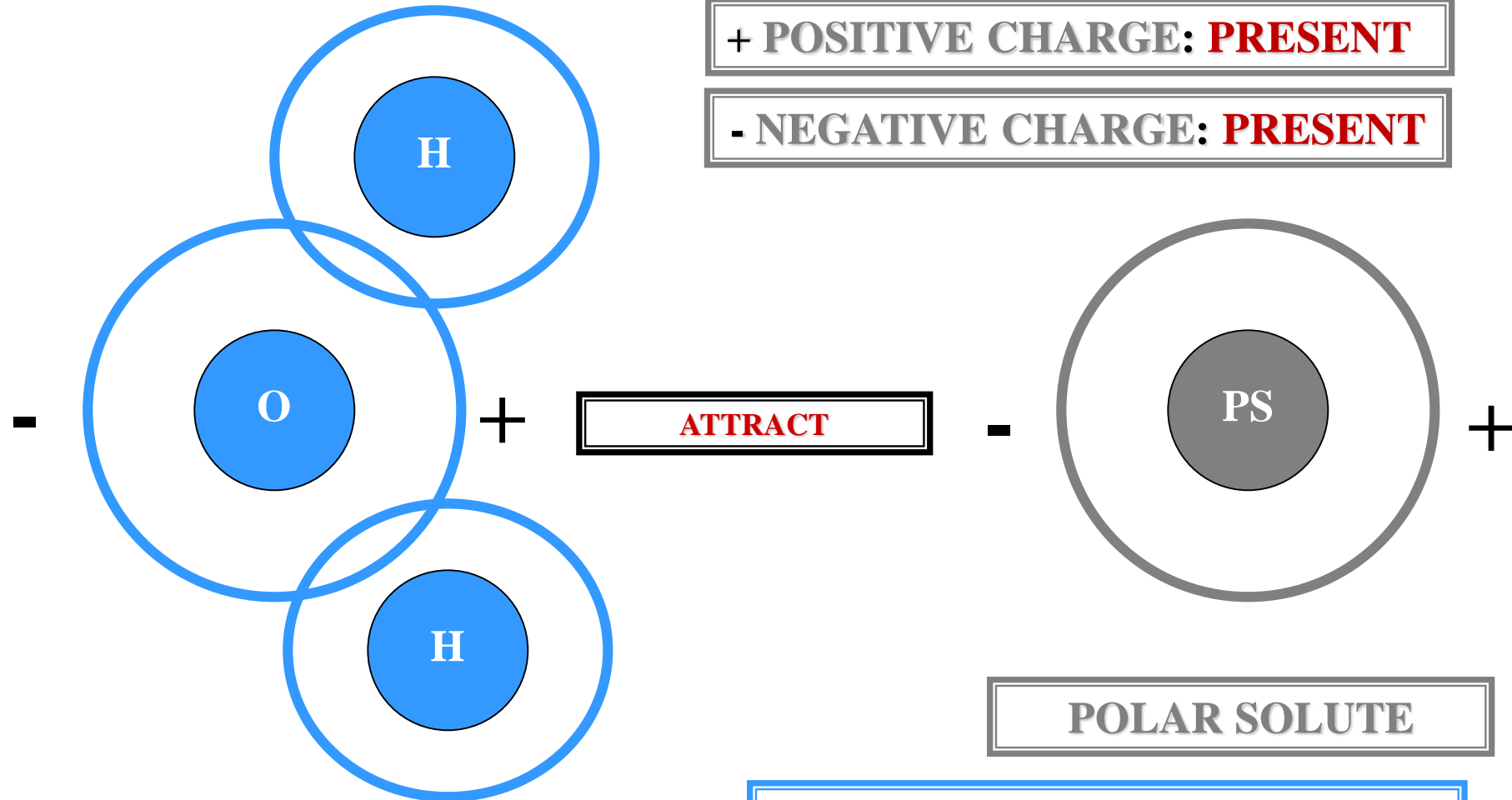
- NEGATIVE CHARGE

POLAR SOLUTE



+ POSITIVE CHARGE: **PRESENT**

- NEGATIVE CHARGE: **PRESENT**



POLAR WATER MOLECULE

+ **POSITIVE CHARGE**

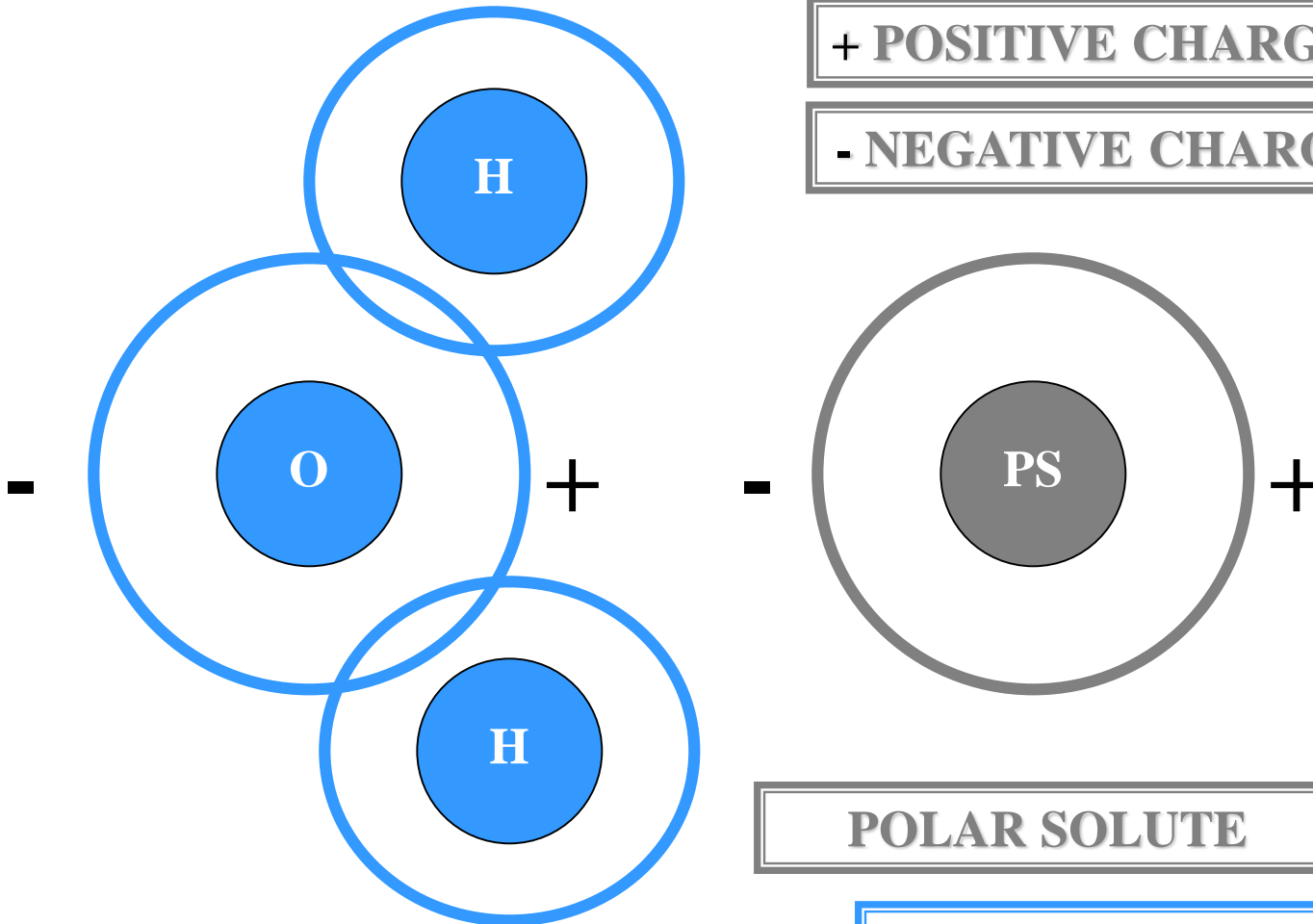
- **NEGATIVE CHARGE**

POLAR SOLUTE



+ POSITIVE CHARGE: **PRESENT**

- NEGATIVE CHARGE: **PRESENT**



POLAR WATER MOLECULE

POLAR SOLUTE

+ **POSITIVE CHARGE**

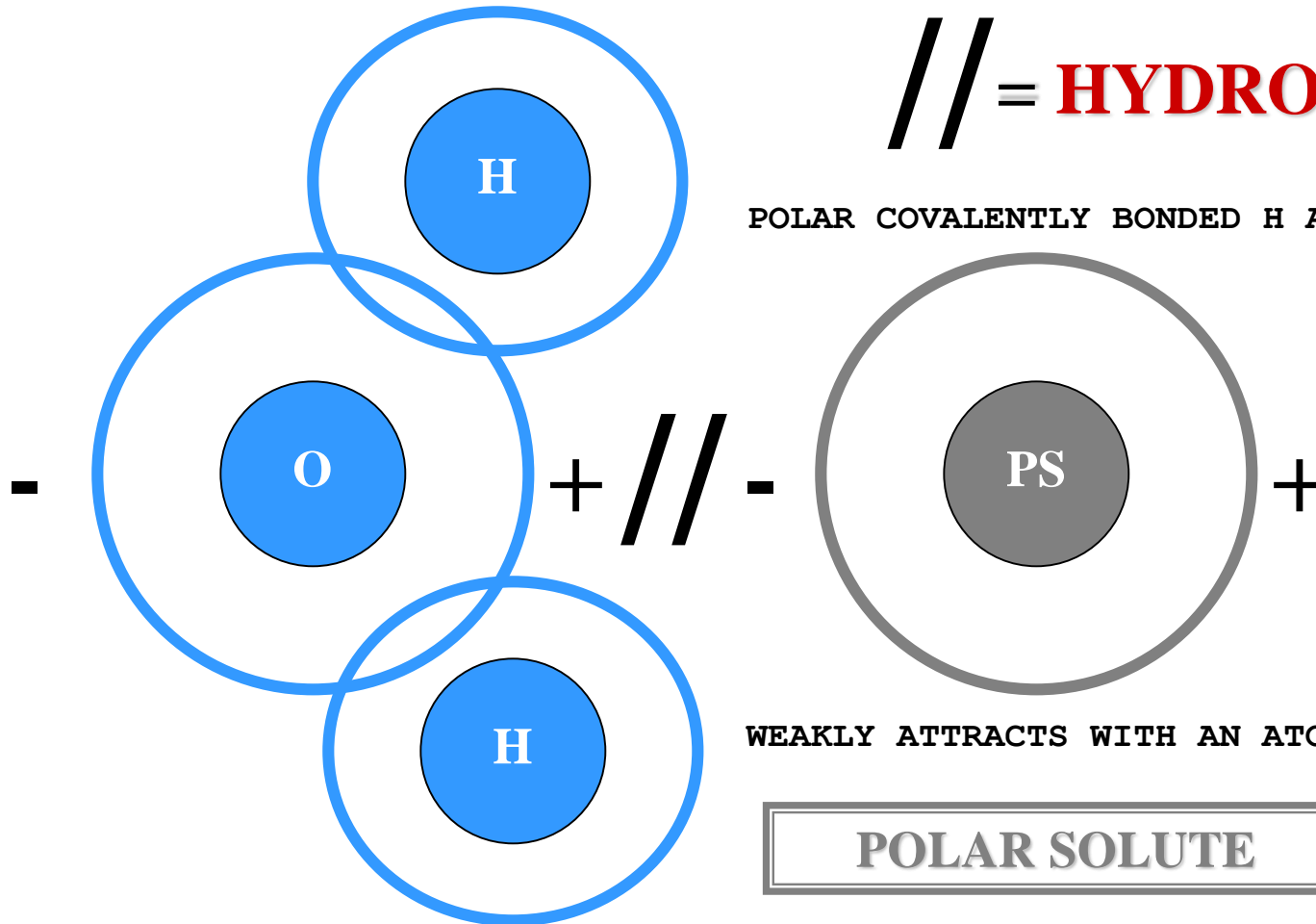
- **NEGATIVE CHARGE**

POLAR SOLUTE

PS
*

// = HYDROGEN BOND

POLAR COVALENTLY BONDED H ATOM (+)



WEAKLY ATTRACTS WITH AN ATOM (-)

// = HYDROGEN BOND

POLAR WATER MOLECULE

WATER BIO-IMPORTANT PROPERTIES

POLAR SOLUTE

ATTRACTS

WATER

WATER BIO-IMPORTANT PROPERTIES

WATER MOLECULES

**WATER
ADHESION**

H

//

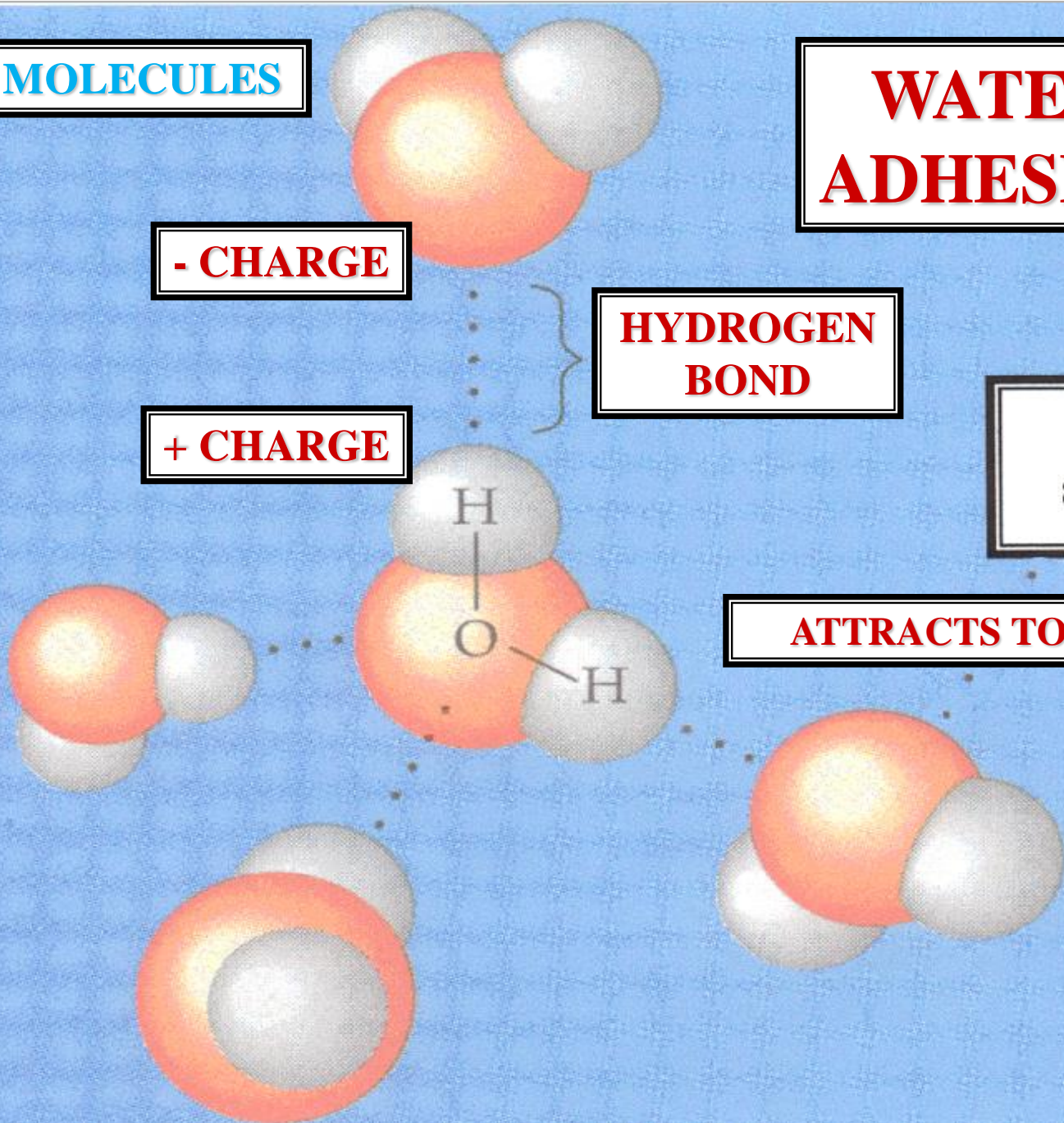
- CHARGE

+ CHARGE

**HYDROGEN
BOND**

-
POLAR
SOLUTE
+

ATTRACTS TO WATER



WATER MOLECULES

**WATER
ADHESION**

H
i

- CHARGE

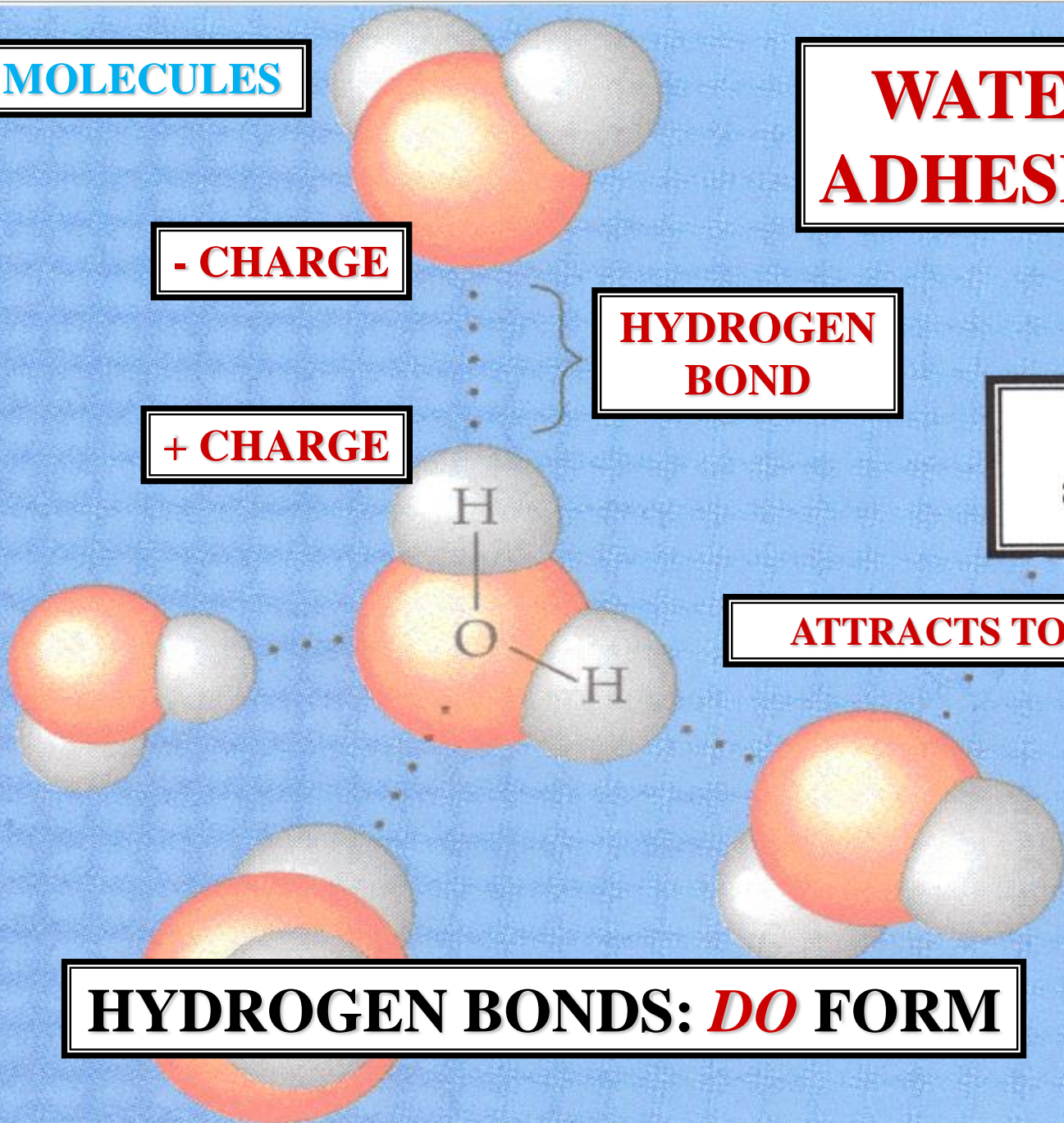
+ CHARGE

**HYDROGEN
BOND**

-
POLAR
SOLUTE
+

ATTRACTS TO WATER

HYDROGEN BONDS: *DO* FORM



WATER MOLECULES

**WATER
ADHESION**

- CHARGE

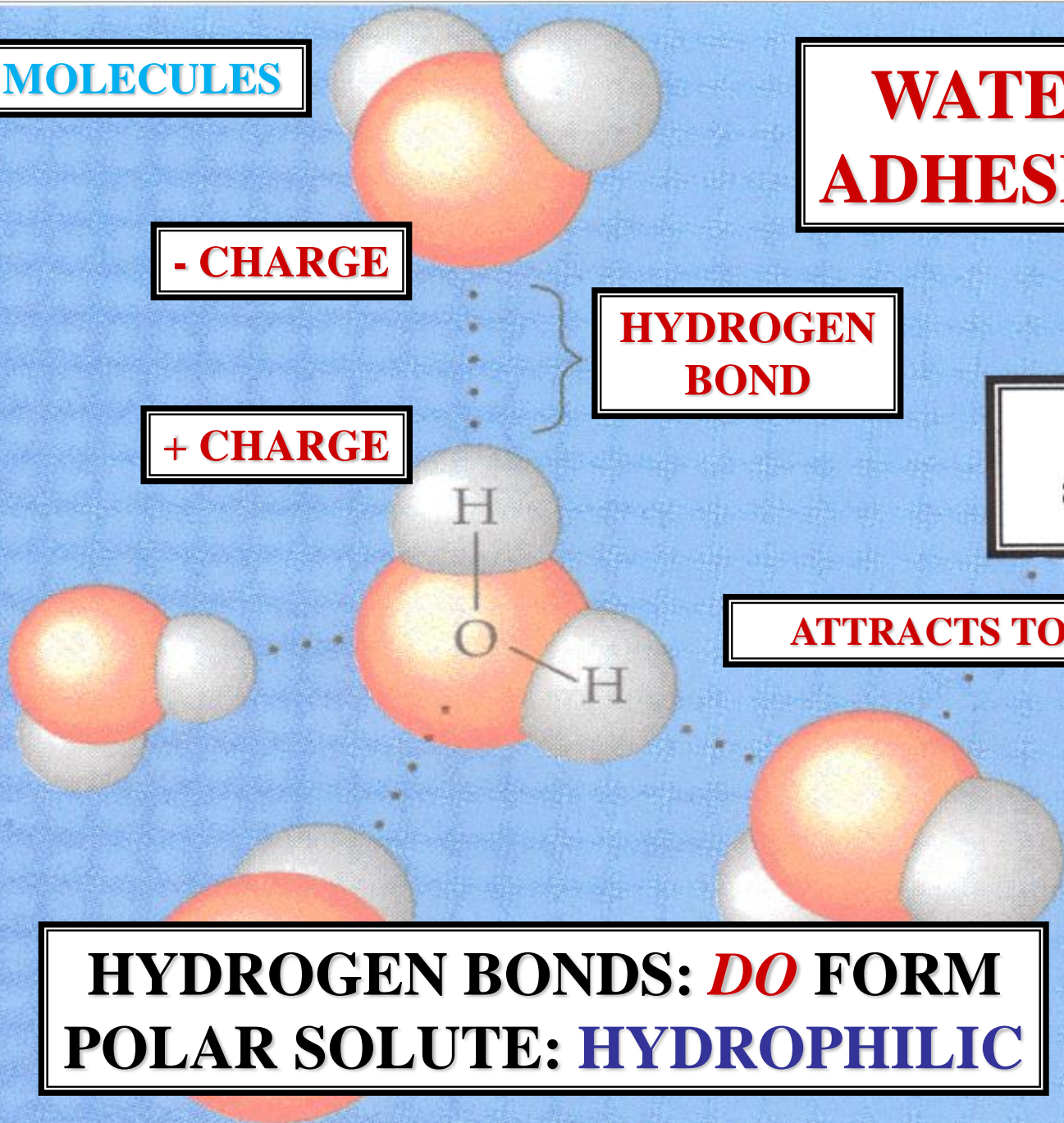
+ CHARGE

**HYDROGEN
BOND**

**-
POLAR
SOLUTE
+**

ATTRACTS TO WATER

**HYDROGEN BONDS: *DO* FORM
POLAR SOLUTE: **HYDROPHILIC****



WATER BIO-IMPORTANT PROPERTIES



WATER

UNDERGOES

ADHESION

POLAR SOLUTES

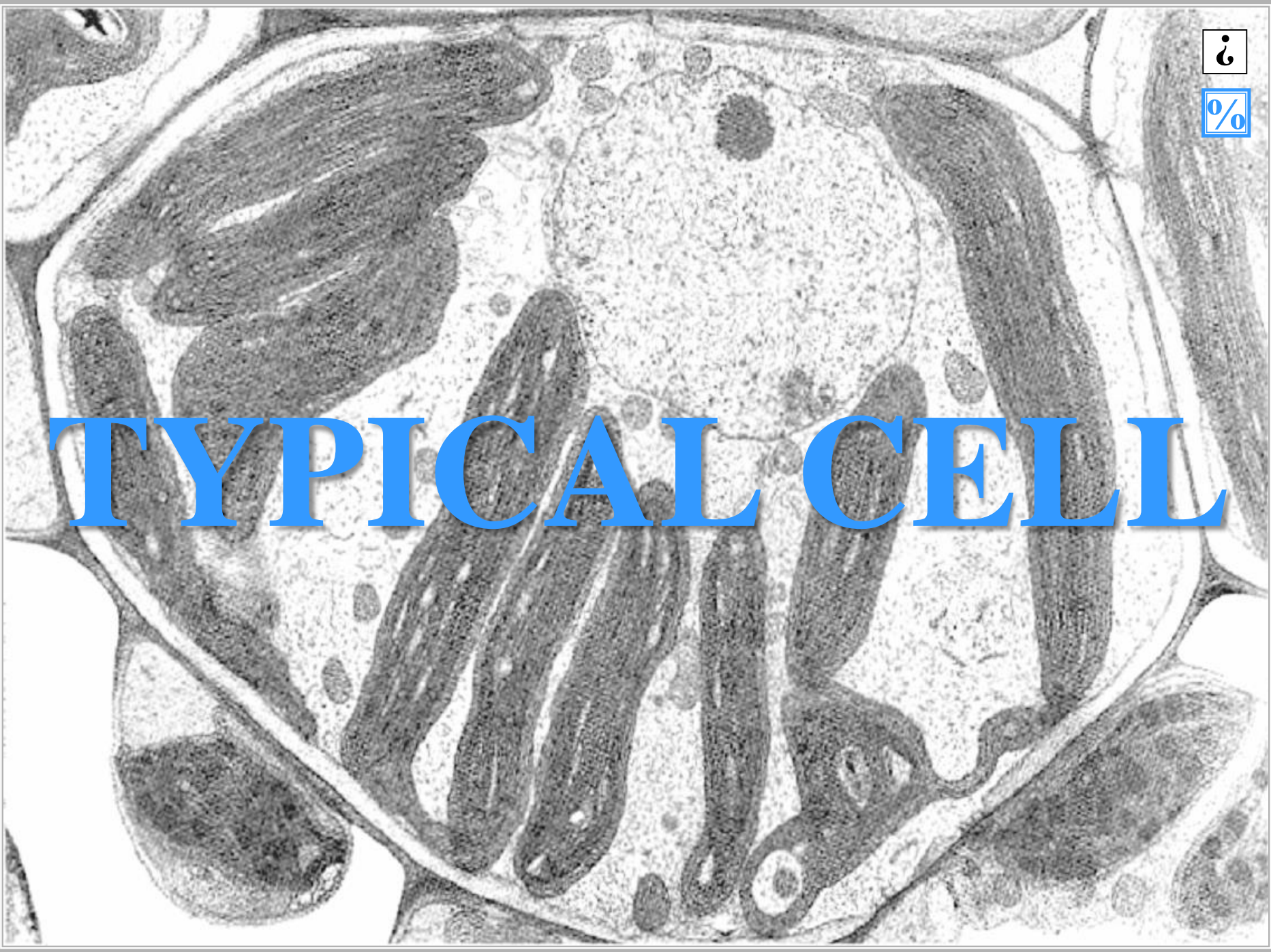
WATER BIO-IMPORTANT PROPERTIES



POLAR-SOLUTES
&
CELL
METABOLISM
APPILED



TYPICAL CELL



A grayscale electron micrograph showing a cross-section of a cell. The cell is filled with various organelles, including a large nucleus with a prominent nucleolus, rough endoplasmic reticulum with ribosomes, and several mitochondria with visible internal folds (cristae). The cell membrane is clearly defined, and the overall structure is highly organized.

TYPICAL CELL

70% - 90%

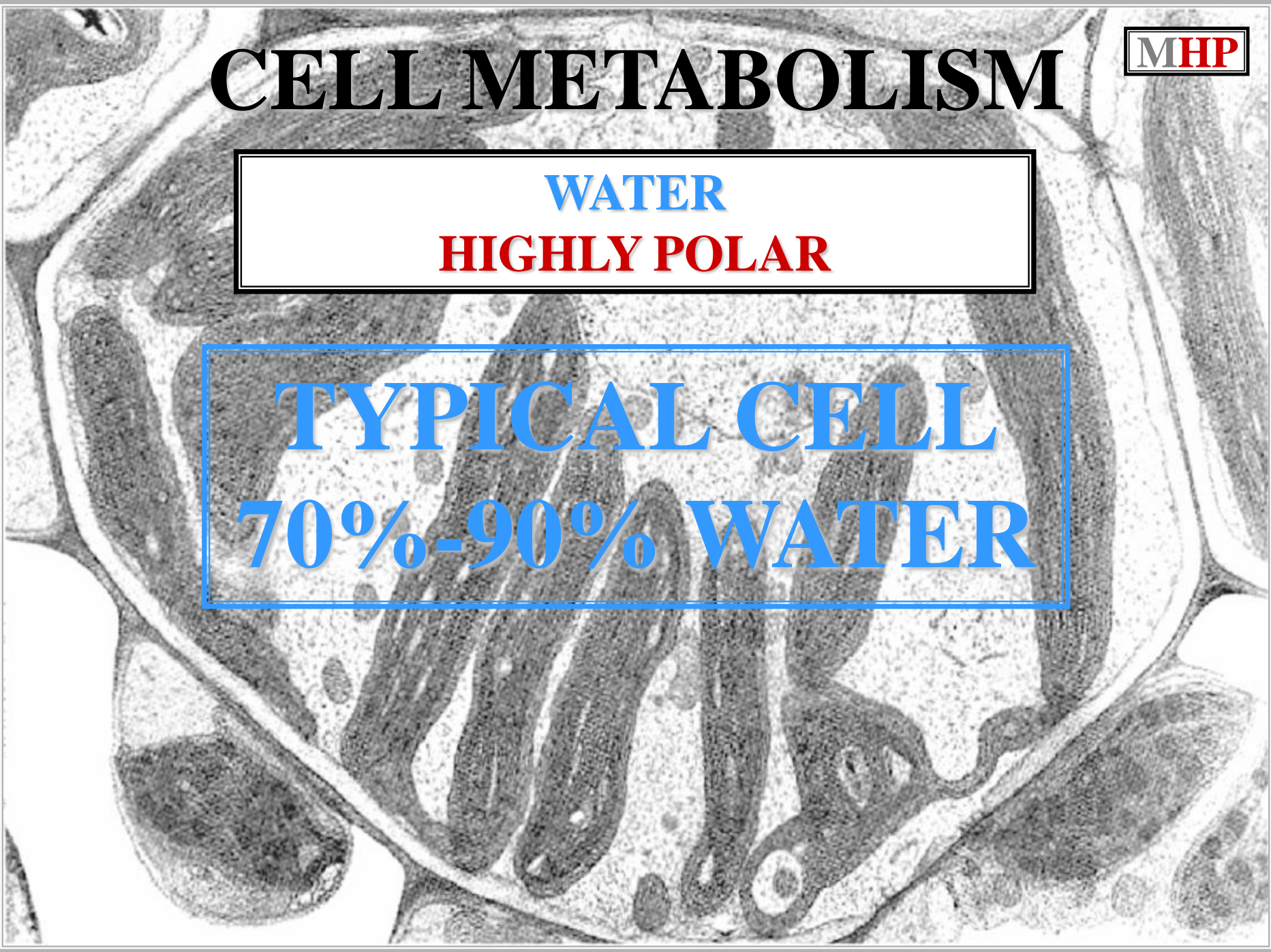
WATER

CELL METABOLISM

MHP

WATER
HIGHLY POLAR

TYPICAL CELL
70%-90% WATER



A grayscale electron micrograph of a cell, showing various organelles like mitochondria and membranes. The image is used as a background for text overlays.

CELL METABOLISM

//

WATER
HIGHLY POLAR

TYPICAL CELL
70%-90% WATER

BIOCHEMICAL METABOLITES
HIGHLY POLAR

A grayscale electron micrograph of a cell, showing various organelles such as mitochondria, endoplasmic reticulum, and a nucleus. The image is used as a background for the text.

CELL METABOLISM

H

WATER
HIGHLY POLAR

TYPICAL CELL
70%-90% WATER

HYDROGEN BONDS

BIOCHEMICAL METABOLITES
HIGHLY POLAR

A grayscale electron micrograph of a cell, showing various organelles such as mitochondria, endoplasmic reticulum, and a nucleus. The image is used as a background for the text.

CELL METABOLISM

D

WATER
HIGHLY POLAR

TYPICAL CELL
70%-90% WATER

HYDROGEN BONDS

BIOCHEMICAL METABOLITES
HYDROPHILIC

A grayscale electron micrograph of a cell, showing various organelles such as mitochondria, endoplasmic reticulum, and a nucleus. The image is used as a background for the text.

CELL METABOLISM

A

WATER
HIGHLY POLAR

TYPICAL CELL
70%-90% WATER

HYDROGEN BONDS

BIOCHEMICAL METABOLITES
DISSOLVE IN WATER/CELL

CELL METABOLISM



WATER
HIGHLY POLAR

TYPICAL CELL
70%-90% WATER

HYDROGEN BONDS

BIOCHEMICAL METABOLITES
AVAILABLE TO METABOLISM

***EFFICIENT
CELL
METABOLISM***



HOMEOSTASIS



WATER BIO-IMPORTANT PROPERTIES



WATER

VERSITILE

BIO-SOLVENT

WATER BIO-IMPORTANT PROPERTIES

SPECIFIC HEAT

SPECIFIC HEAT



SPECIFIC HEAT

**HEAT ABSORBED OR LOST
TO CHANGE 1 G OF ANY
SUBSTANCE 1 DEGREE C**

SPECIFIC HEAT

CALORIE
VS
TEMPERATURE

CALORIE

CALORIE

HEAT ENERGY NEEDED
TO RAISE 1 G OF WATER
1 DEGREE C

CALORIE

TEMPERATURE

TEMPERATURE

MEASURE

MOLECULAR MOVEMENT

TEMPERATURE



CALORIE
VS
TEMPERATURE
APPLIED

CALORIE / TEMPERATURE

EXPEND MORE CALORIES

CALORIE / TEMPERATURE

CALORIE / TEMPERATURE

**EXPEND MORE CALORIES
MORE ENERGY RELEASED**

CALORIE / TEMPERATURE

CALORIE / TEMPERATURE

**EXPEND MORE CALORIES
MORE ENERGY RELEASED
MOLECULAR MOVEMENT
INCREASES**

CALORIE / TEMPERATURE



CALORIE / TEMPERATURE

**EXPEND MORE CALORIES
MORE ENERGY RELEASED
MOLECULAR MOVEMENT
INCREASES**

TEMPERATURE INCREASES

CALORIE / TEMPERATURE

CALORIE / TEMPERATURE

EXPEND FEWER CALORIES

CALORIE / TEMPERATURE

CALORIE / TEMPERATURE

**EXPEND FEWER CALORIES
LESS ENERGY RELEASED**

CALORIE / TEMPERATURE

CALORIE / TEMPERATURE

EXPEND FEWER CALORIES

LESS ENERGY RELEASED

MOLECULAR MOVEMENT

DECREASES

CALORIE / TEMPERATURE



CALORIE / TEMPERATURE

EXPEND FEWER CALORIES

LESS ENERGY RELEASED

MOLECULAR MOVEMENT

DECREASES

TEMPERATURE DECREASES

CALORIE / TEMPERATURE

SPECIFIC HEAT WATER: APPLIED

SPECIFIC HEAT: APPLIED SH

1G WATER

1G ETHANOL

SPECIFIC HEAT: APPLIED

1

1G WATER

1G ETHANOL

SPECIFIC HEAT

SPECIFIC HEAT: APPLIED

10

1G WATER

1G ETHANOL

1 CAL / G

**IT TAKES 1 CALORIE
TO RAISE 1 G OF WATER
1 DEGREE C**

SPECIFIC HEAT: APPLIED



1G WATER

1G ETHANOL

1 CAL / G

10 CAL / G

EXPEND

**IT TAKES 1 CALORIE
TO RAISE 1 G OF WATER
1 DEGREE C**

SPECIFIC HEAT: APPLIED

10

1G WATER

1G ETHANOL

1 CAL / G

10 CAL / G

EXPEND

? DEGREES C

**IT TAKES 1 CALORIE
TO RAISE 1 G OF WATER
1 DEGREE C**

SPECIFIC HEAT: APPLIED



1G WATER

1G ETHANOL

1 CAL / G

10 CAL / G

EXPEND

10 DEGREES C

**IT TAKES 1 CALORIE
TO RAISE 1 G OF WATER
1 DEGREE C**

SPECIFIC HEAT: APPLIED .5

1G WATER

1G ETHANOL

1 CAL / G

SPECIFIC HEAT

10 CAL / G

EXPEND

10 DEGREES C

SPECIFIC HEAT: APPLIED

10

1G WATER

1G ETHANOL

1 CAL / G

.5 CAL / G

10 CAL / G

EXPEND

10 DEGREES C

IT TAKES .5 CALORIE
TO RAISE 1 G OF ETHANOL
1 DEGREE C

SPECIFIC HEAT: APPLIED

?

1G WATER

1G ETHANOL

1 CAL / G

.5 CAL / G

10 CAL / G

10 CAL / G

EXPEND

EXPEND

10 DEGREES C

**IT TAKES .5 CALORIE
TO RAISE 1 G OF ETHANOL
1 DEGREE C**

SPECIFIC HEAT: APPLIED

1G WATER

1G ETHANOL

1 CAL / G

.5 CAL / G

10 CAL / G

10 CAL / G

EXPEND

EXPEND

10 DEGREES C

? DEGREES C

**IT TAKES .5 CALORIE
TO RAISE 1 G OF ETHANOL
1 DEGREE C**

SPECIFIC HEAT: APPLIED

?

1G WATER

1G ETHANOL

1 CAL / G

.5 CAL / G

10 CAL / G

10 CAL / G

EXPEND

EXPEND

10 DEGREES C

20 DEGREES C

**IT TAKES .5 CALORIE
TO RAISE 1 G OF ETHANOL
1 DEGREE C**



QUESTION

WHICH OF THE
PRECEDING WATER
OR ETHANOL RESISTS
TEMPERATURE CHANGE?

QUESTION

SPECIFIC HEAT: APPLIED



1G WATER

1G ETHANOL

1 CAL / G

.5 CAL / G

10 CAL / G

10 CAL / G

EXPEND

EXPEND

10 DEGREES C

20 DEGREES C

SPECIFIC HEAT: APPLIED

?

2

1G WATER

1G ETHANOL

1 CAL / G

.5 CAL / G

10 CAL / G

10 CAL / G

EXPEND

EXPEND

10 DEGREES C

20 DEGREES C

WATER

RESISTS TEMPERATURE CHANGE

QUESTION

WHICH OF THE
PRECEDING WATER
OR ETHANOL RESISTS
TEMPERATURE CHANGE?

QUESTION

ANSWER

WATER

ANSWER

WATER MOLECULES

**WATER
HIGH SPECIFIC
HEAT**

- CHARGE

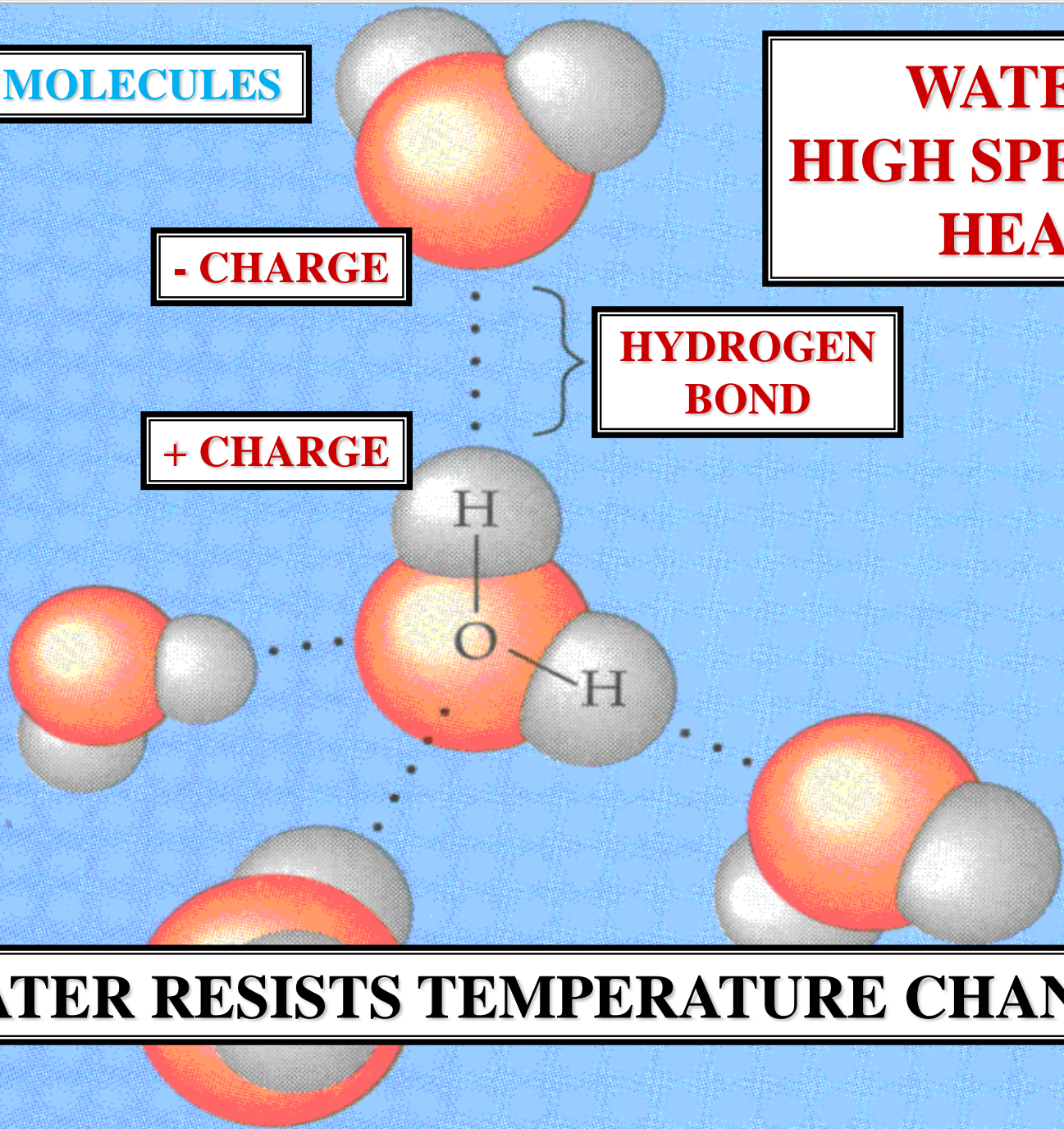
+ CHARGE

**HYDROGEN
BOND**

i

H

WATER RESISTS TEMPERATURE CHANGE



WATER MOLECULES

**WATER
HIGH SPECIFIC
HEAT**

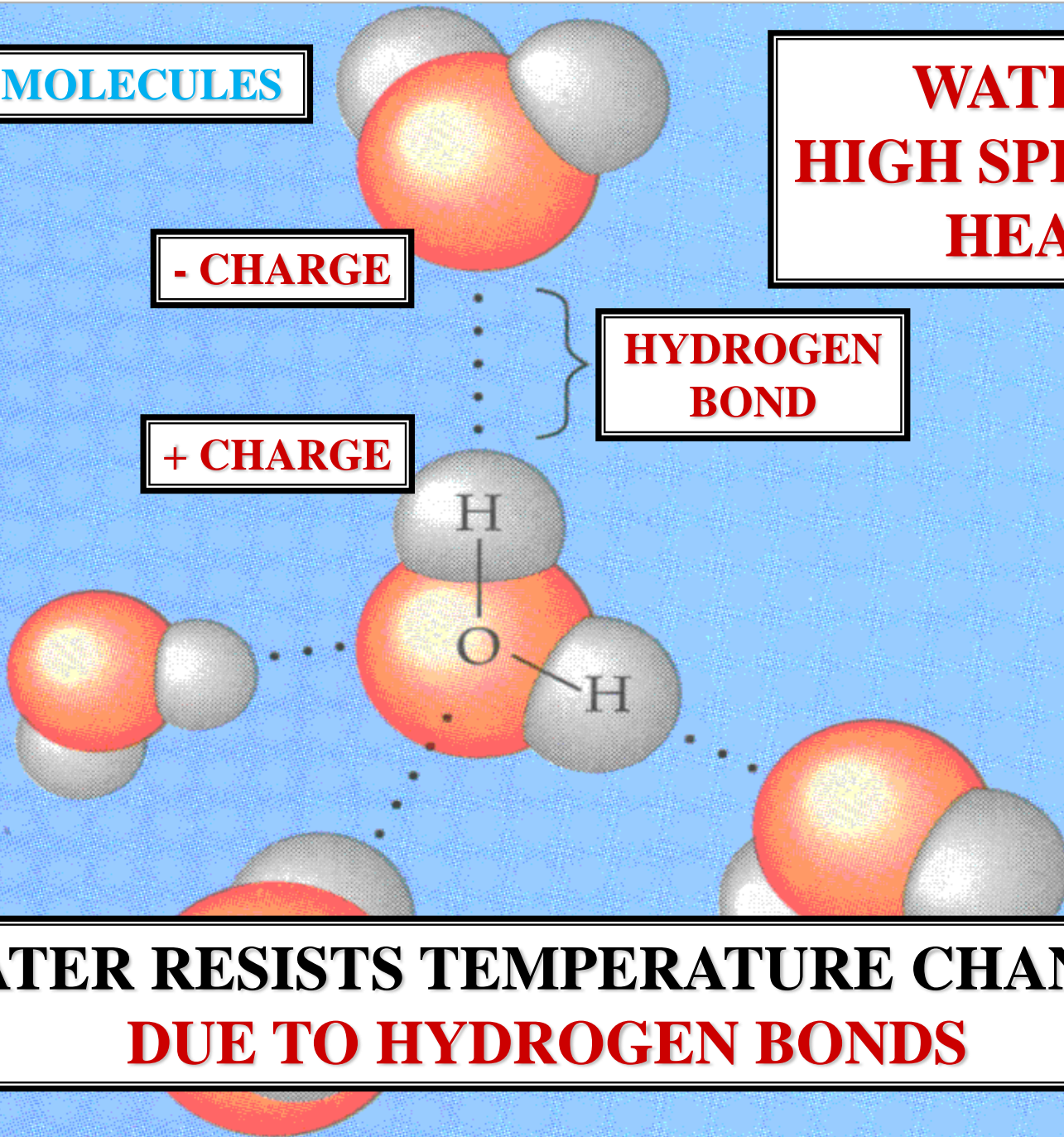
- CHARGE

+ CHARGE

**HYDROGEN
BOND**

?

**WATER RESISTS TEMPERATURE CHANGE
DUE TO HYDROGEN BONDS**



QUESTION

**WATER REQUIRES A LOT
OF ENERGY TO CHANGE
TEMPERATURE.**

TRUE OR FALSE?

QUESTION

ANSWER




TRUE

ANSWER



SH

**WATER REQUIRES A LOT
OF ENERGY TO CHANGE
TEMPERATURE**

A blue background featuring a central water drop that has just hit the surface, creating concentric ripples. The drop is positioned at the top center, and its reflection is visible at the bottom center. The text is overlaid on this background.

**WATER
HIGH
SPECIFIC HEAT**



**WATER'S HIGH
SPECIFIC HEAT**

**GLOBAL CLIMATIC
REGULATOR**



PLANET EARTH AND WATER

EARTH

A satellite photograph of the Earth showing the Western Hemisphere, including North and South America, the Atlantic Ocean, and the Pacific Ocean. The image is framed by a thin black border.

**EARTH SURFACE
70% WATER**

EARTH

**WATER'S HIGH
SPECIFIC HEAT
REGULATES
EARTH'S TEMP**

EARTH



**WATER'S HIGH
SPECIFIC HEAT
ENSURES GRADUAL
TEMP CHANGE**

EARTH



**WATER'S HIGH
SPECIFIC HEAT
ENSURES LIFE
CONDUCTIVE
ENVIRONMENT**

EARTH



LIVING ORGANISMS



LIVING ORGANISMS

LIVING ORGANISMS

EARTH



**WATER'S HIGH
SPECIFIC HEAT
LOCAL CLIMATIC
REGULATOR**



“LAKE EFFECT”

GREAT LAKES

REGION

NORTH AMERICA



“LAKE EFFECT”

GREAT LAKES

REGION

NORTH AMERICA

NORTH AMERICA

GREAT LAKES REGION



NORTH AMERICA

GREAT LAKES REGION



NORTH AMERICA

GREAT LAKES REGION



NORTH AMERICA

GREAT LAKES REGION



NORTH AMERICA

GREAT LAKES REGION



NORTH AMERICA

GREAT LAKES REGION



NORTH AMERICA

GREAT LAKES REGION





**GREAT LAKES
FRESHWATER
OCEANS**

GREAT LAKES IMPACT

LOCAL CLIMATE
“LAKE EFFECT”



SU

GREAT LAKES IMPACT

“LAKE EFFECT”
FALL CLIMATE

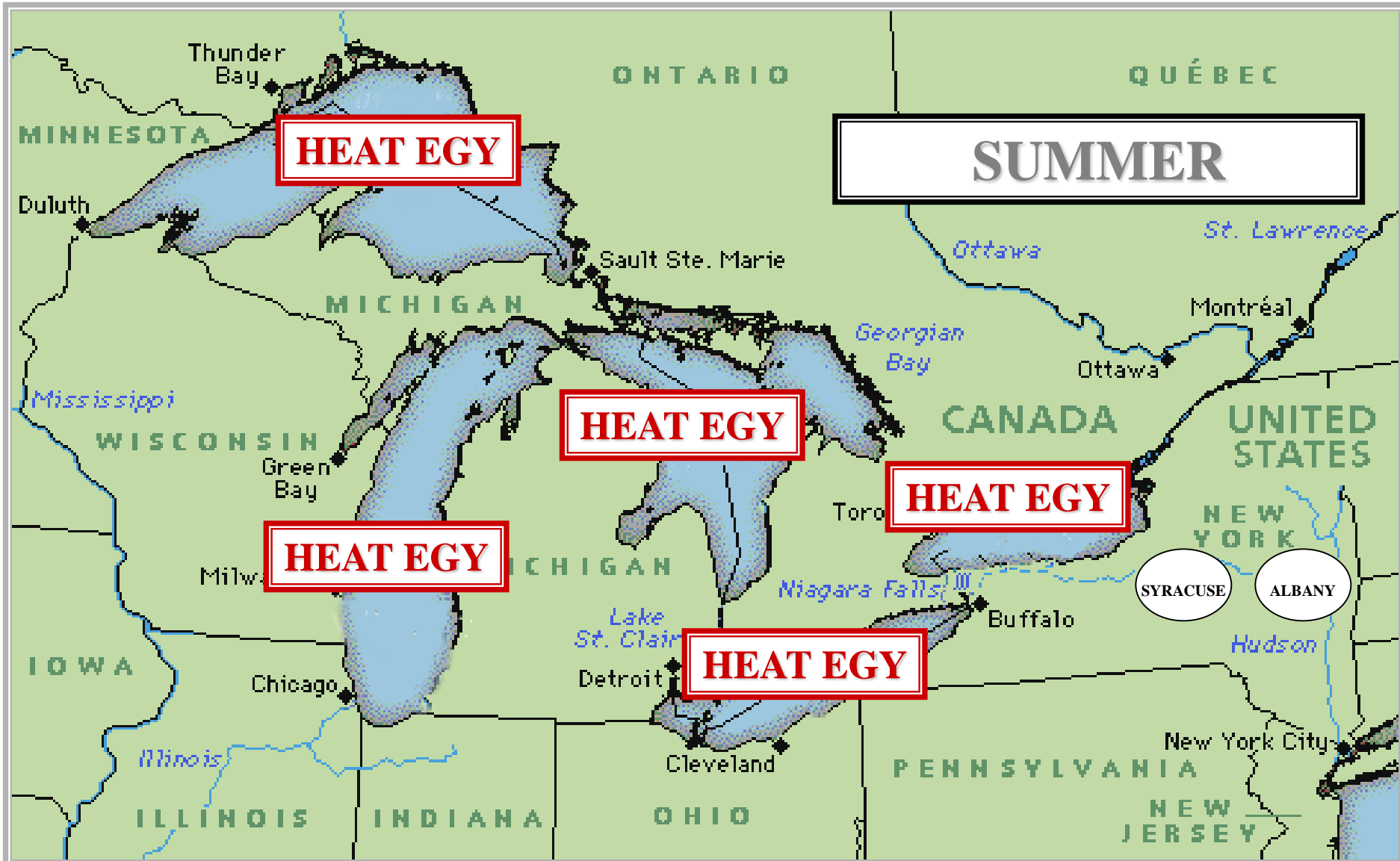
“LAKE EFFECT” FALL CLIMATE



“LAKE EFFECT” FALL CLIMATE



“LAKE EFFECT” FALL CLIMATE

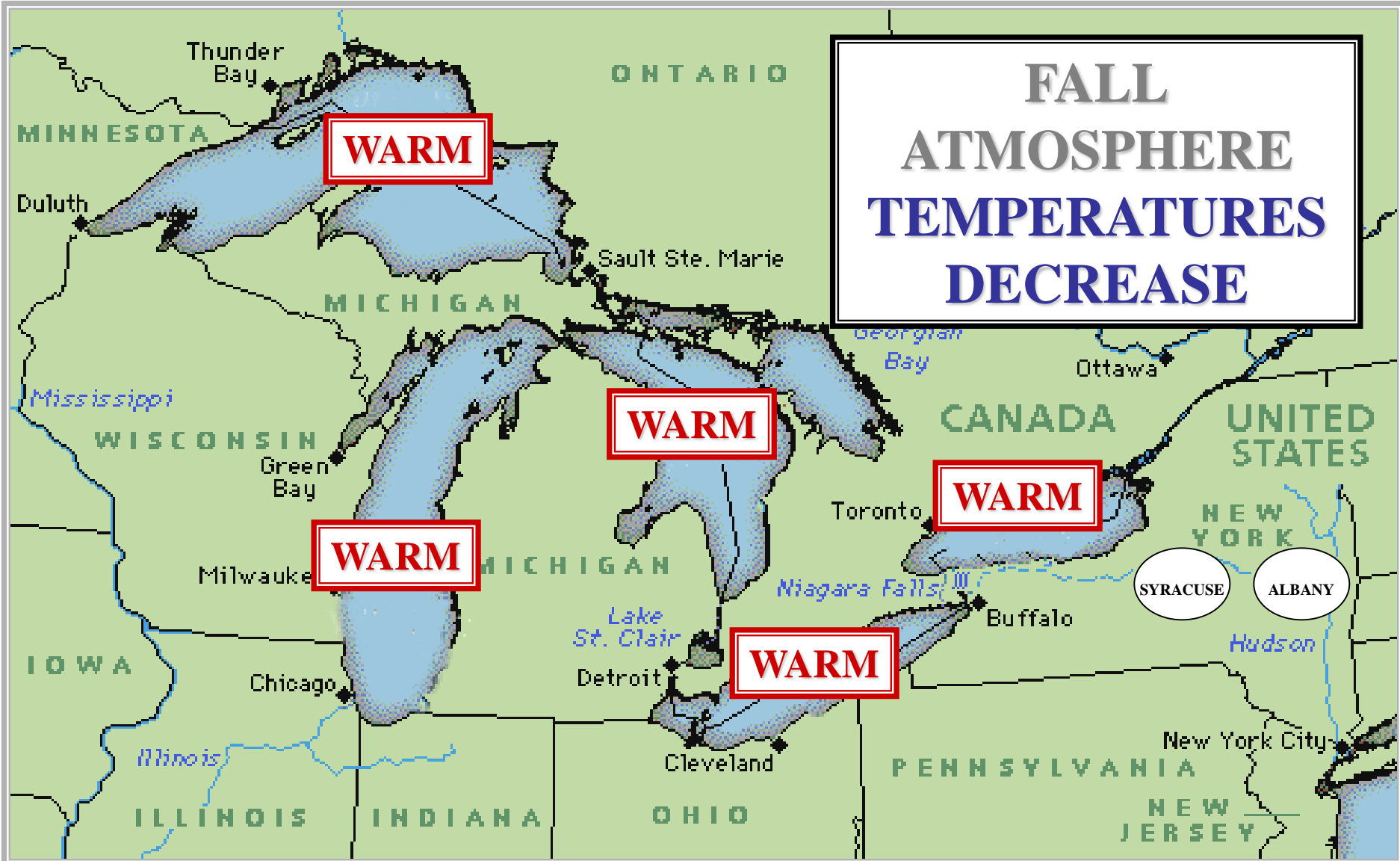


“LAKE EFFECT” FALL CLIMATE

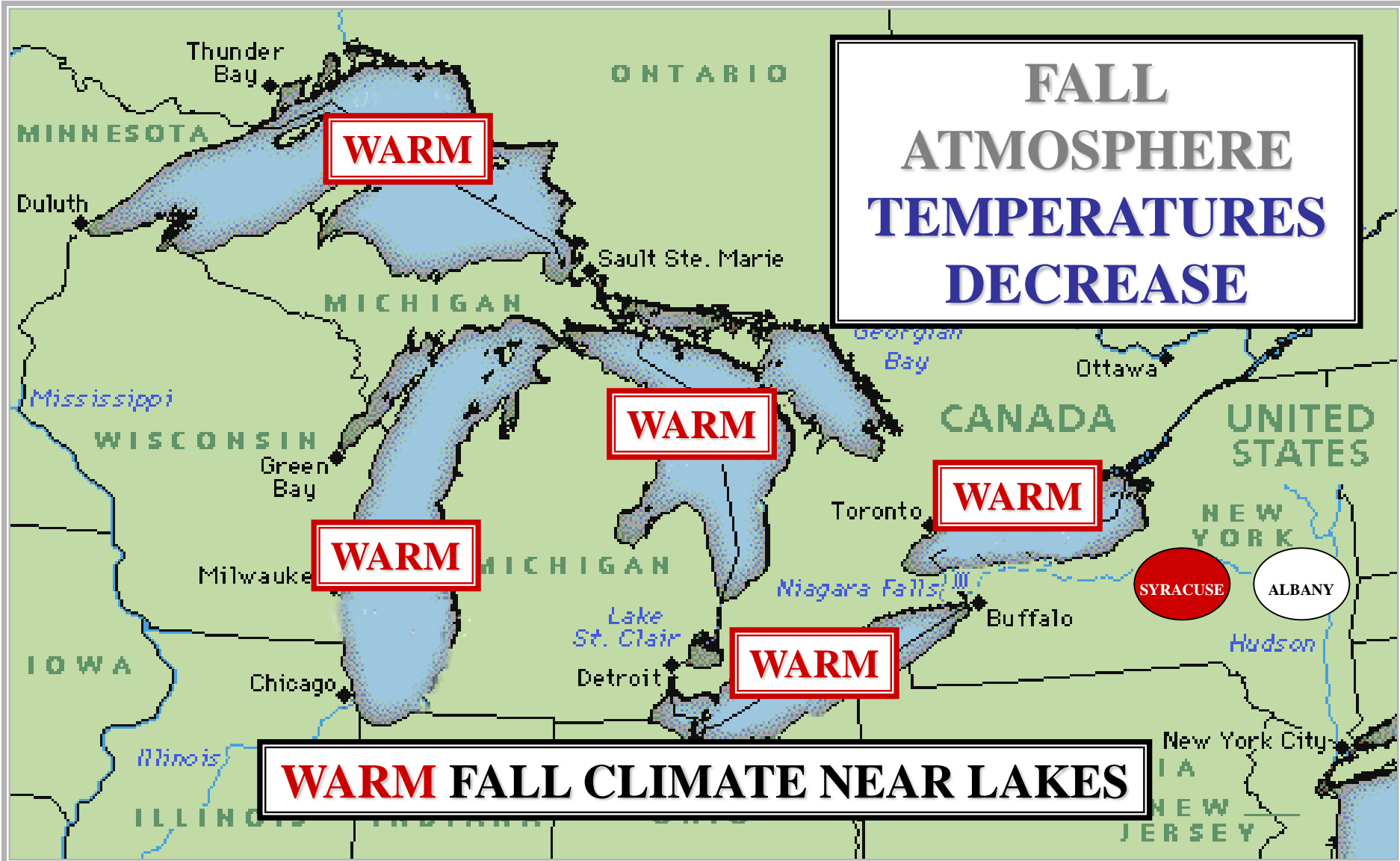
TD



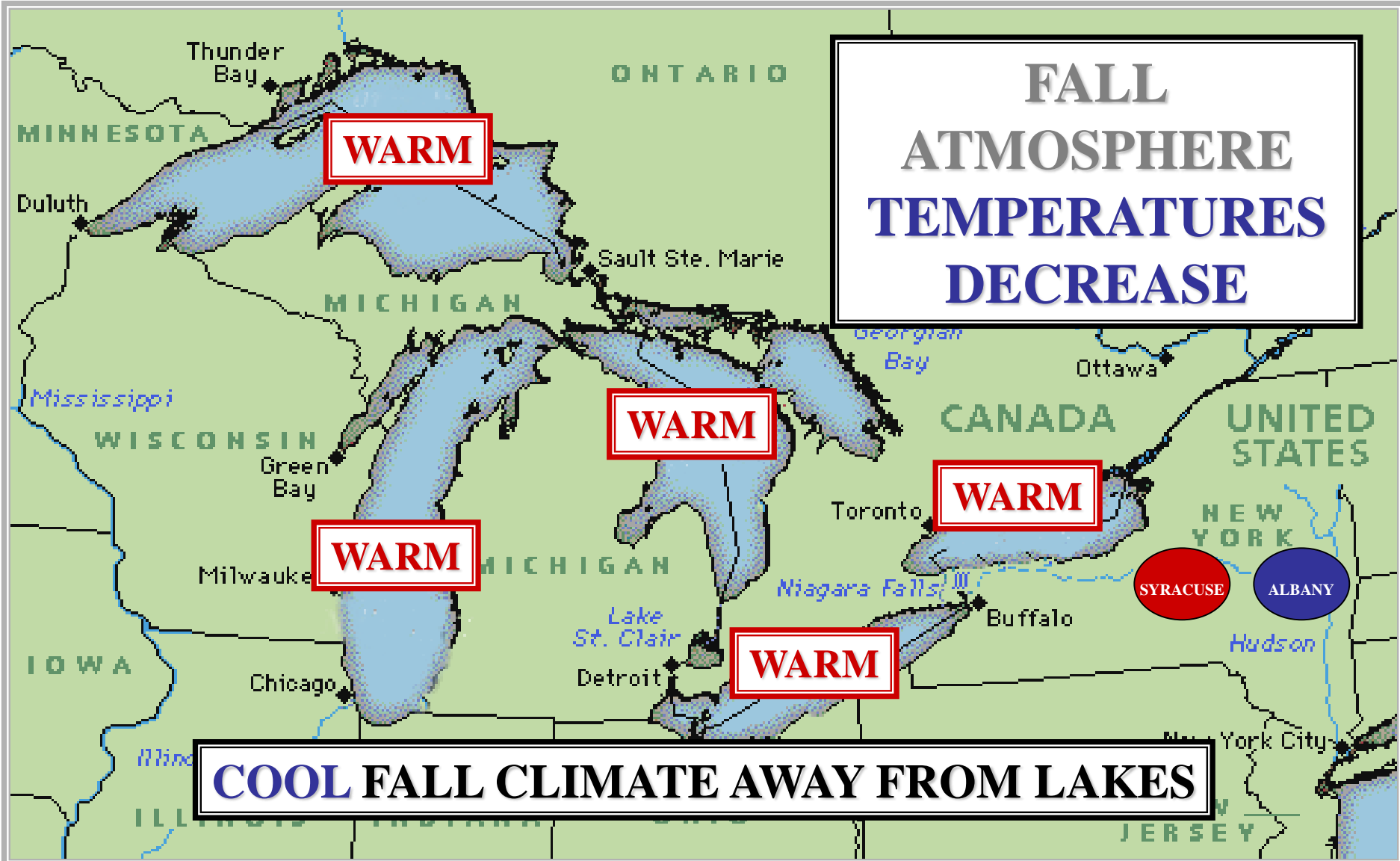
“LAKE EFFECT” FALL CLIMATE



“LAKE EFFECT” FALL CLIMATE



“LAKE EFFECT” FALL CLIMATE

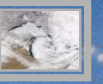


GREAT LAKES REGION

“LAKE EFFECT”

NEAR LAKES

WARM FALLS



GREAT LAKES REGION

“LAKE EFFECT”
SNOW STORMS

“LAKE EFFECT” FALL CLIMATE



LAKE SUPERIOR

WARM

FALL

LAKE HURON

WARM

LAKE MICHIGAN

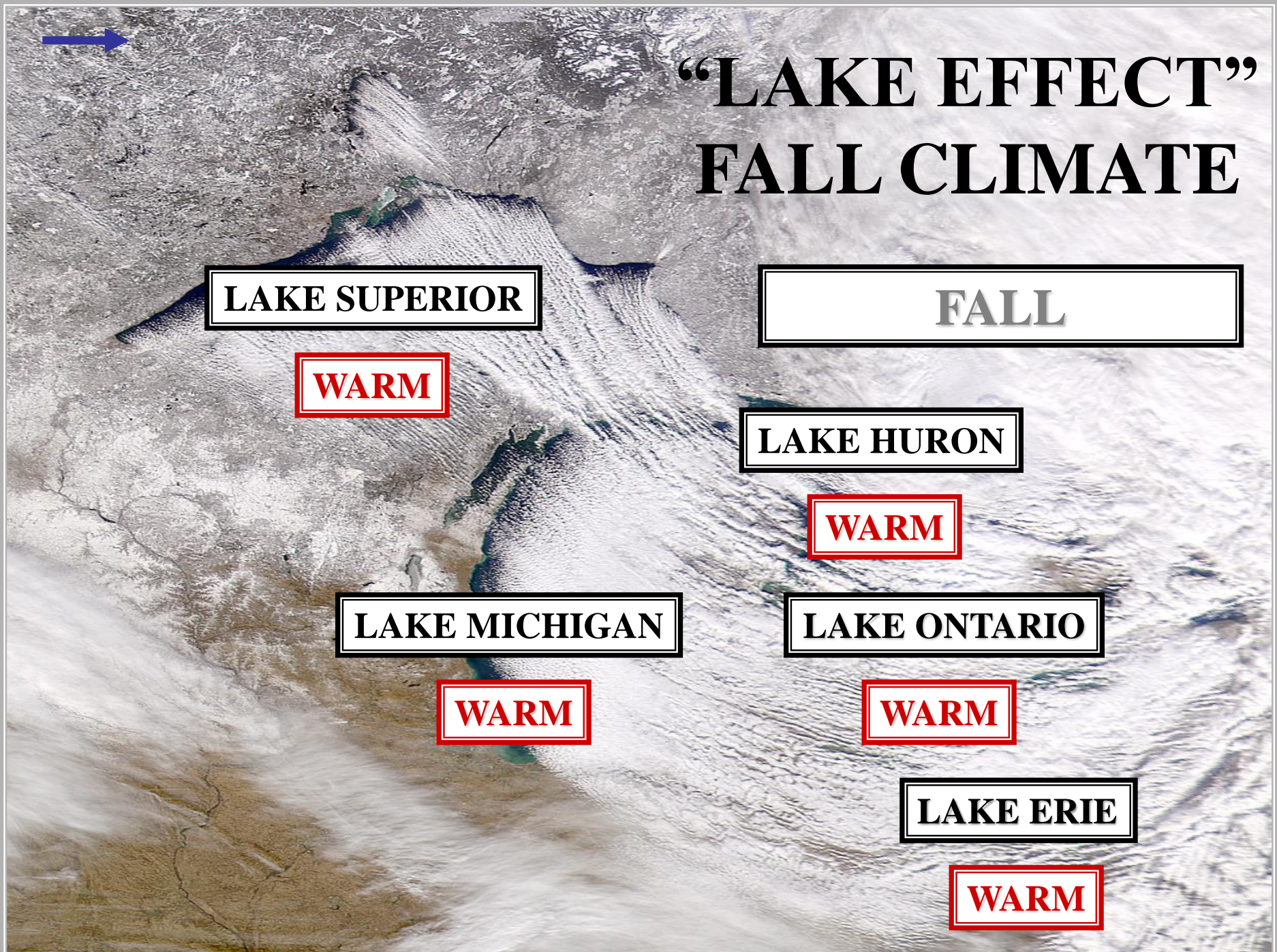
WARM

LAKE ONTARIO

WARM

LAKE ERIE

WARM



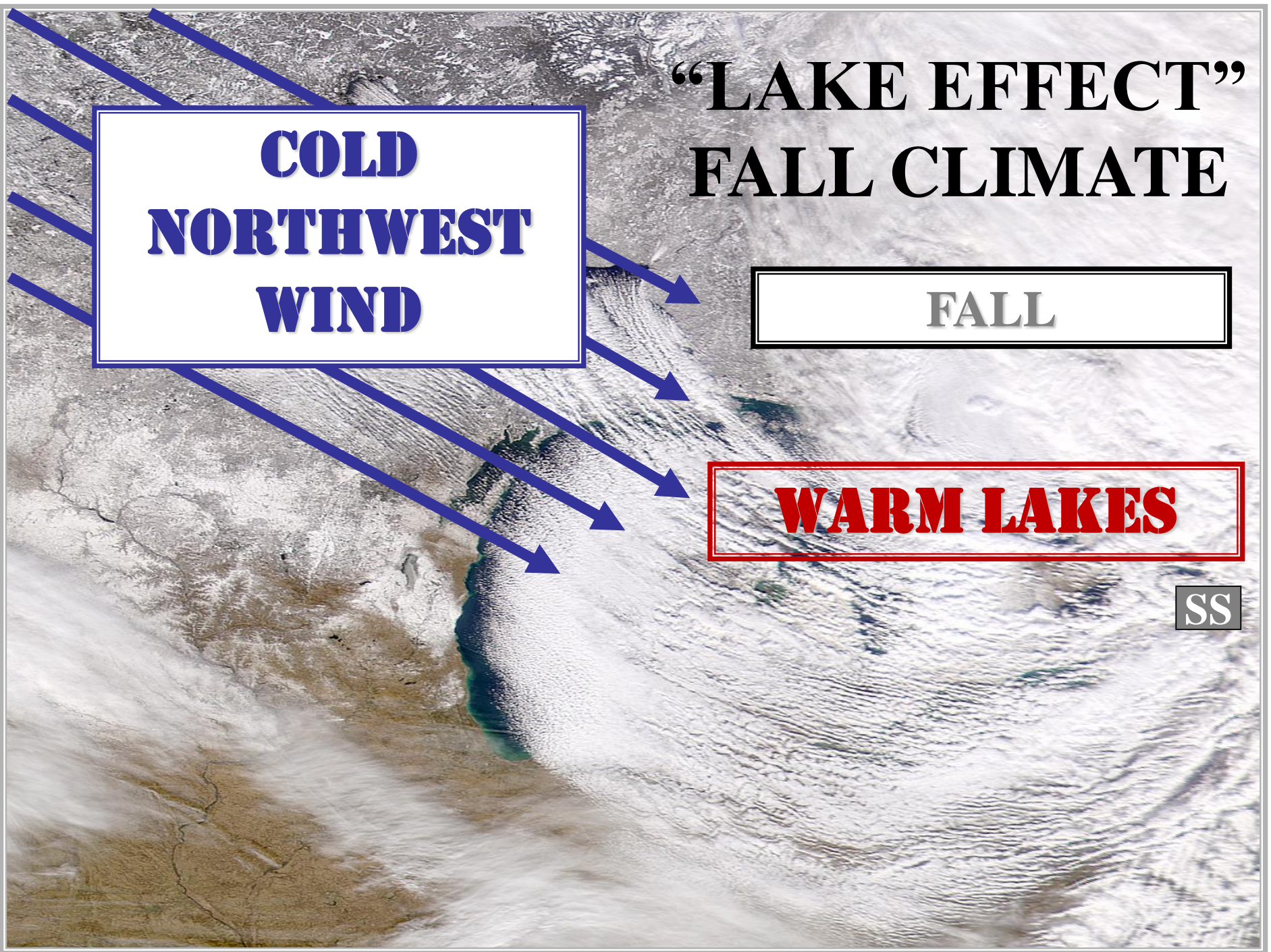
“LAKE EFFECT” FALL CLIMATE

**COLD
NORTHWEST
WIND**

FALL

WARM LAKES

SS



“LAKE EFFECT” FALL CLIMATE

**COLD
NORTHWEST
WIND**

FALL

**“LAKE EFFECT”
SNOW STORMS**

