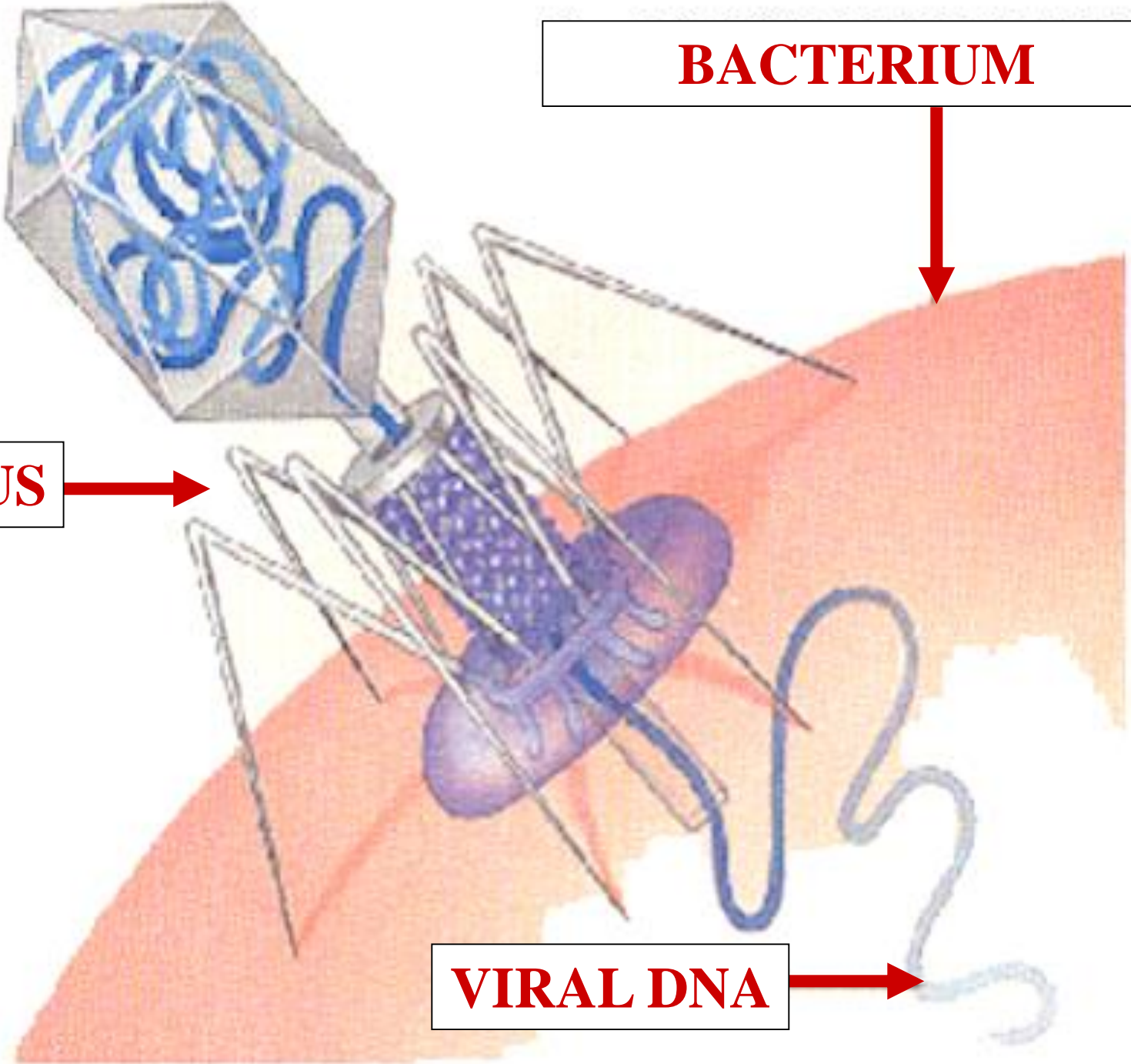


BACTERIUM

VIRUS

VIRAL DNA





BACTERIUM

**CELLULAR
LIVING ORGANISM**



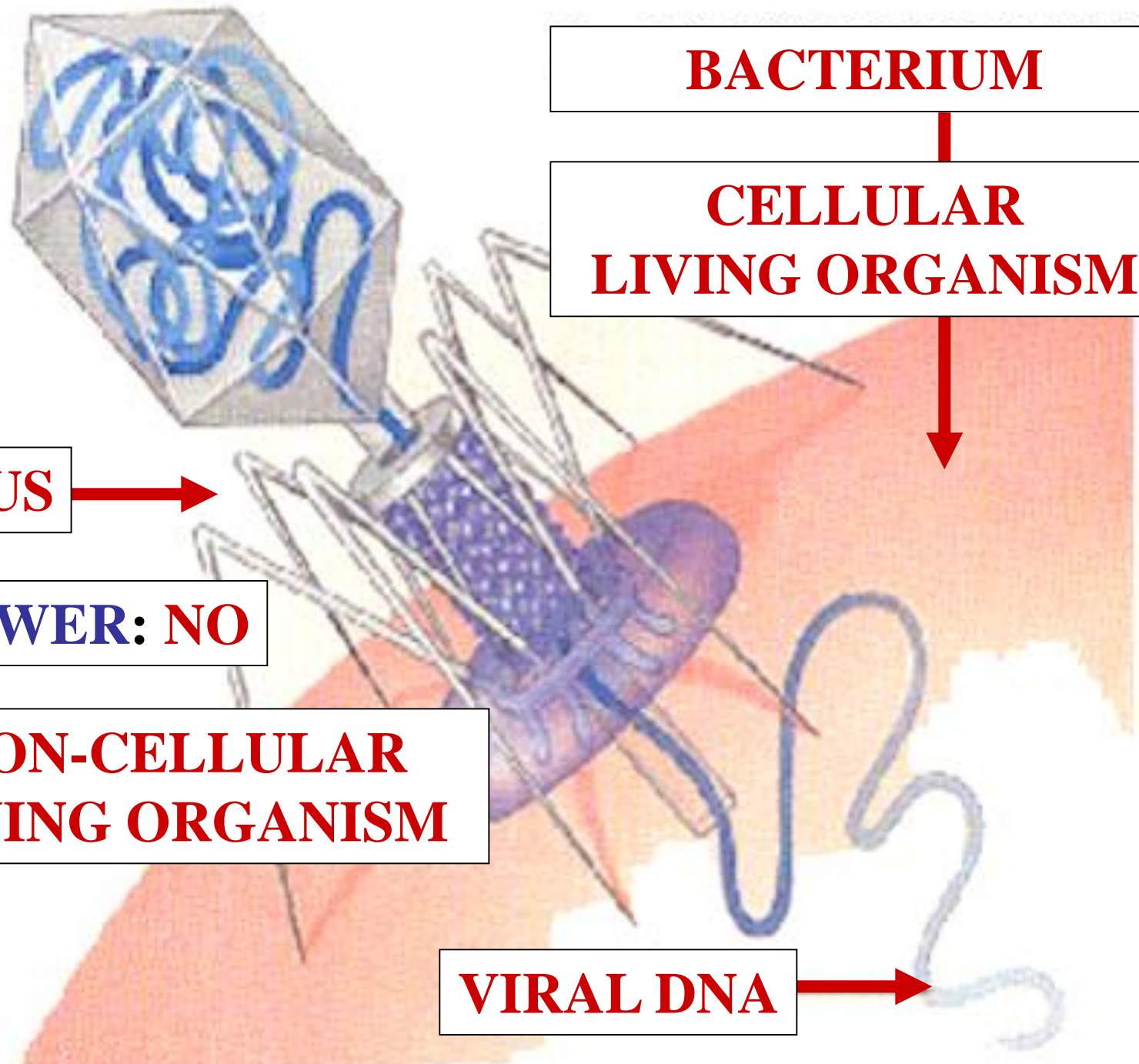
VIRUS



ANSWER: NO

**NON-CELLULAR
LIVING ORGANISM**

VIRAL DNA





CELLULAR LIVING ORGANISM CHARACTERS



CELLULAR LIVING ORGANISM CHARACTERS

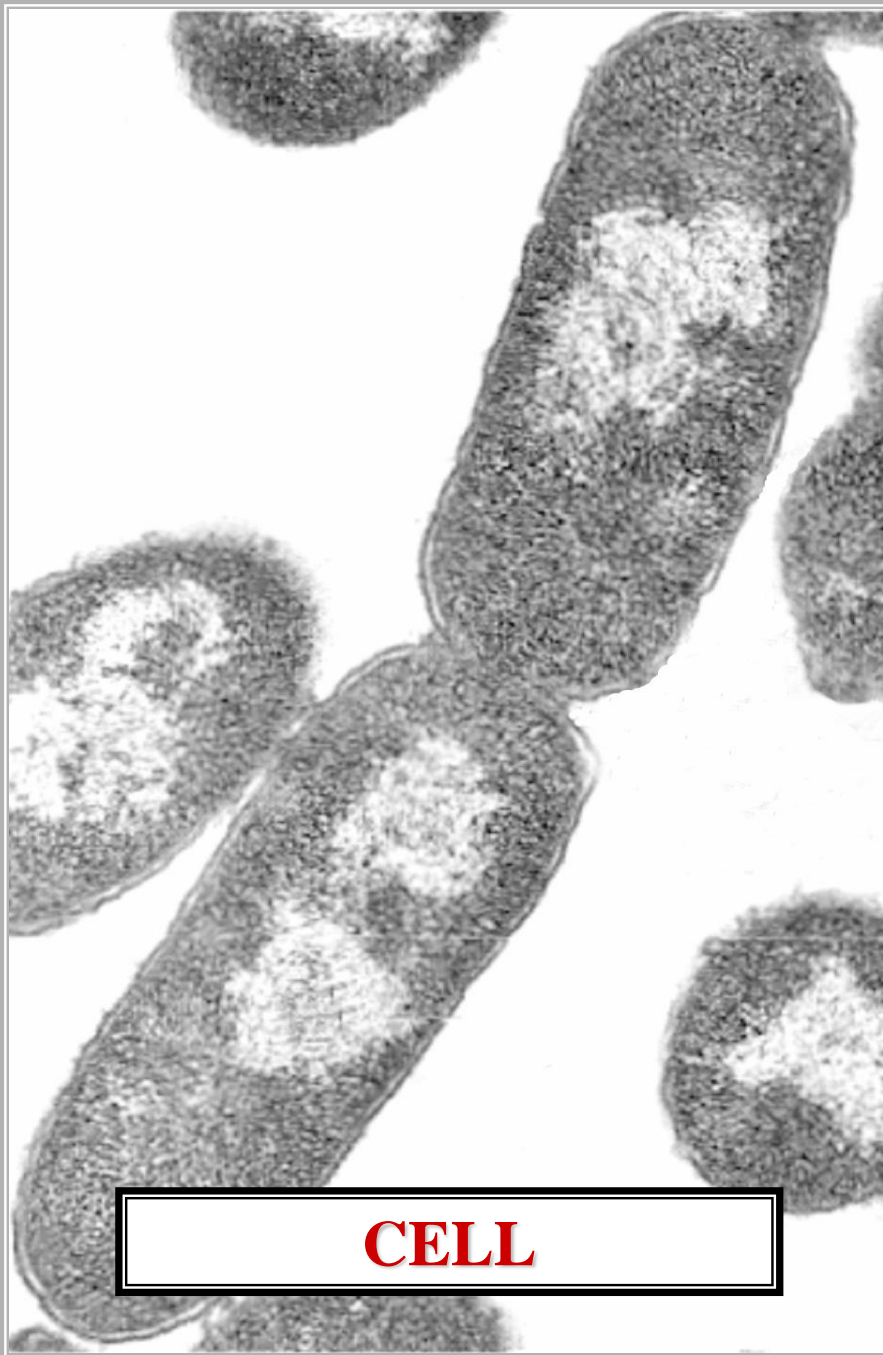
**SOME CHARACTERS
WILL NOT PERTAIN TO A
VIRUS**

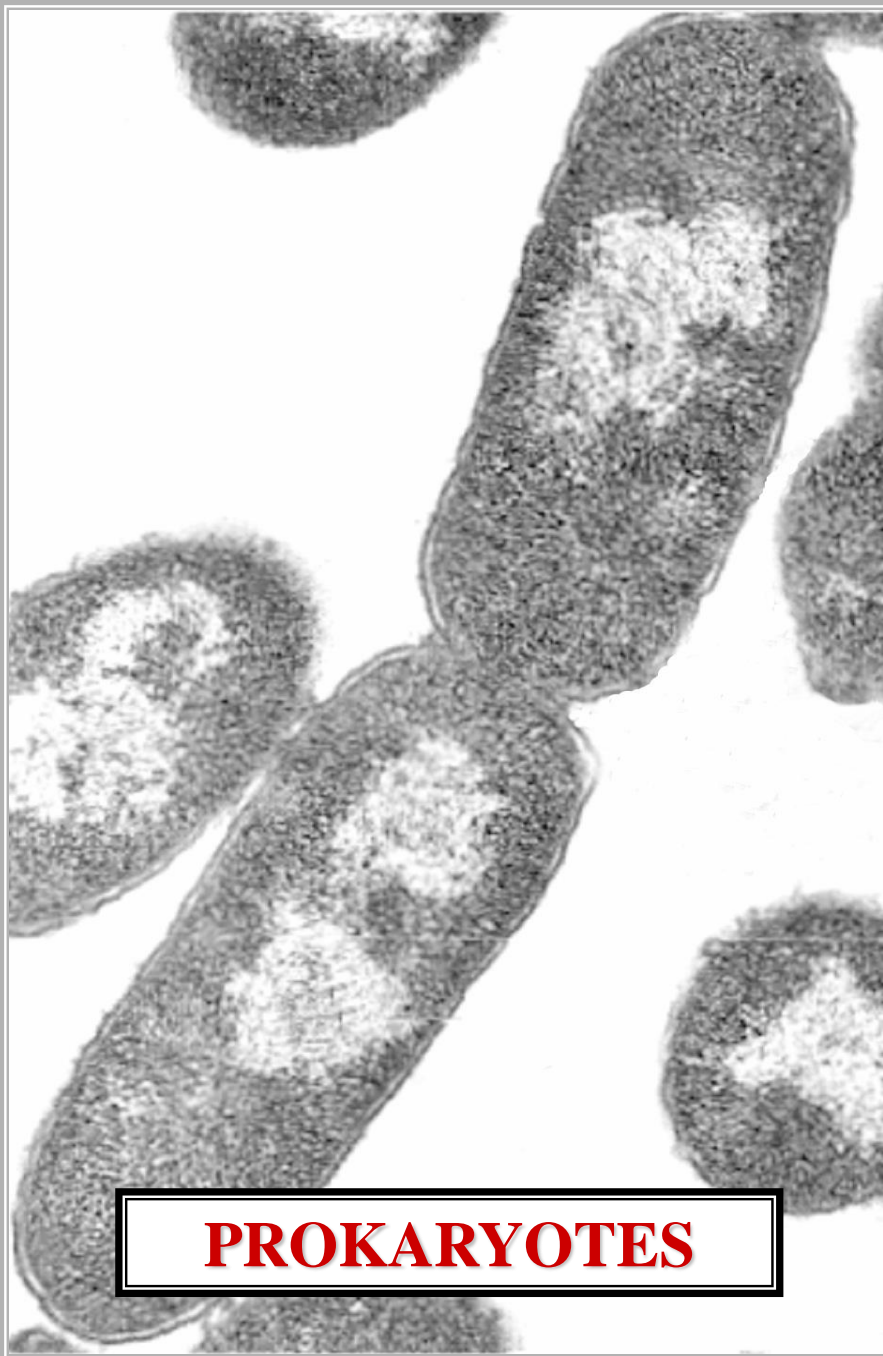
QUESTION

**WHAT ARE THE
GENERAL CELL
TYPES IN
BIOLOGY?**

QUESTION







PROKARYOTES



E

CELL

The image is a composite of two electron micrographs. The left panel shows several rod-shaped prokaryotic cells with a granular internal structure. The right panel shows a more complex eukaryotic cell with a nucleus, mitochondria, and other organelles. A small grey square with a white upward-pointing arrow is located in the top right corner of the right panel. The text 'CELLULAR LIVING ORGANISM CHARACTERS' is overlaid in the center in a large, blue, serif font.

CELLULAR LIVING ORGANISM CHARACTERS

PROKARYOTES

EUKARYOTES

**CELLULAR
LIVING ORGANISM
CHARACTERS**



CELLULAR
LIVING ORGANISM
CHARACTERS
ORGANIC
COMPOUNDS

**CELLULAR
LIVING ORGANISMS
COMPRISED
ORGANIC
COMPOUNDS**



ORGANIC COMPOUNDS

ORGANIC COMPOUNDS



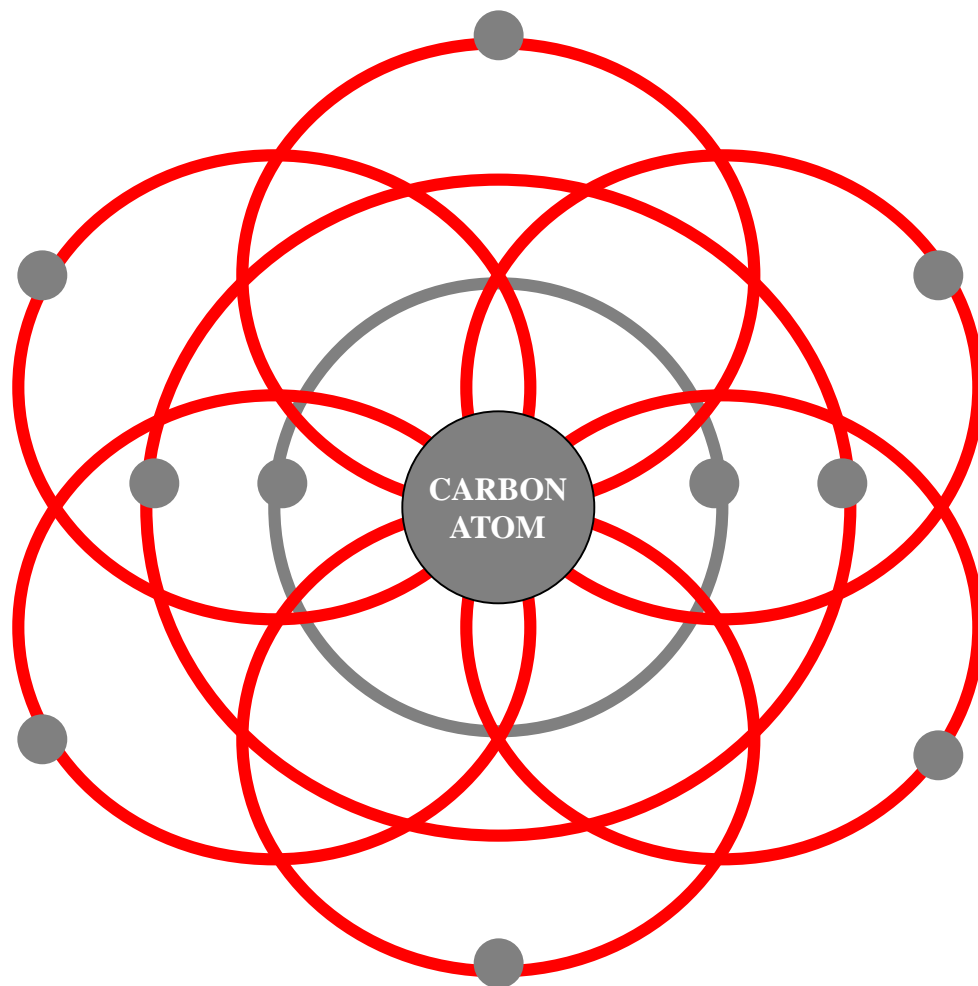
**CARBON BASED
COMPOUNDS**

ORGANIC COMPOUNDS

ORGANIC COMPOUNDS

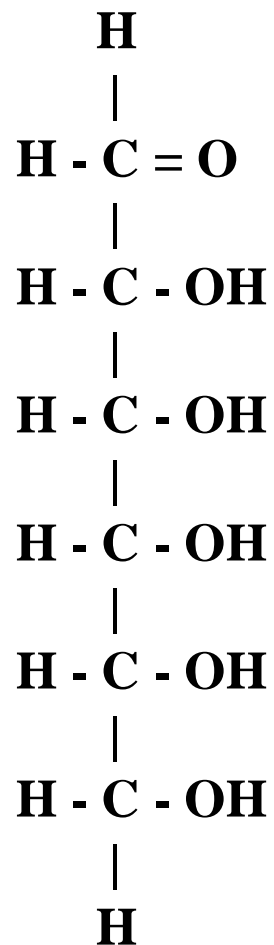
EG

G



CARBON ATOM

ORGANIC COMPOUND



GLUCOSE

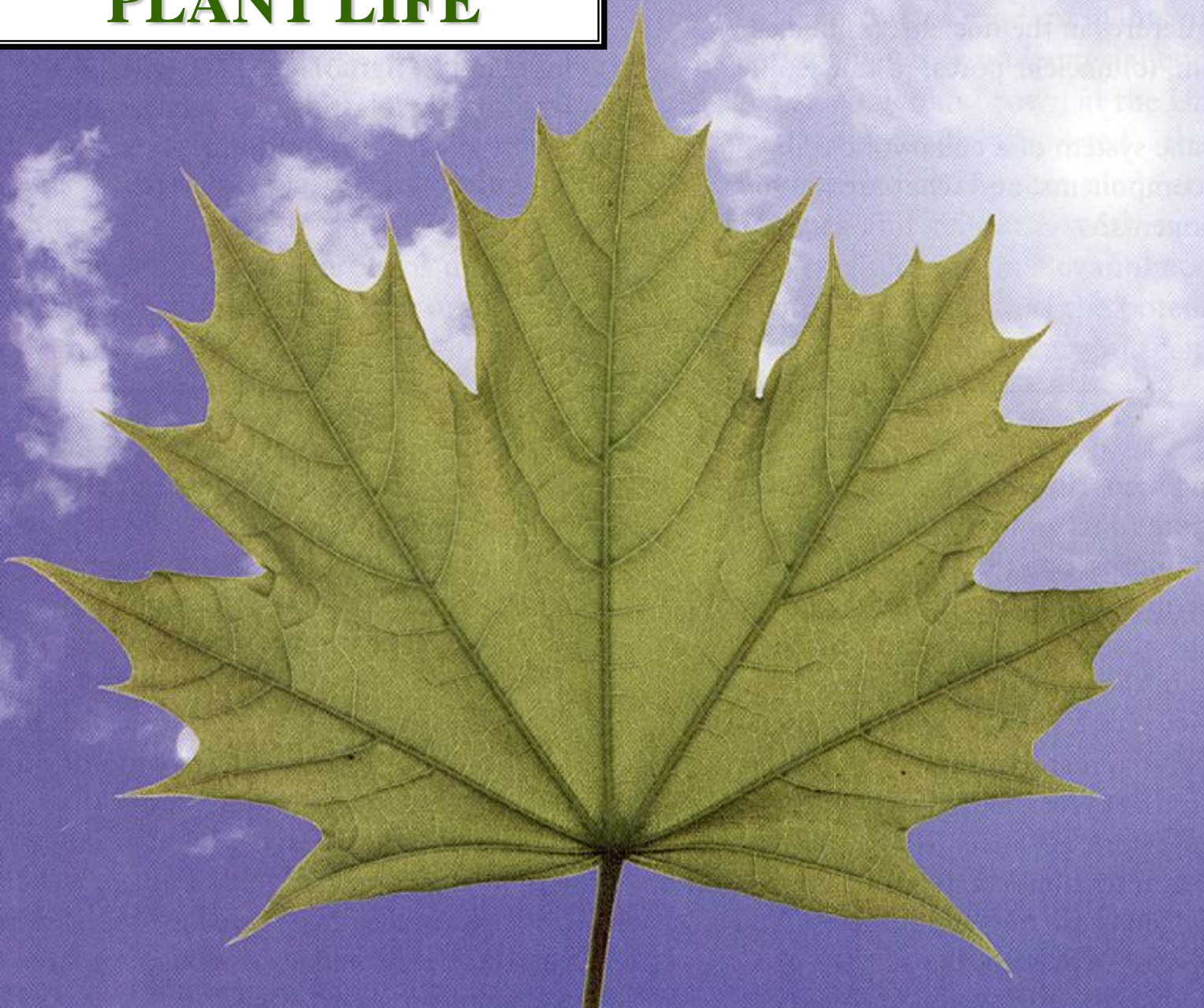


QUESTION

**WHAT IS THE SOURCE
OF
GLUCOSE?**

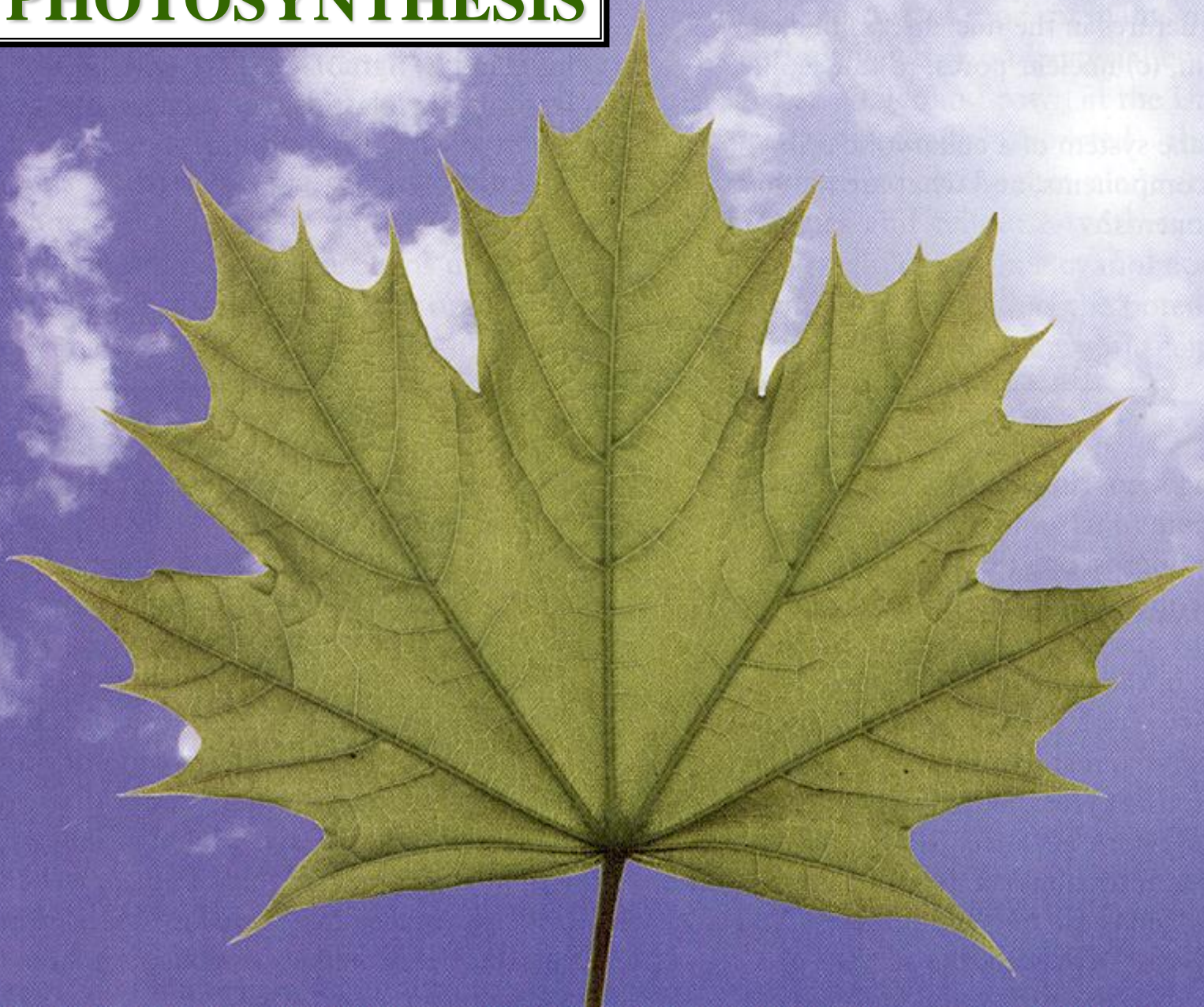
QUESTION

PLANT LIFE



PHOTOSYNTHESIS

P



PHOTOSYNTHESIS



WATER

CO₂

LIGHT ENERGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT
THYLAKOID

CHEMICAL ENERGY

DK RXT
STROMA

CHLOROPLAST

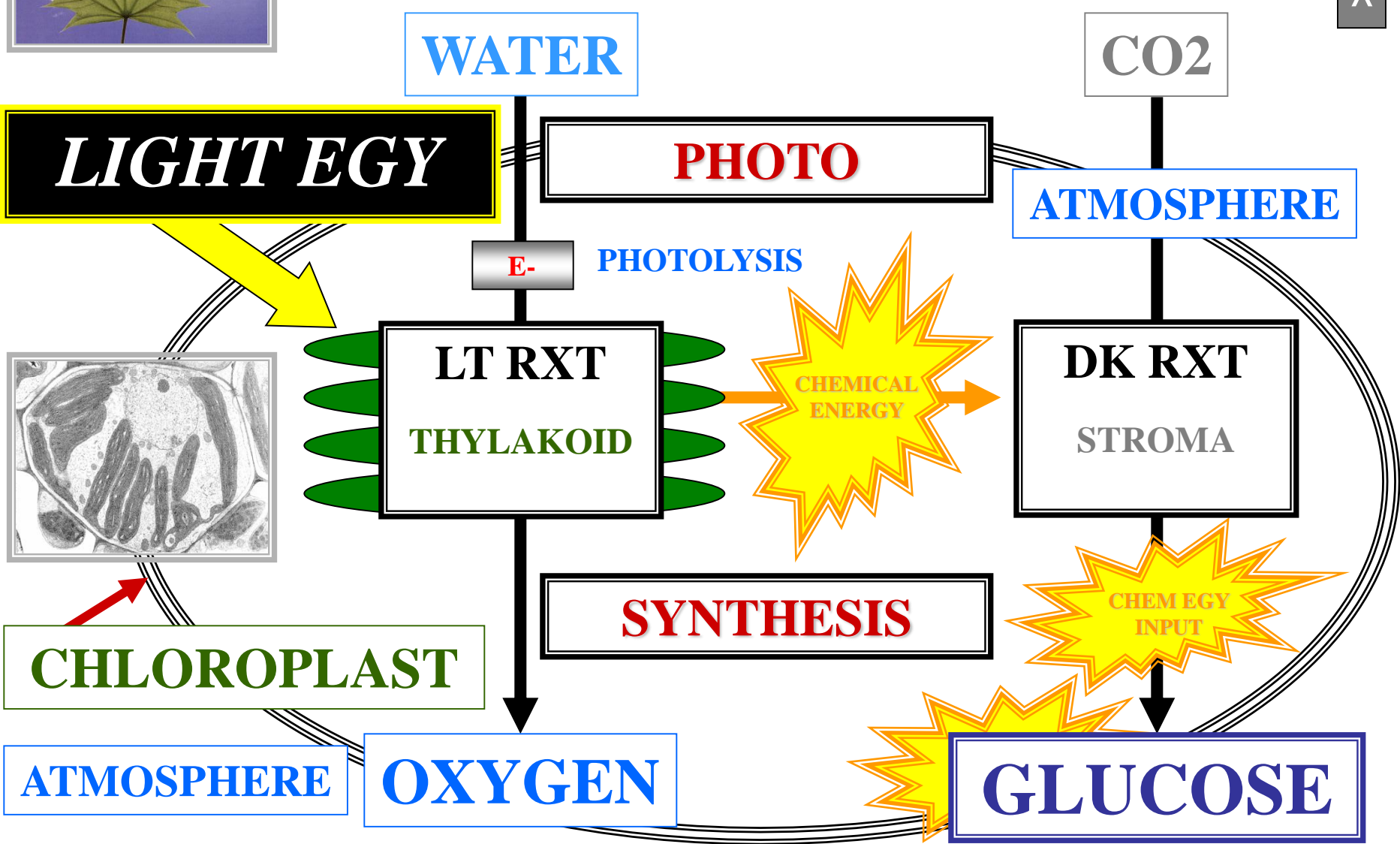
SYNTHESIS

CHEMICAL ENERGY INPUT

ATMOSPHERE

OXYGEN

GLUCOSE





CELLULAR
LIVING ORGANISM
CHARACTERS
HIGHLY
ORGANIZED

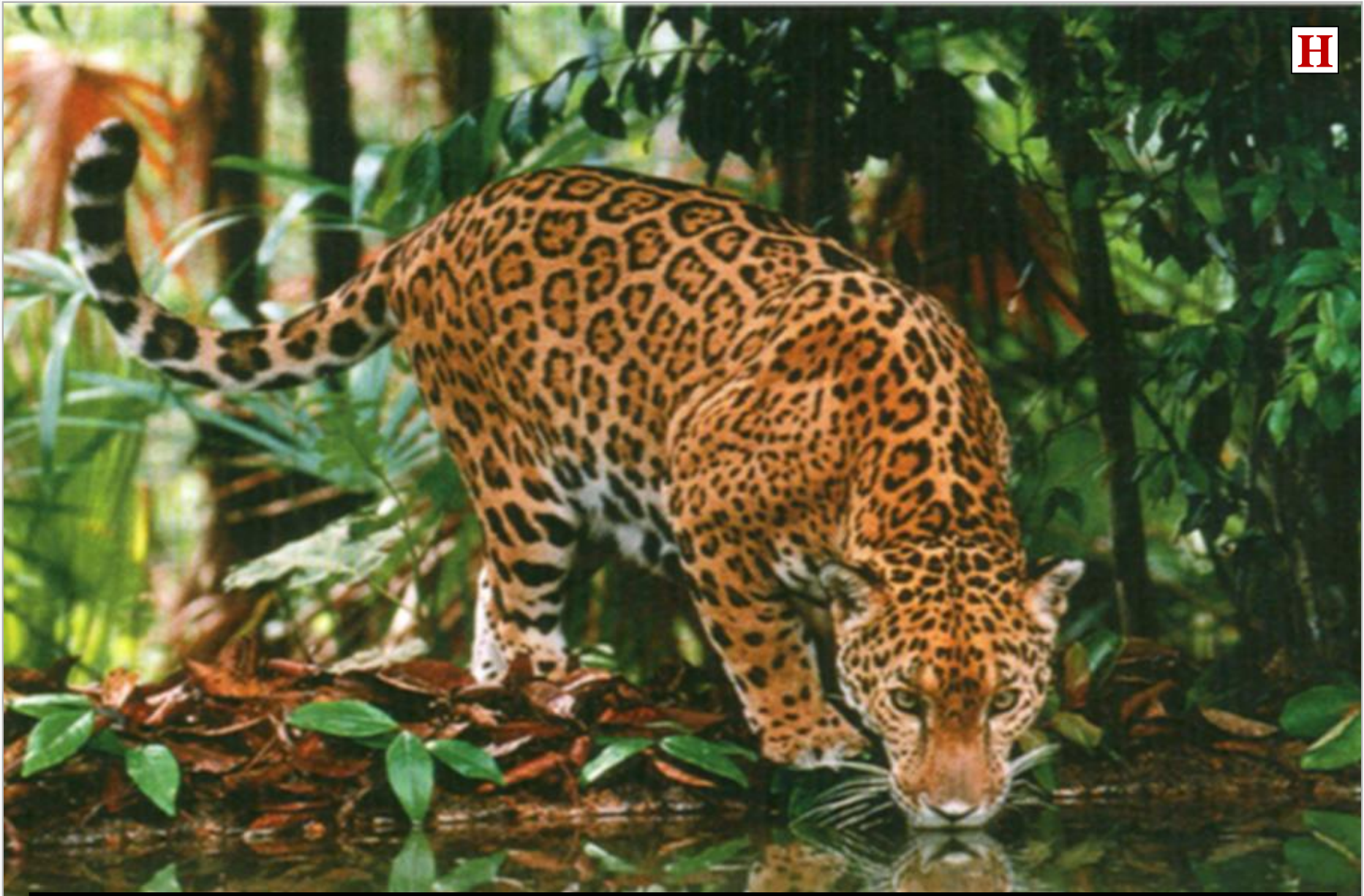


CELLULAR

LIVING ORGANISMS

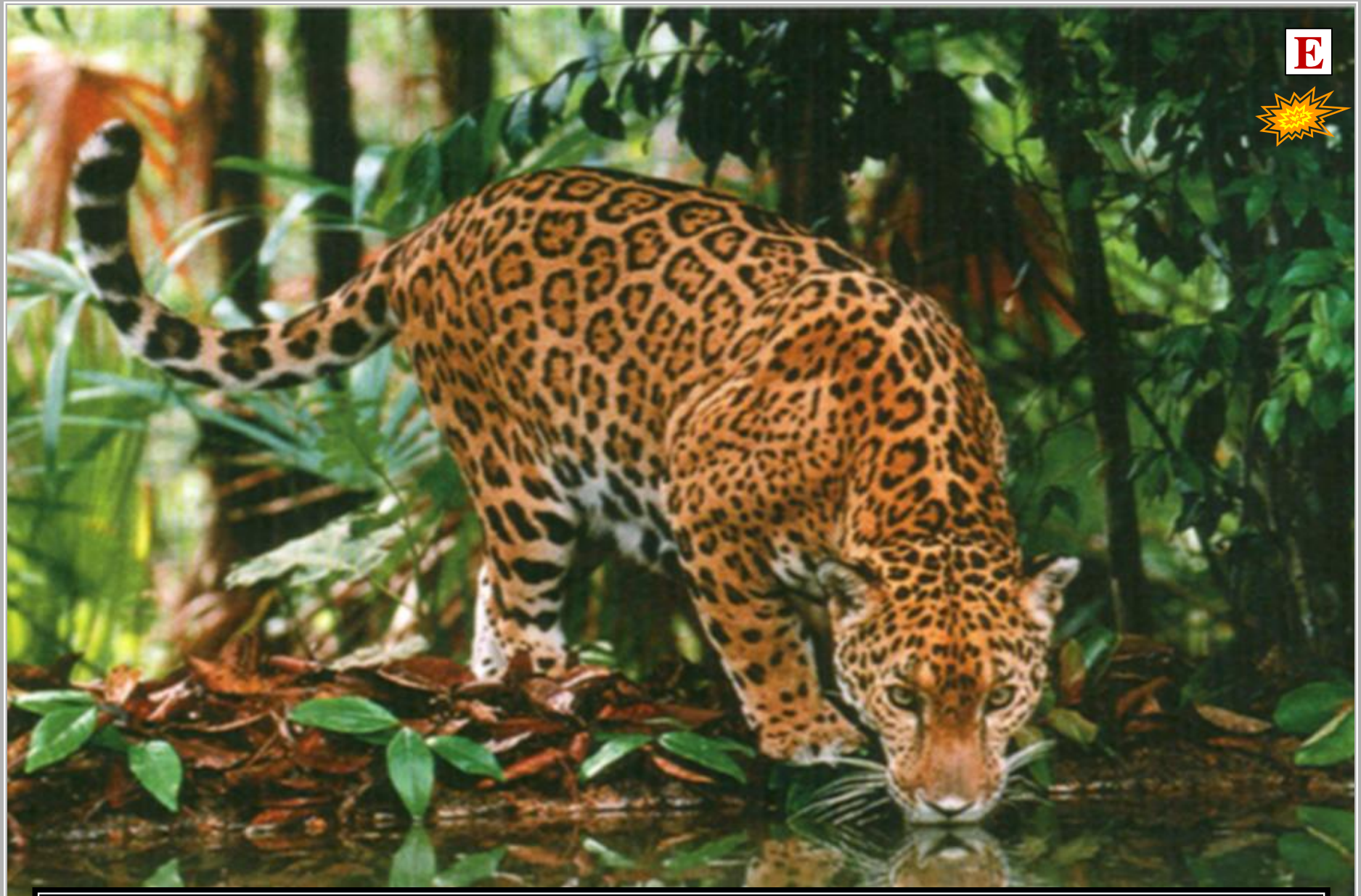
HIGHLY

ORGANISED

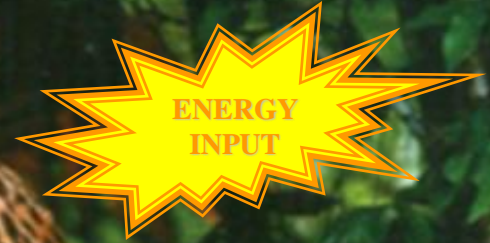


JAGUAR

E



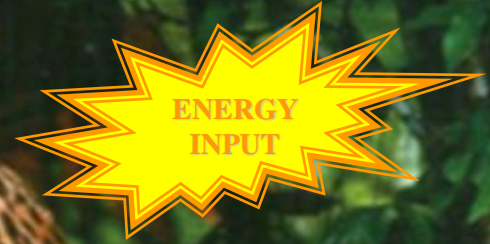
LIVING ORGANISMS HIGHLY ORGANIZED



ENERGY
INPUT

ENERGY INPUT

ATOMS



ENERGY INPUT

BIO-CMPS

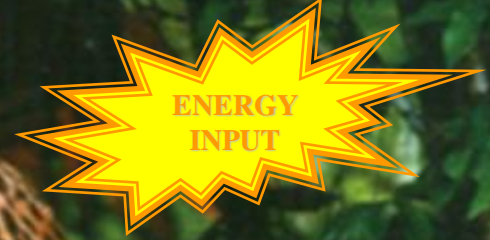


ENERGY
INPUT



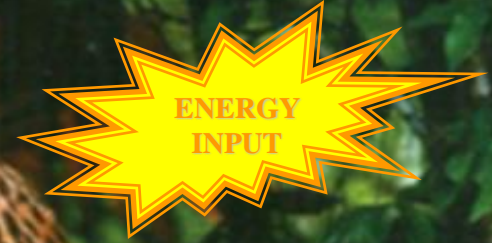
ENERGY INPUT

CELLS



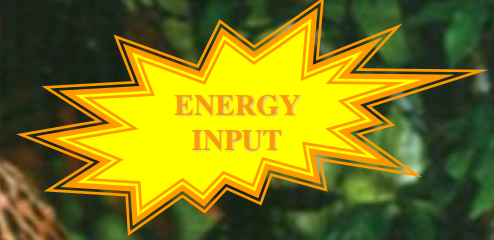
ENERGY INPUT

TISSUES



ENERGY INPUT

ORGANS



ENERGY INPUT



E

ORGANISM

ENERGY
INPUT

LIVING ORGANISMS HIGHLY ORGANIZED

ORGANISM



ENERGY
INPUT

ENERGY INPUT MAINTAINS HIGH ORDER



ORGANISM



ENERGY
INPUT

A yellow starburst graphic with a black outline, containing the text 'ENERGY INPUT' in yellow capital letters.

METABOLISM PROVIDES ENERGY INPUT



CELLULAR
LIVING ORGANISM
CHARACTERS
METABOLISM



**CELLULAR
LIVING
ORGANISMS
UNDERGO
METABOLISM**

METABOLISM

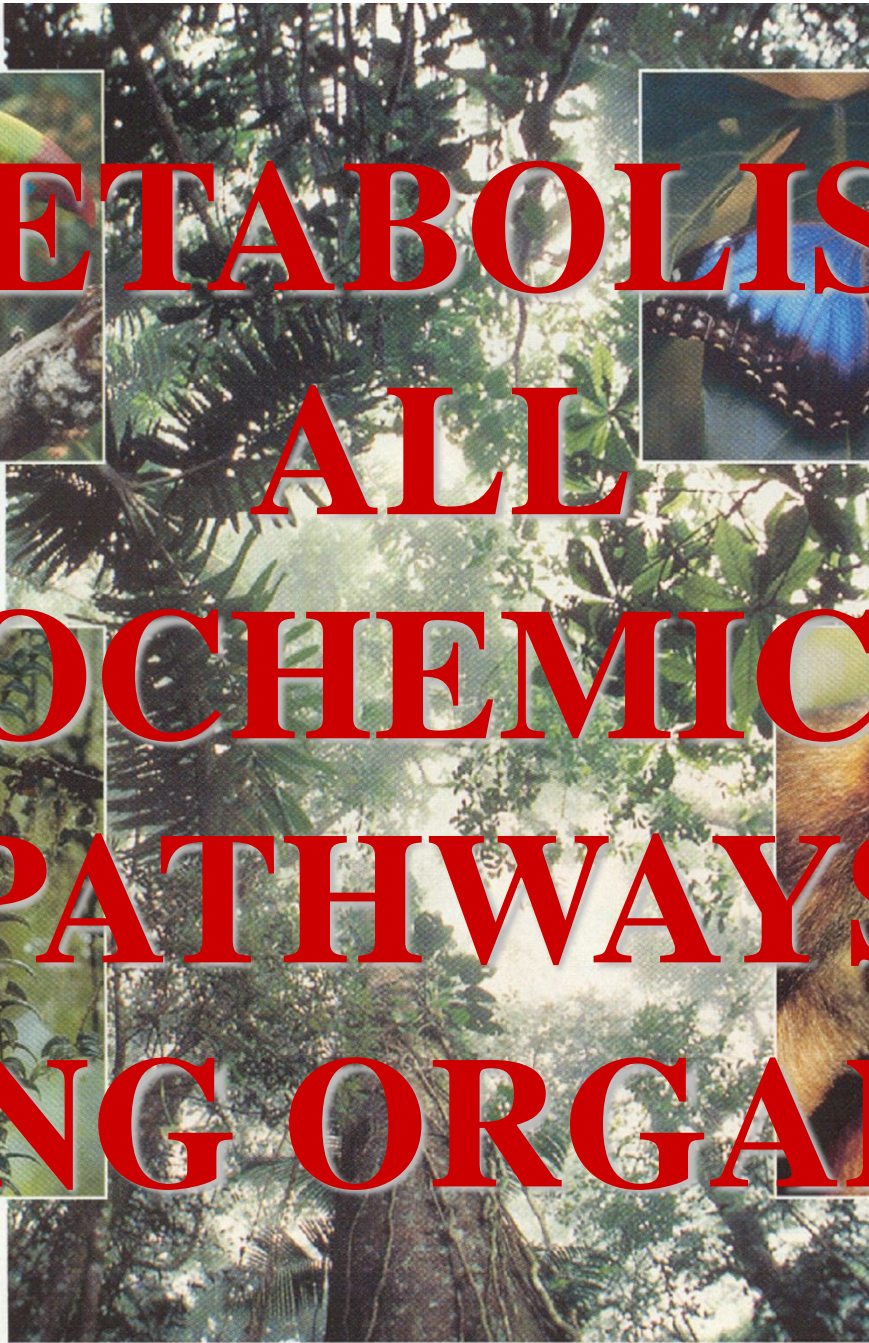
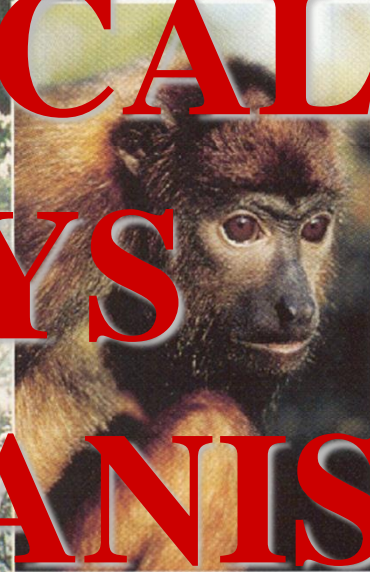
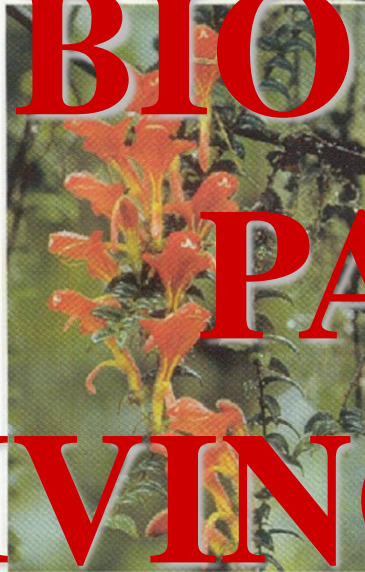
METABOLISM



**ALL
BIOCHEMICAL
PATHWAYS
LIVING ORGANISM**

METABOLISM

METABOLISM
ALL
BIOCHEMICAL
PATHWAYS
LIVING ORGANISM



CELL RESPIRATION



GLUCOSE

HEXOKINASE

CELL RESPIRATION



GLUCOSE-6-PHOSPHATE

PHOSPHOGLUCOISOMERASE

FRUCTOSE-6-PHOSPHATE

PHOSPHOFRUCTOKINASE

FRUCTOSE-1-6-PHOSPHATE



3-PHOSPHOGLYCERATE - PGA

ENOLASE

3-PHOSPHOENOLPYRUVATE

PYRUVATE KINASE



PYRUVATE

3-PHOSPHOGLYCERATE - PGA

ENOLASE

3-PHOSPHOENOLPYRUVATE

PYRUVATE KINASE



PYRUVATE

ENERGY RELEASED

CELL
RESPIRATION

ENERGY RELEASED MAINTAINS HIGH ORDER



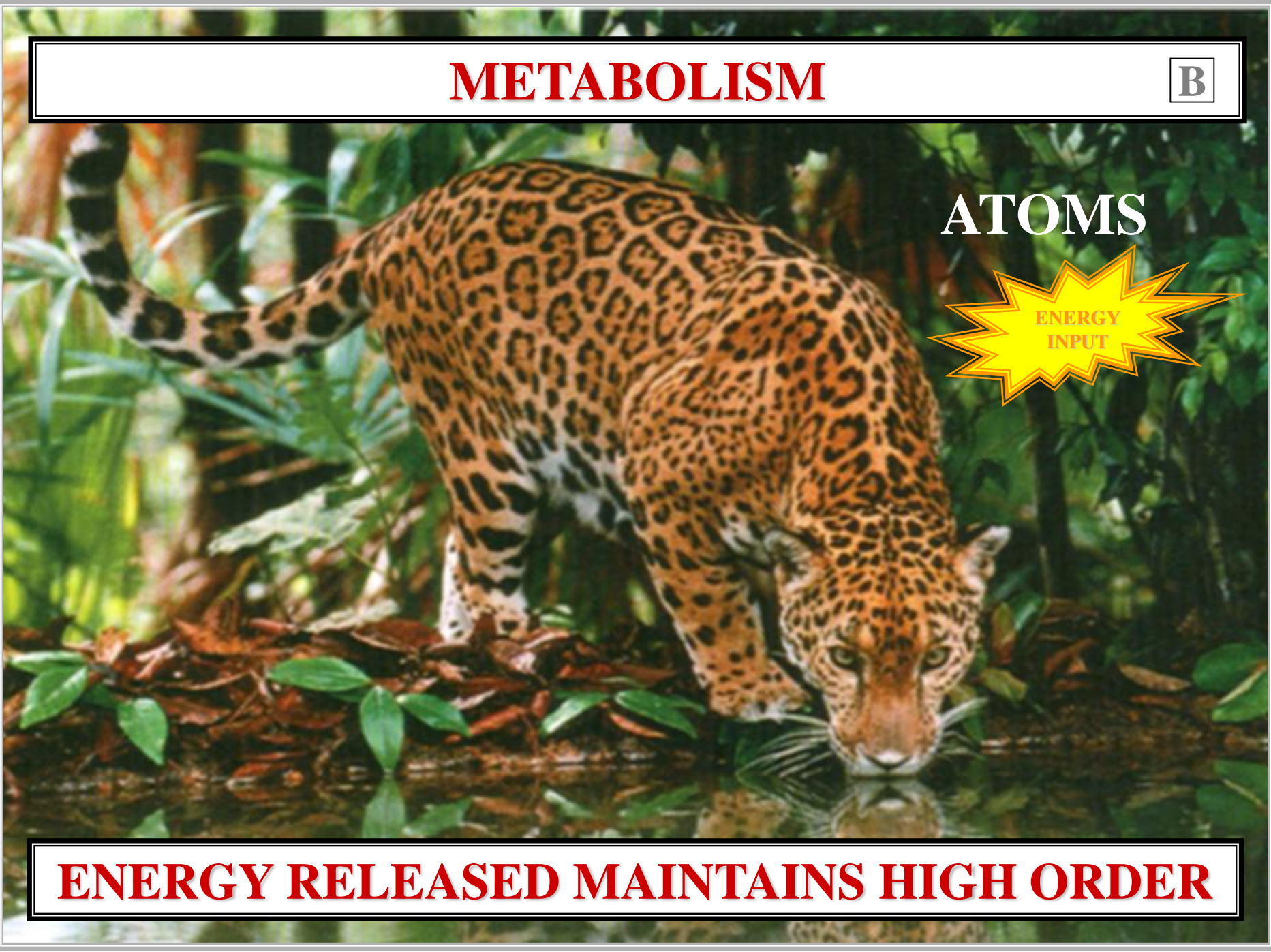
METABOLISM

B

ATOMS

**ENERGY
INPUT**

ENERGY RELEASED MAINTAINS HIGH ORDER



METABOLISM

C

BIO-CMPS



ENERGY
INPUT

ENERGY RELEASED MAINTAINS HIGH ORDER

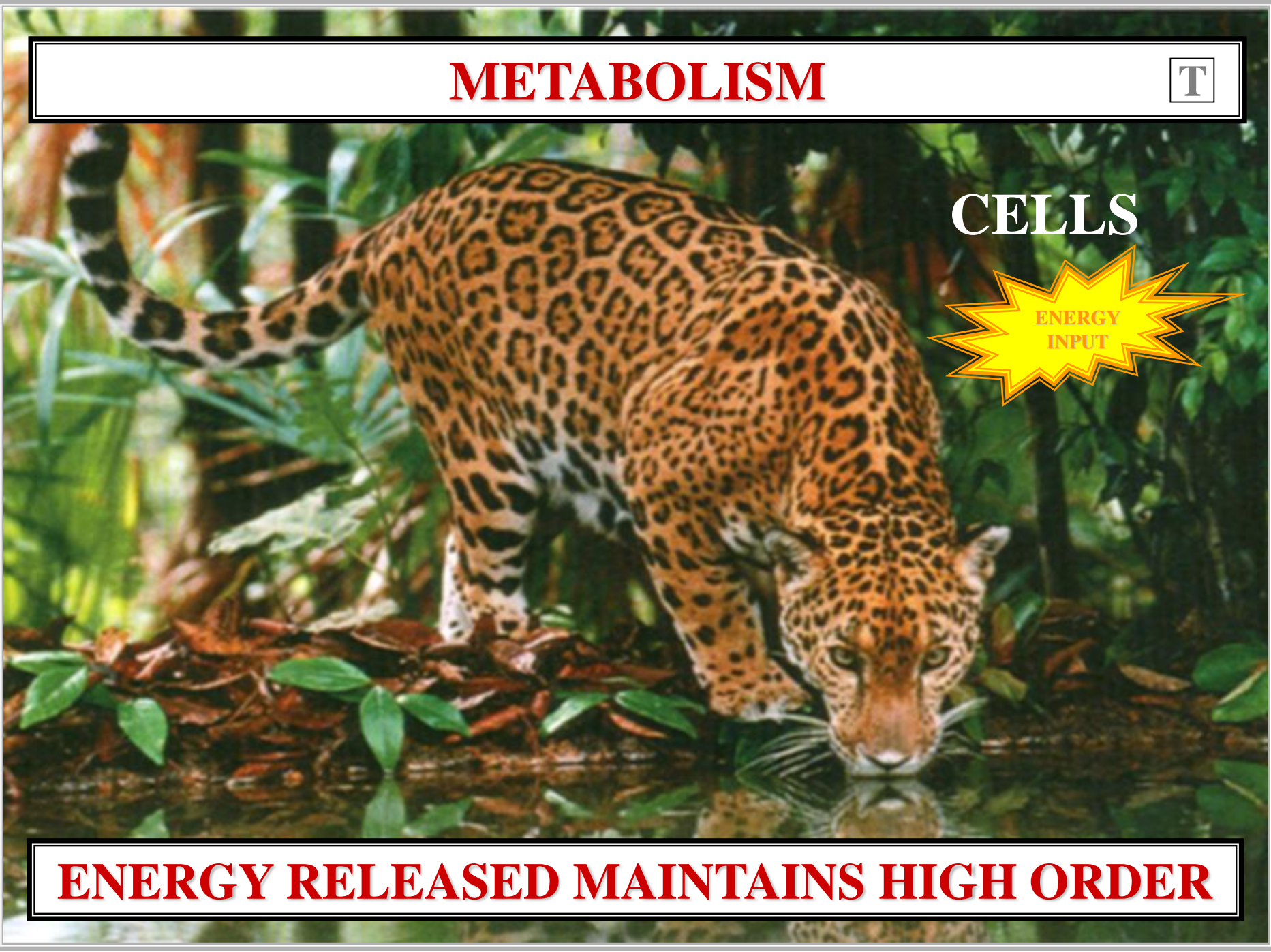
METABOLISM

T

CELLS

ENERGY
INPUT

ENERGY RELEASED MAINTAINS HIGH ORDER



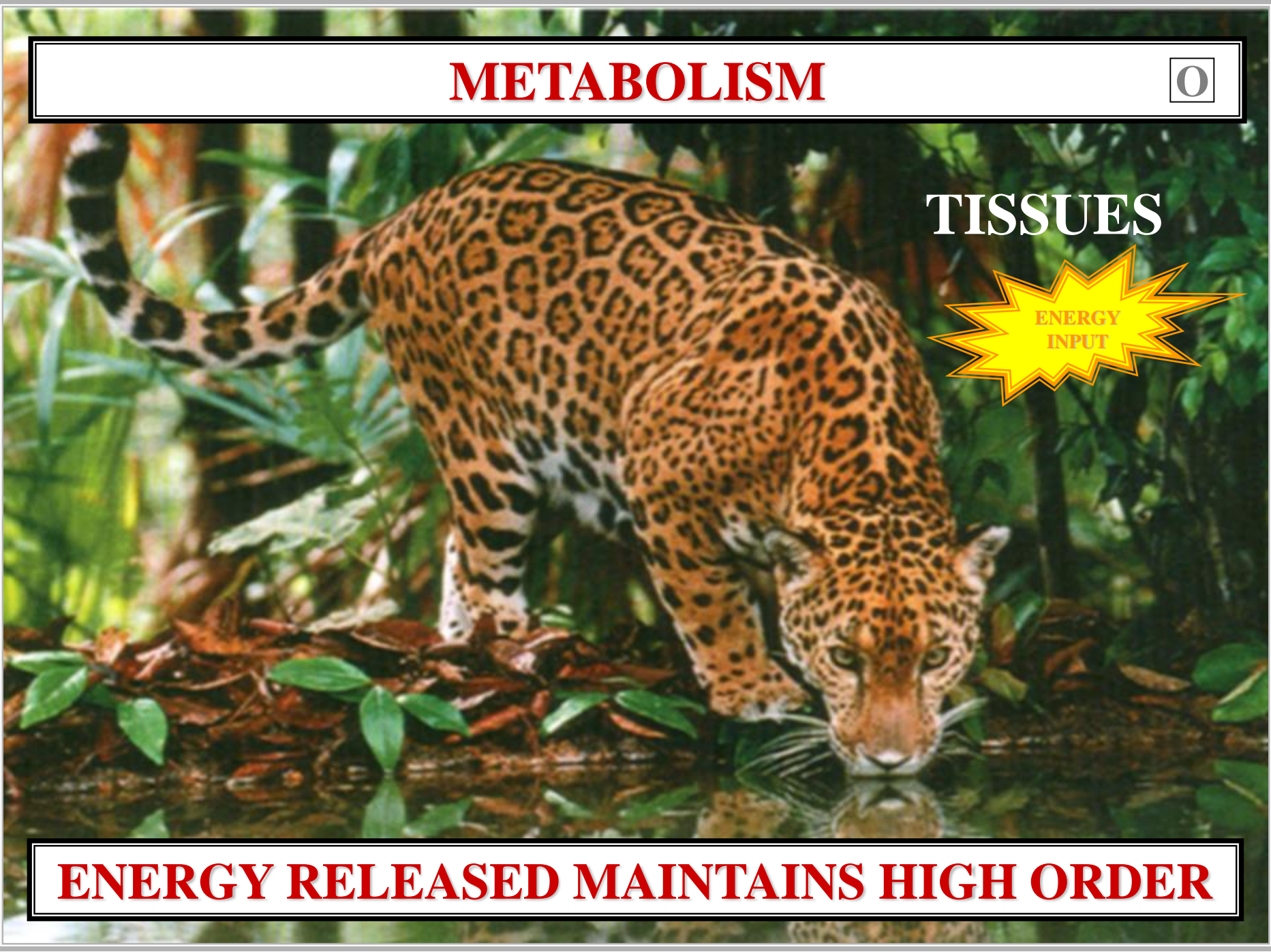
METABOLISM

0

TISSUES

ENERGY
INPUT

ENERGY RELEASED MAINTAINS HIGH ORDER



METABOLISM

0

ORGANS



ENERGY
INPUT

ENERGY RELEASED MAINTAINS HIGH ORDER

METABOLISM

! **H**

ORGANISM



**ENERGY
INPUT**

ENERGY RELEASED MAINTAINS HIGH ORDER

METABOLISM



ORGANISM



HOMEOSTASIS





CELLULAR
LIVING ORGANISM
CHARACTERS
HOMEOSTASIS



**CELLULAR
LIVING
ORGANISMS
DESIRE
HOMEOSTASIS**

HOMEOSTASIS



HOMEOSTASIS

**METABOLIC
“COMFORT STATE”**

HOMEOSTASIS



HOMEOSTASIS
METABOLIC
“COMFORT STATE”

EFFICIENT
METABOLISM
HOMEOSTASIS

HOMEOSTASIS “COMFORT STATE”

B

EFFICIENT METABOLISM

ATOMS

**ENERGY
INPUT**

ENERGY INPUT



HOMEOSTASIS “COMFORT STATE”

C

EFFICIENT METABOLISM

BIO-CMPS

**ENERGY
INPUT**

ENERGY INPUT



HOMEOSTASIS “COMFORT STATE”

EG

EFFICIENT METABOLISM

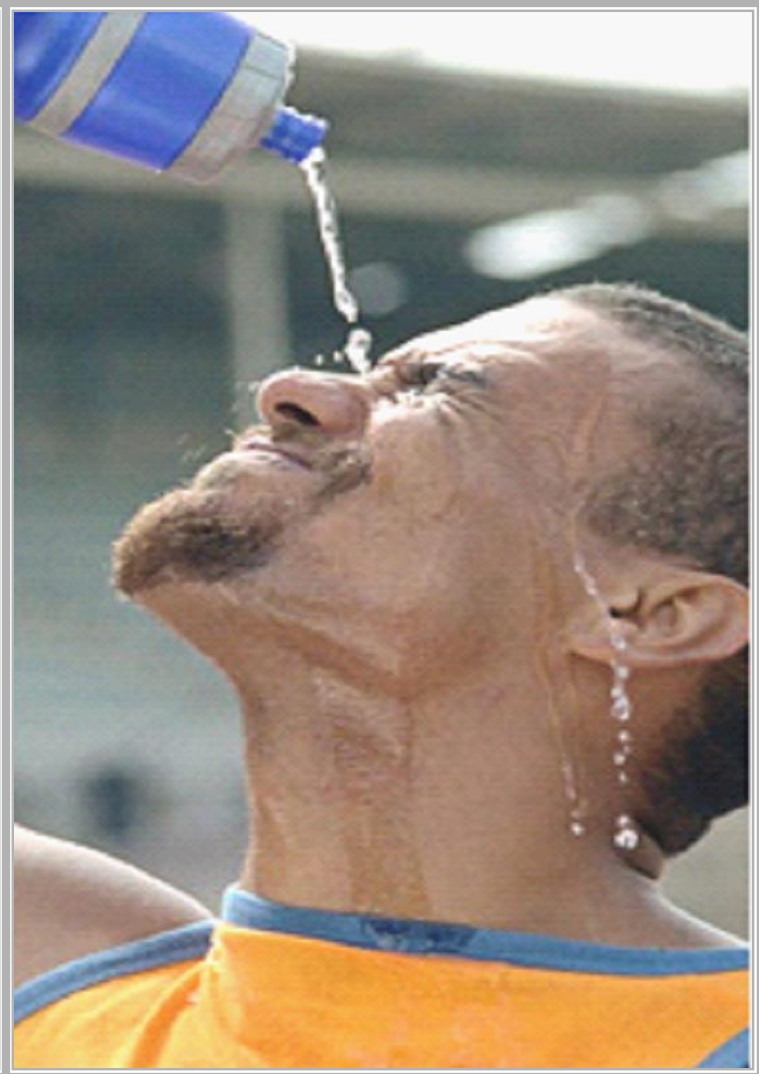


CELLS

**ENERGY
INPUT**

LIVING ORGANISMS HIGHLY ORGANIZED

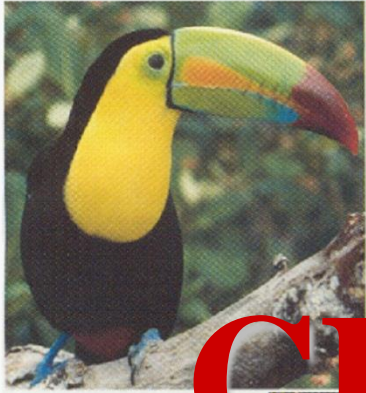
HOMEOSTATIS: EXAMPLE



HYPOTHERMIA VS HYPERTHERMIA



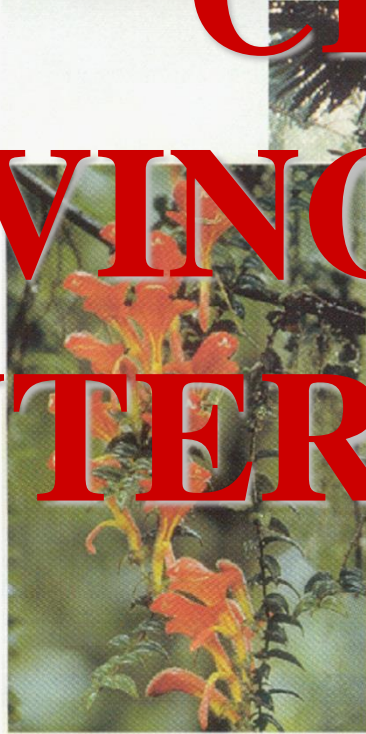
CELLULAR
LIVING ORGANISM
CHARACTERS
INTER-DEPENDENT



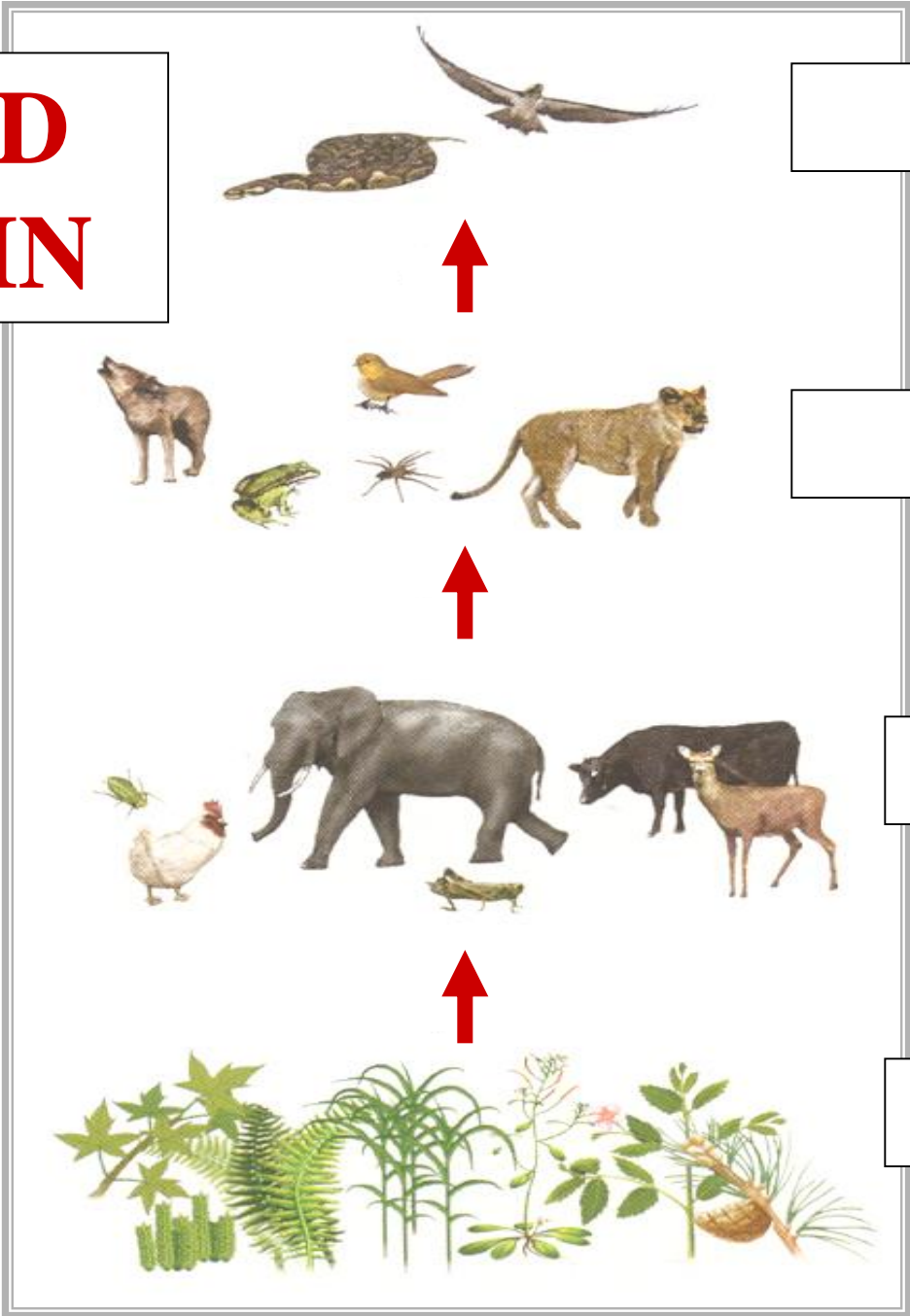
CELLULAR

LIVING ORGANISMS

INTER-DEPENDENT

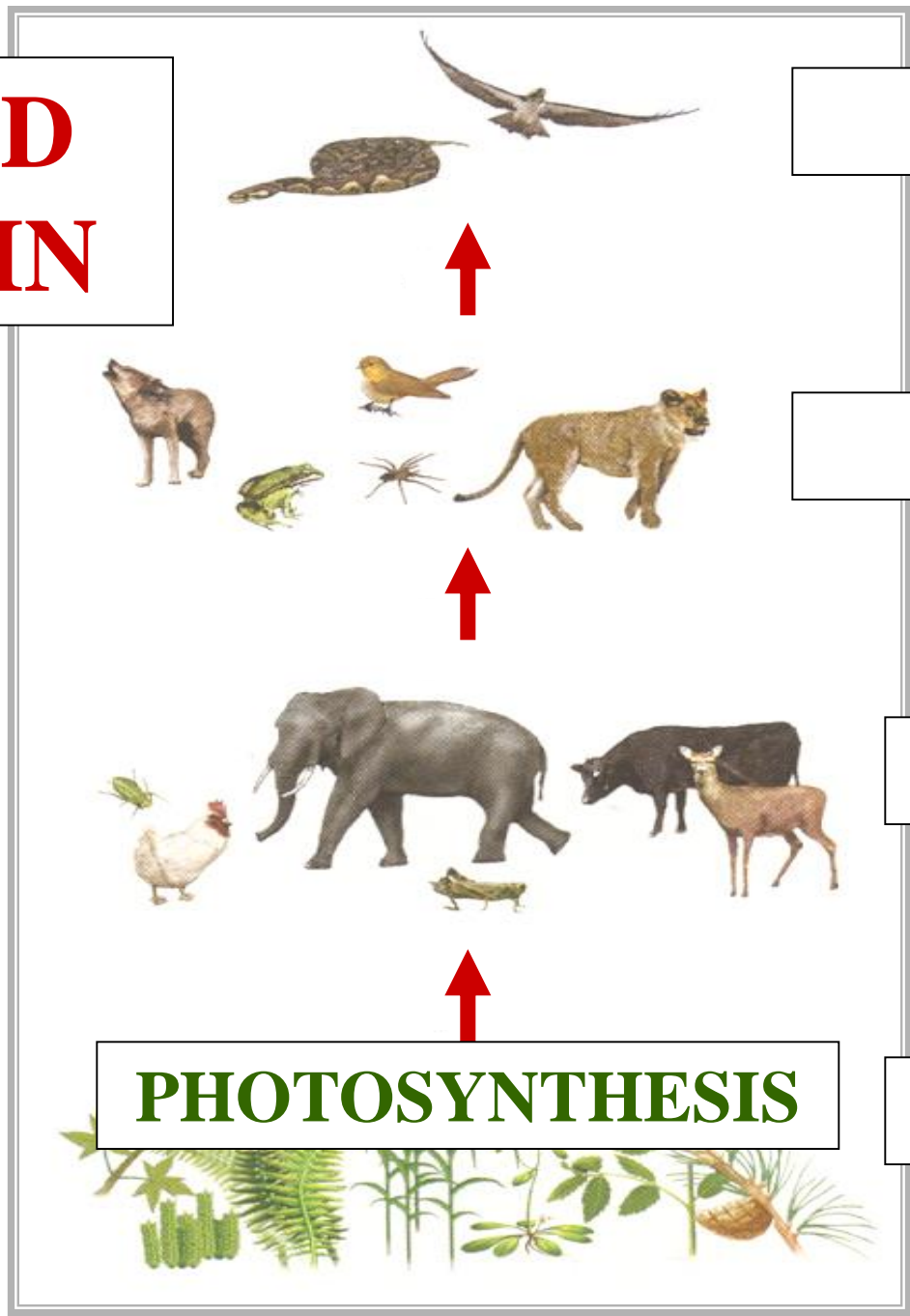


FOOD CHAIN



 = ENERGY

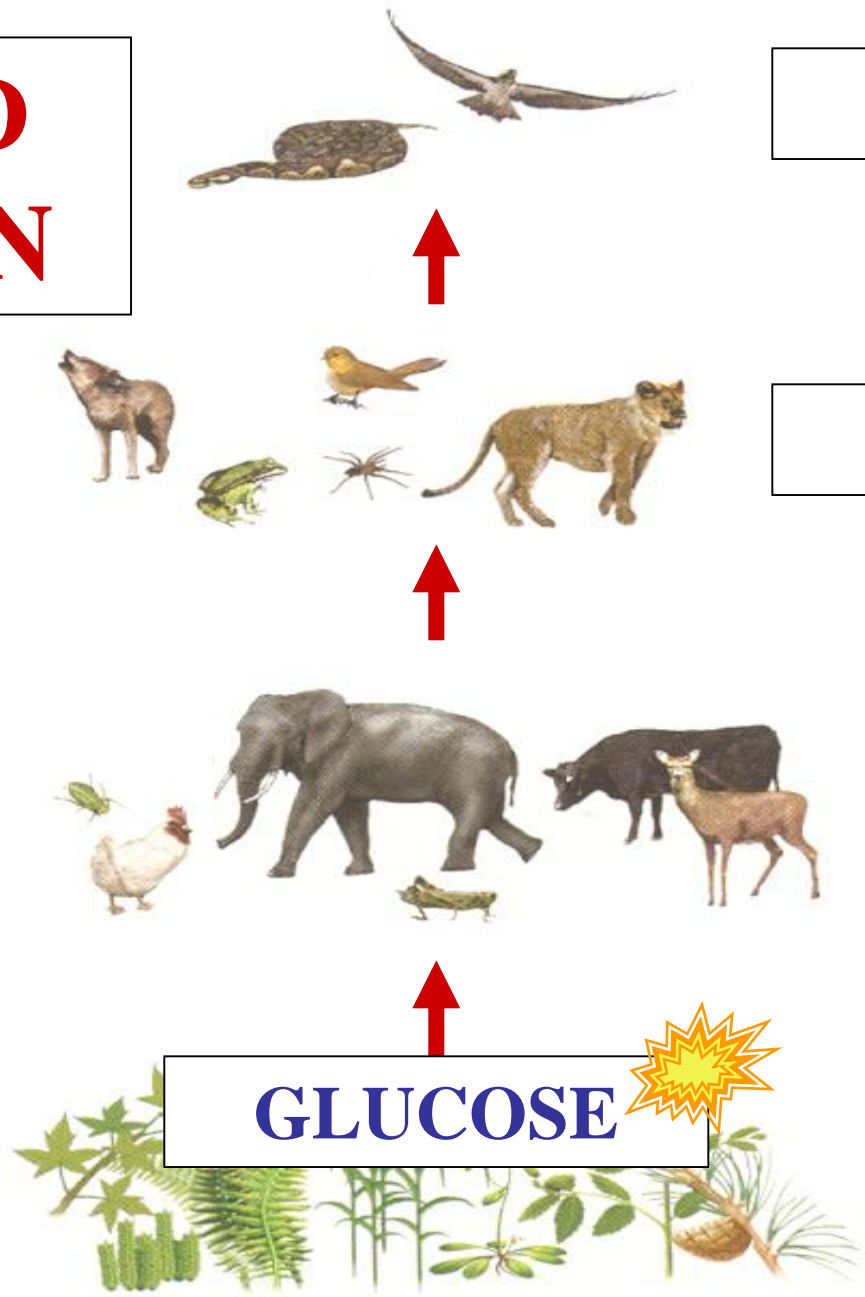
FOOD CHAIN



PHOTOSYNTHESIS

 = ENERGY

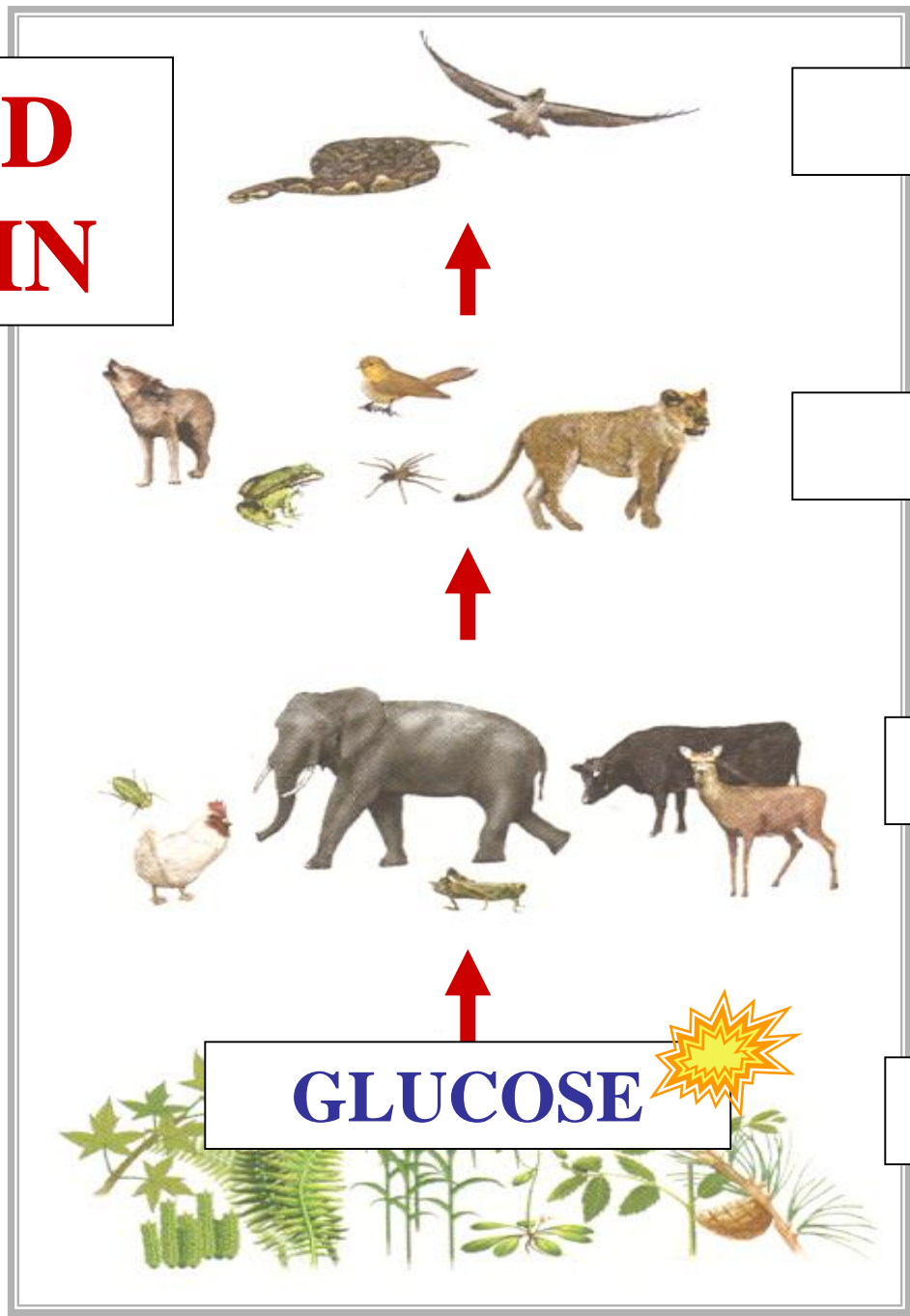
FOOD CHAIN



?

 = ENERGY

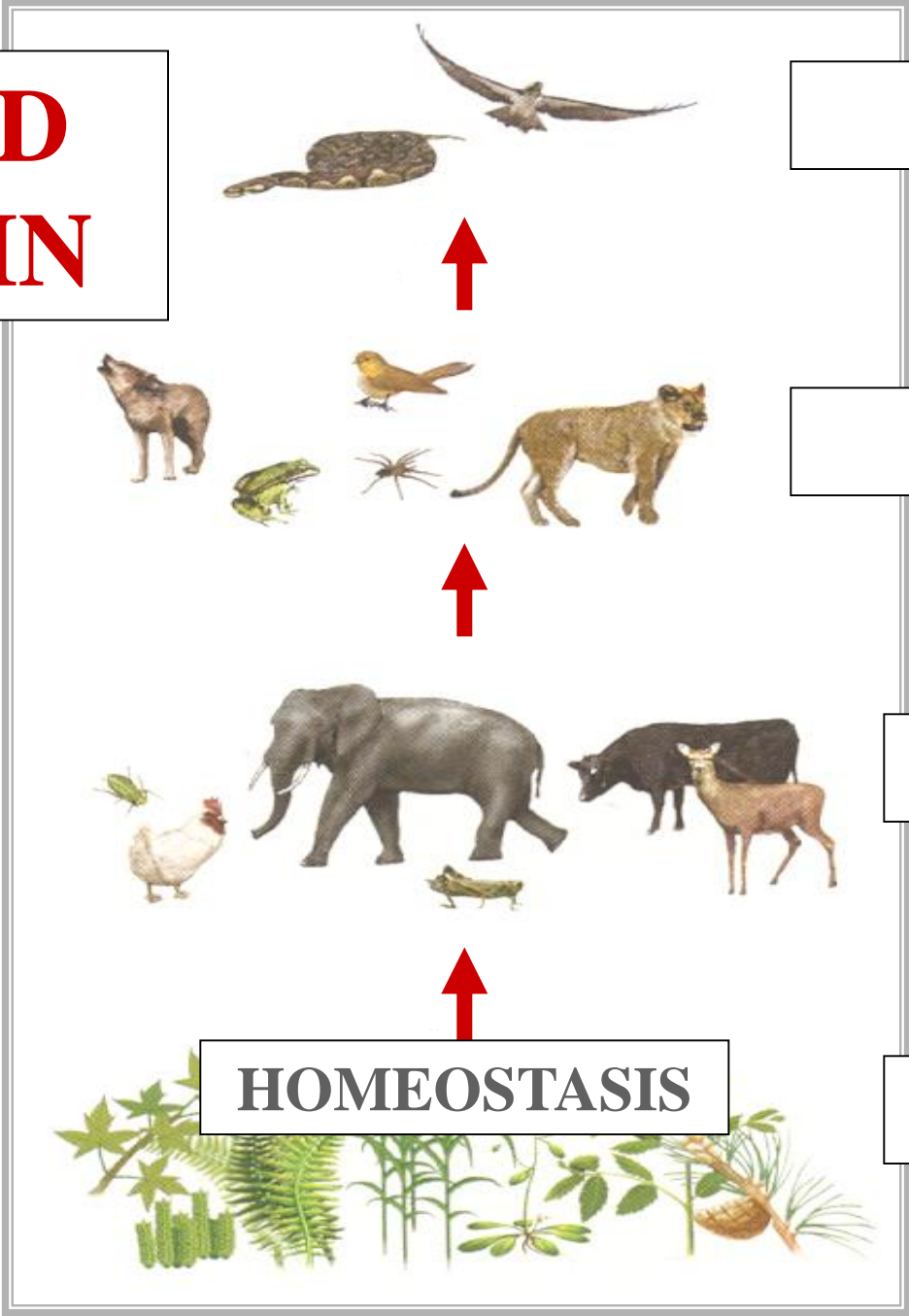
FOOD CHAIN



 = ENERGY

PRODUCERS

FOOD CHAIN



HOMEOSTASIS

[Empty box]

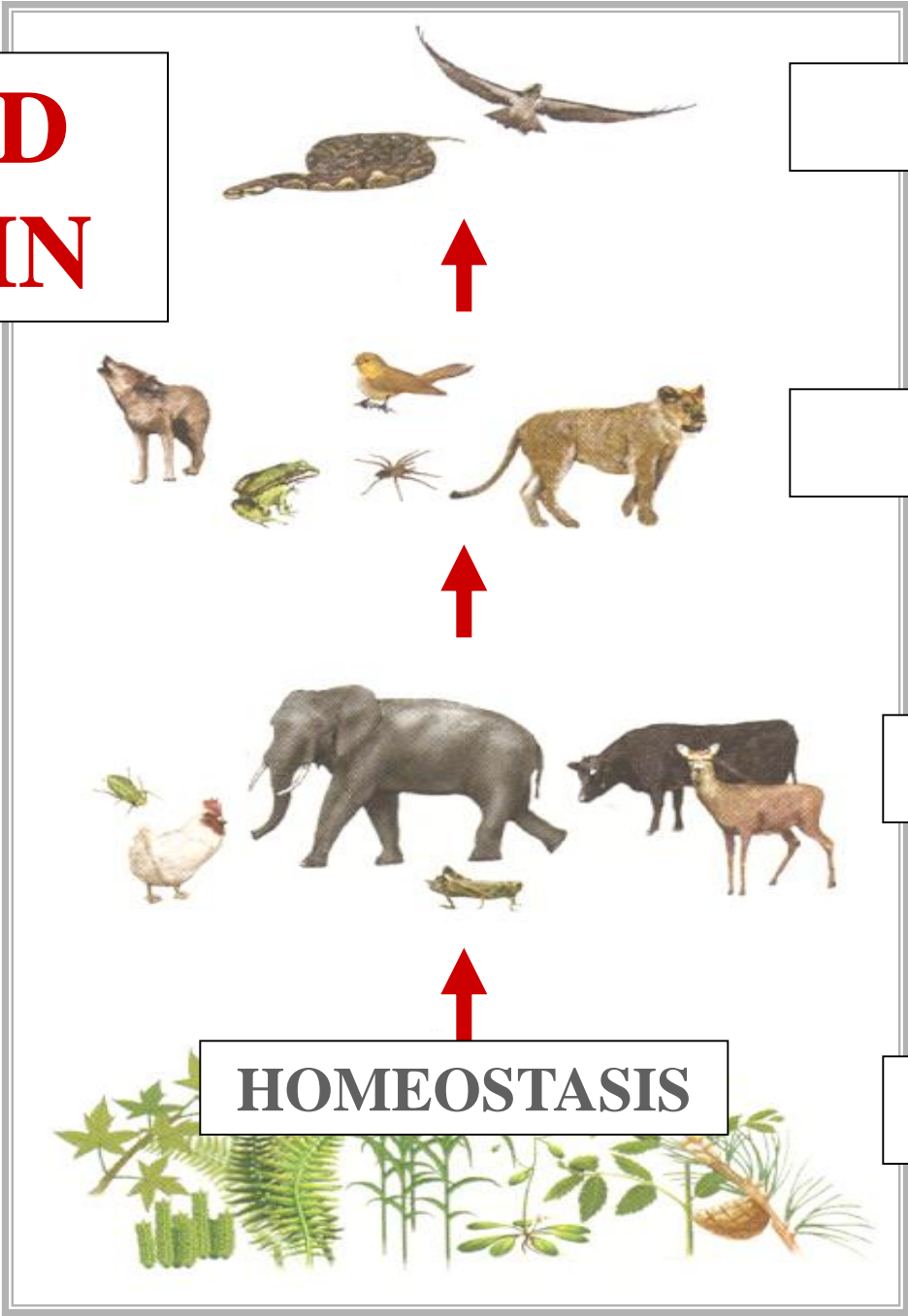
[Empty box]

?

PRODUCERS



FOOD CHAIN

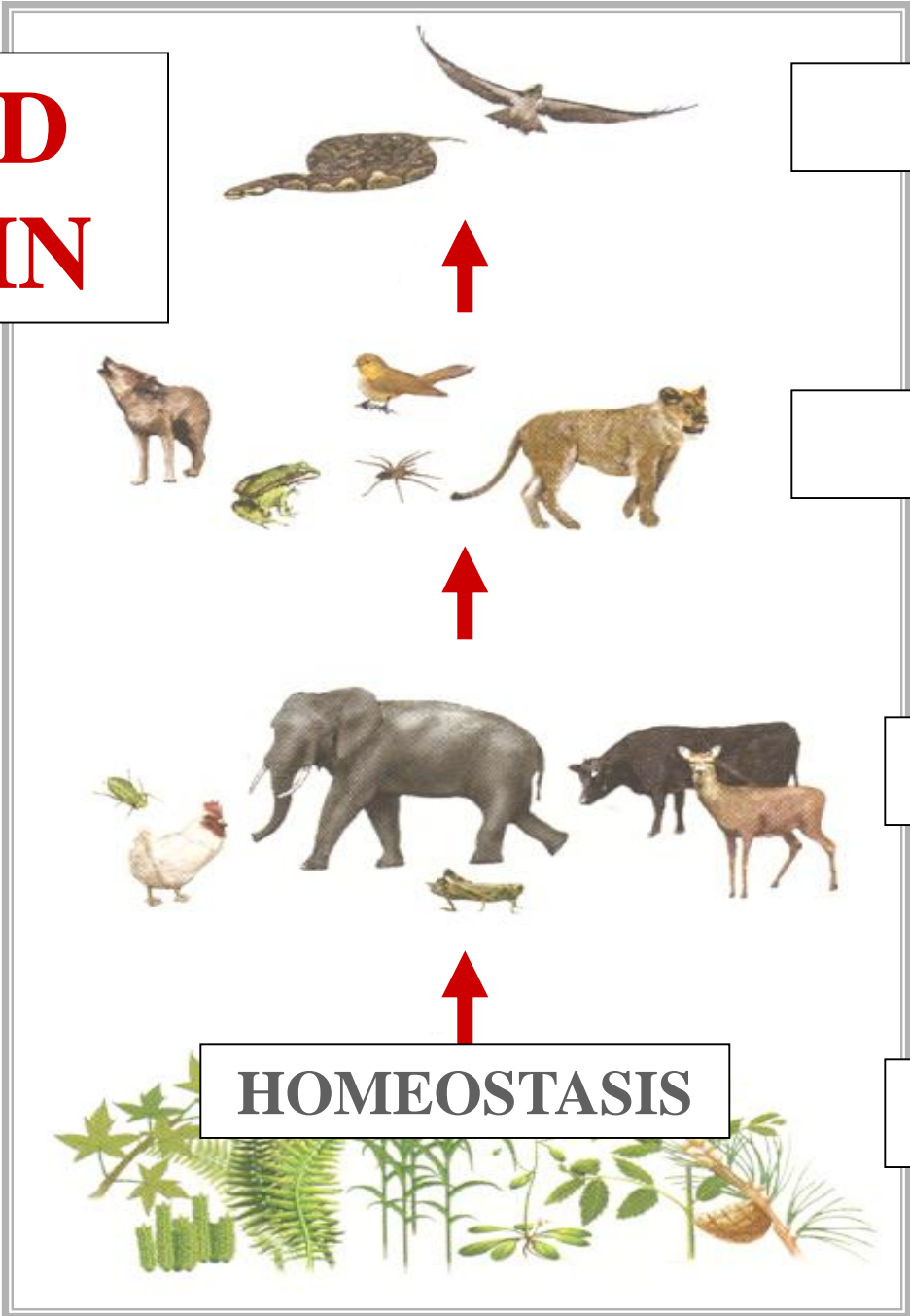


CONSUMERS

PRODUCERS



FOOD CHAIN



[Empty box]

[Empty box]

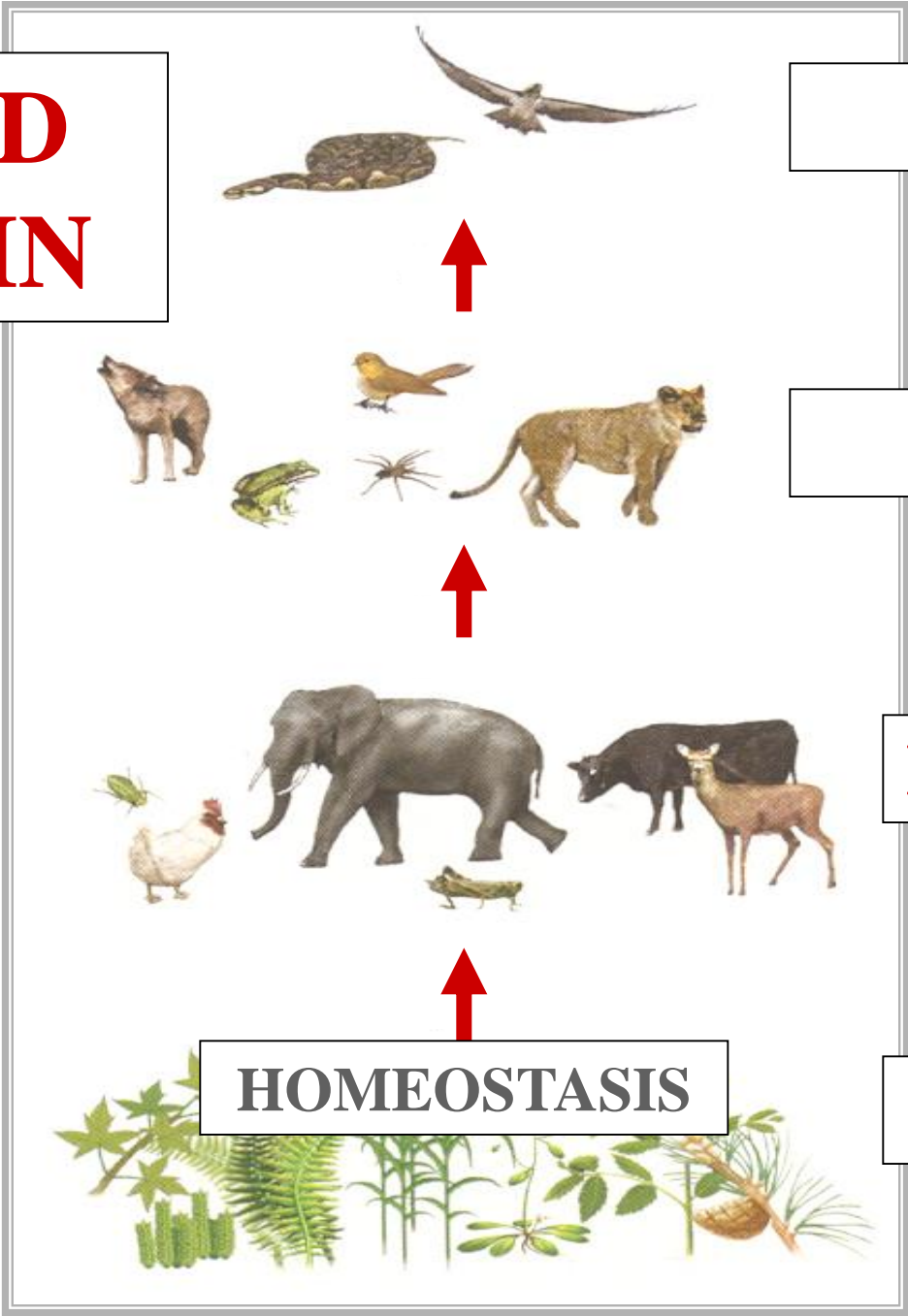
?

HOMEOSTASIS

PRODUCERS



FOOD CHAIN



[Empty box]

[Empty box]

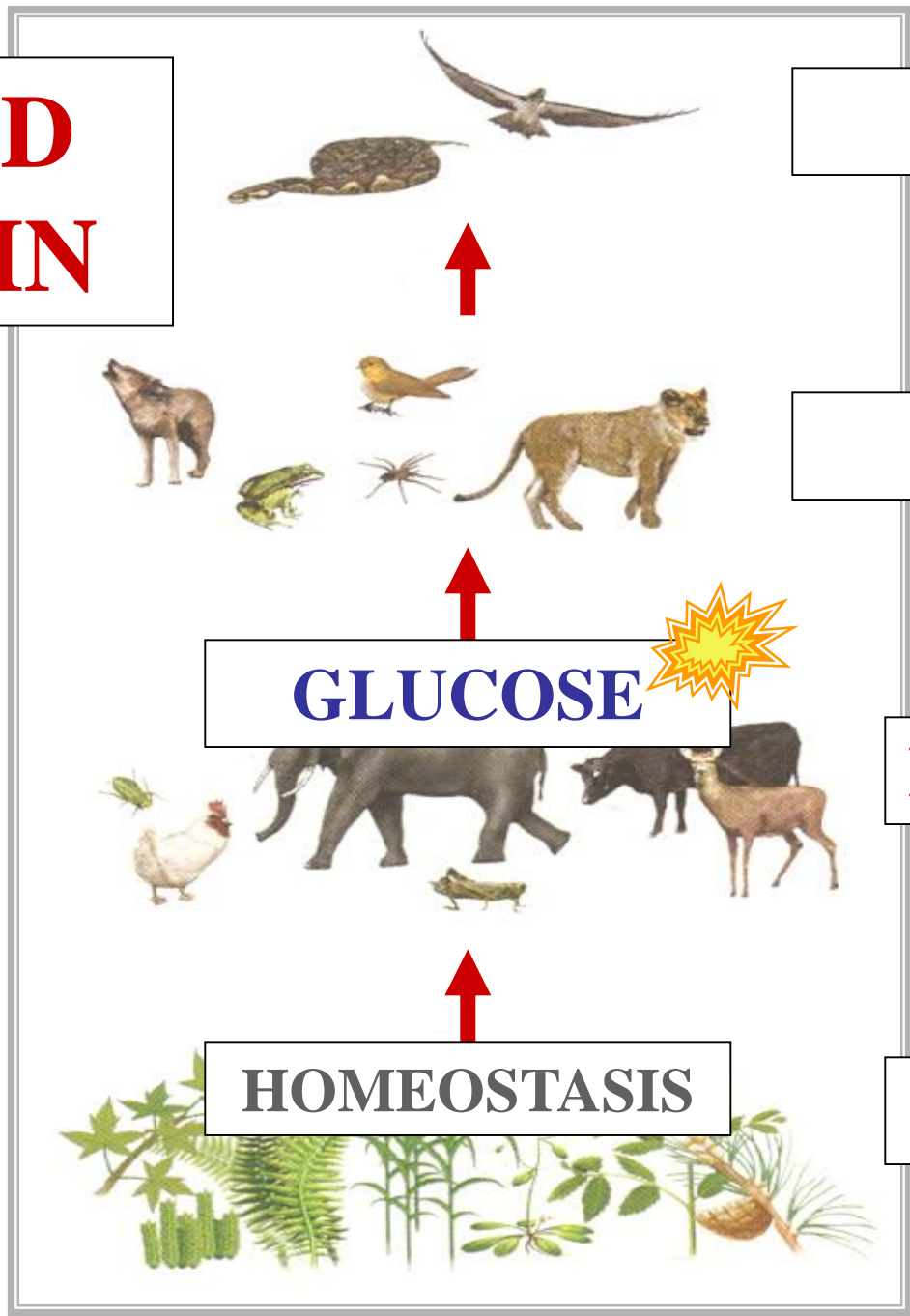
HERBIVORES

HOMEOSTASIS

PRODUCERS



FOOD CHAIN



[Empty box]

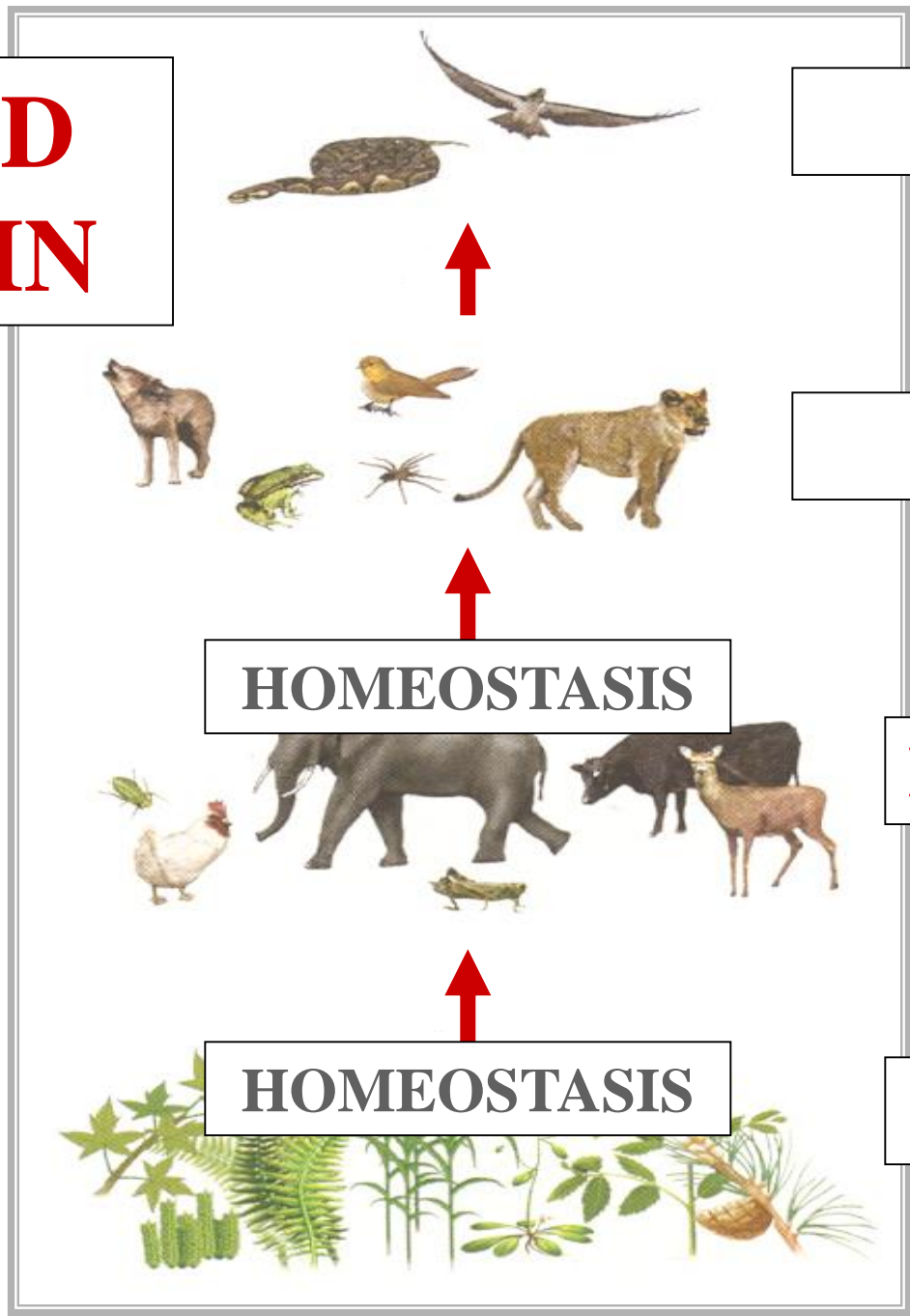
[Empty box]

HERBIVORES

PRODUCERS

 = ENERGY

FOOD CHAIN



?

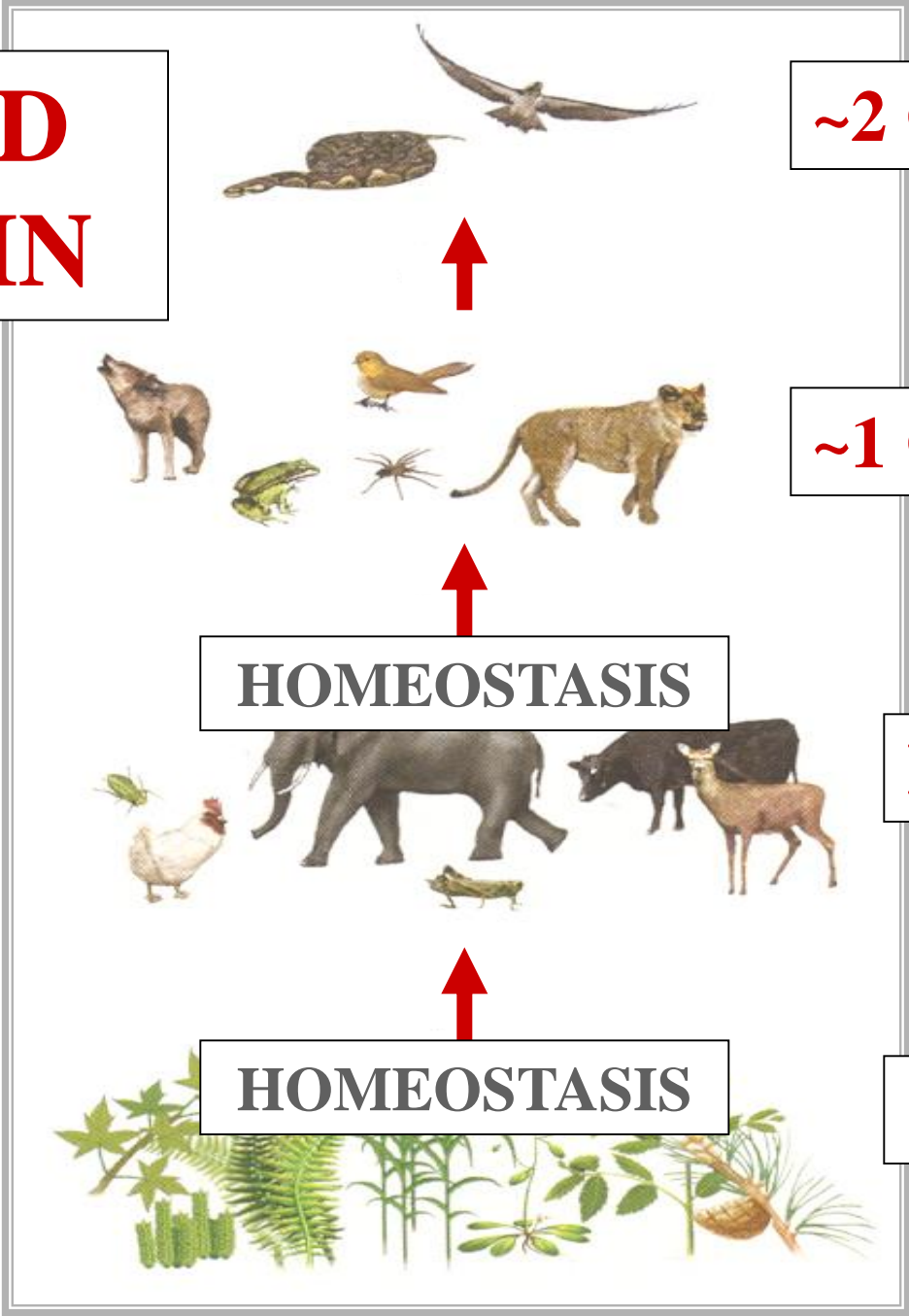
?

HERBIVORES

PRODUCERS



FOOD CHAIN



~2 CARNIVORES

~1 CARNIVORES

HERBIVORES

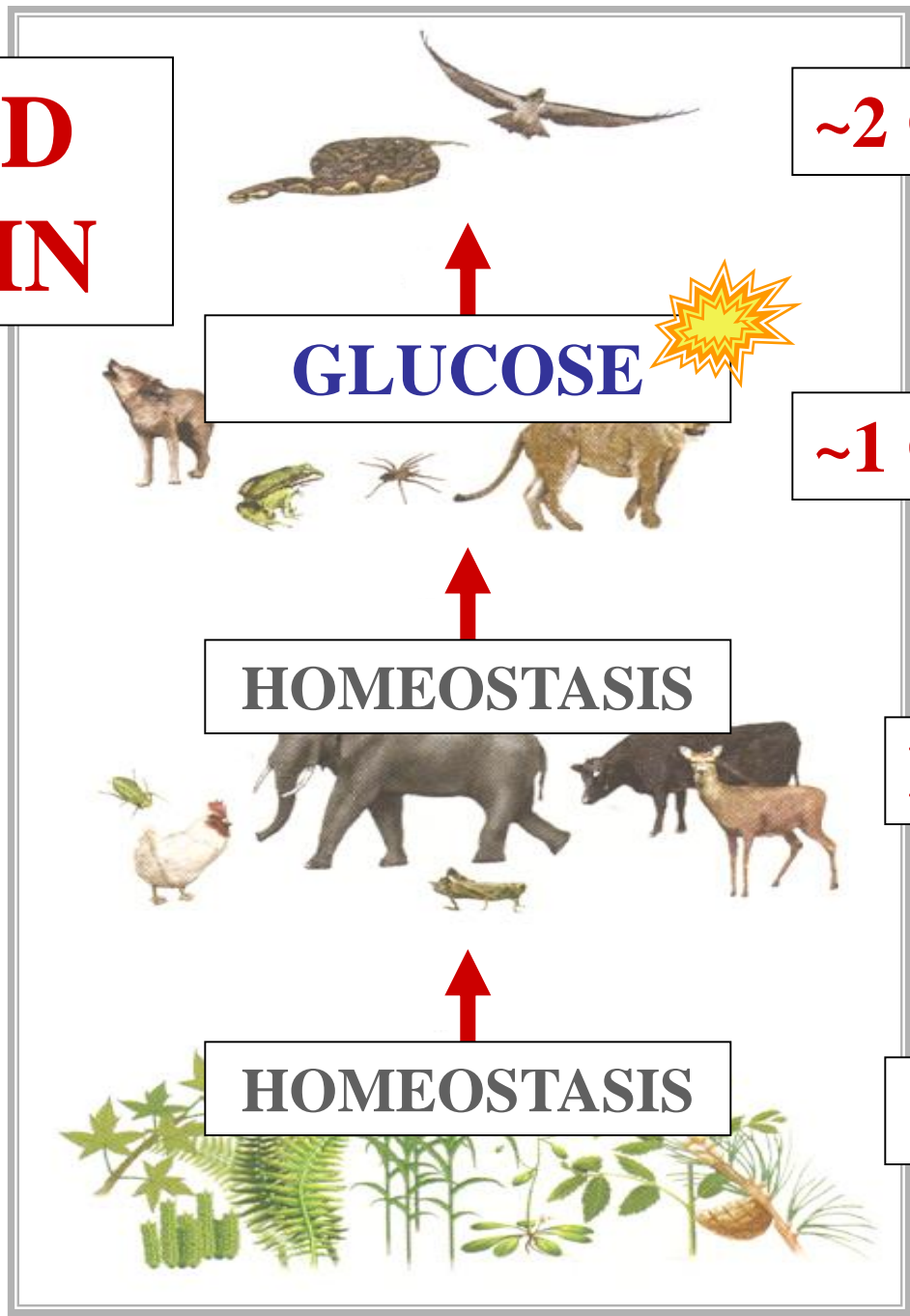
PRODUCERS

HOMEOSTASIS

HOMEOSTASIS



FOOD CHAIN



~2 CARNIVORES

GLUCOSE

~1 CARNIVORES

HOMEOSTASIS

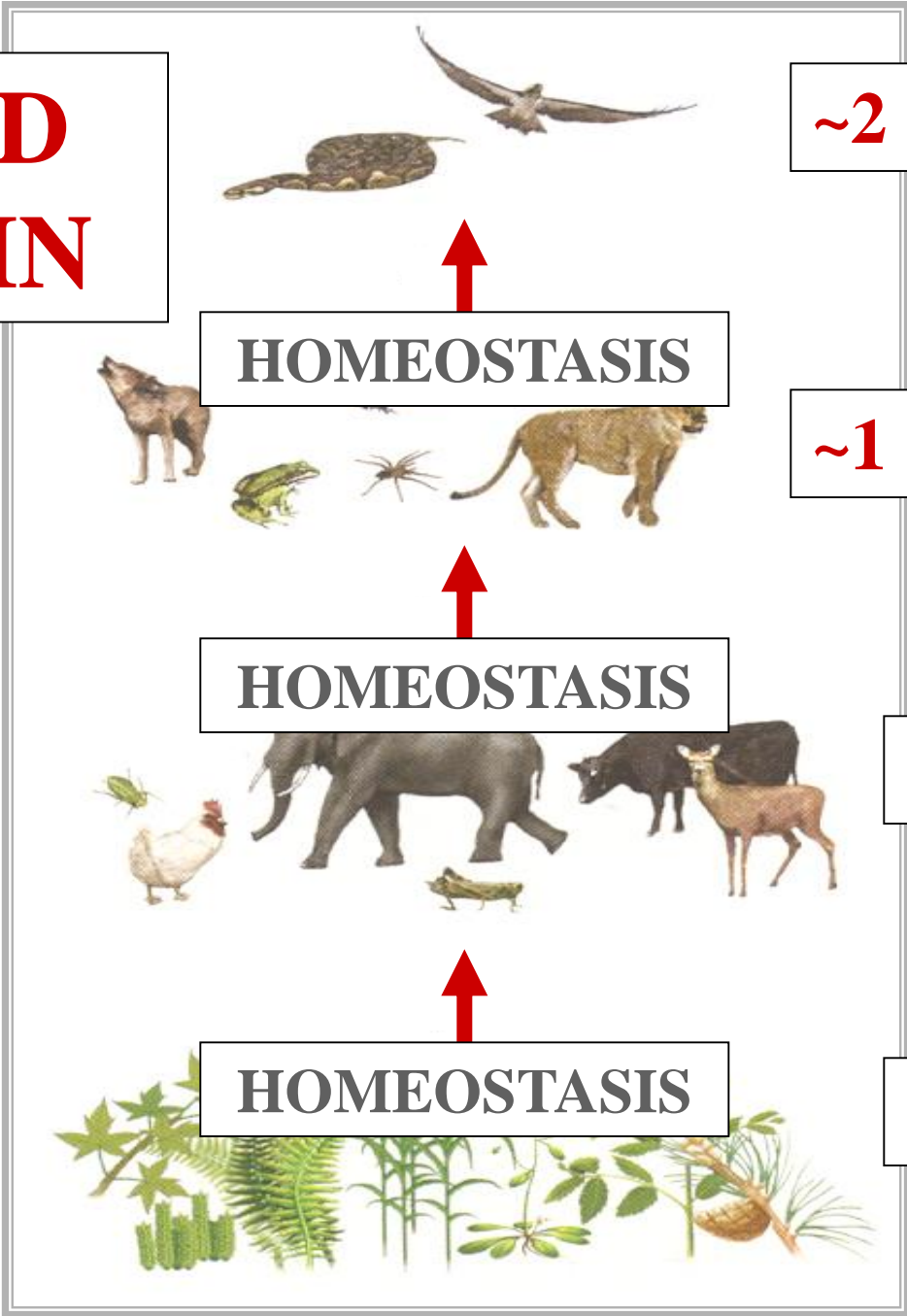
HERBIVORES

HOMEOSTASIS

PRODUCERS

 = ENERGY

FOOD CHAIN



~2 CARNIVORES

~1 CARNIVORES

HERBIVORES

PRODUCERS

HOMEOSTASIS

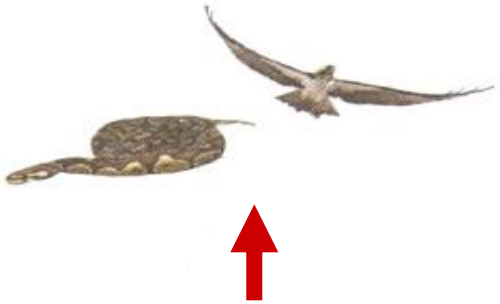
HOMEOSTASIS

HOMEOSTASIS



FOOD CHAIN

~2 CARNIVORES



~1 CARNIVORES



INTER-DEPENDENT

HERBIVORES



PRODUCERS





CELLULAR
LIVING ORGANISM
CHARACTERS
MUTATION



CELLULAR

LIVING

ORGANISMS

UNDERGO

MUTATIONS

MUTATION



MUTATION

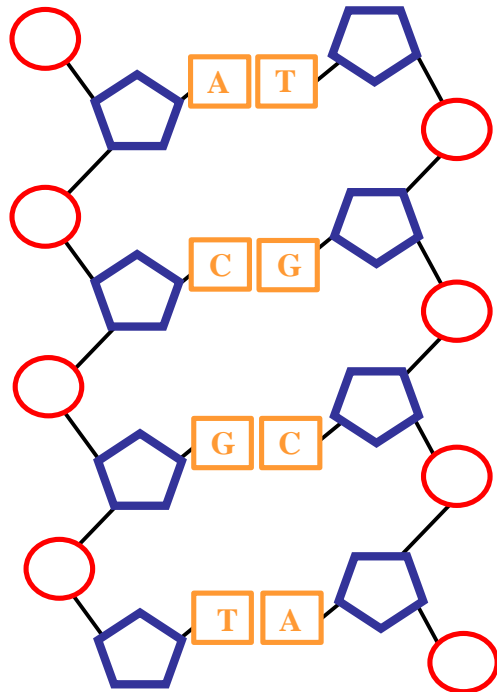
**DNA
STRUCTURAL
CHANGE**

MUTATION

MUTATION

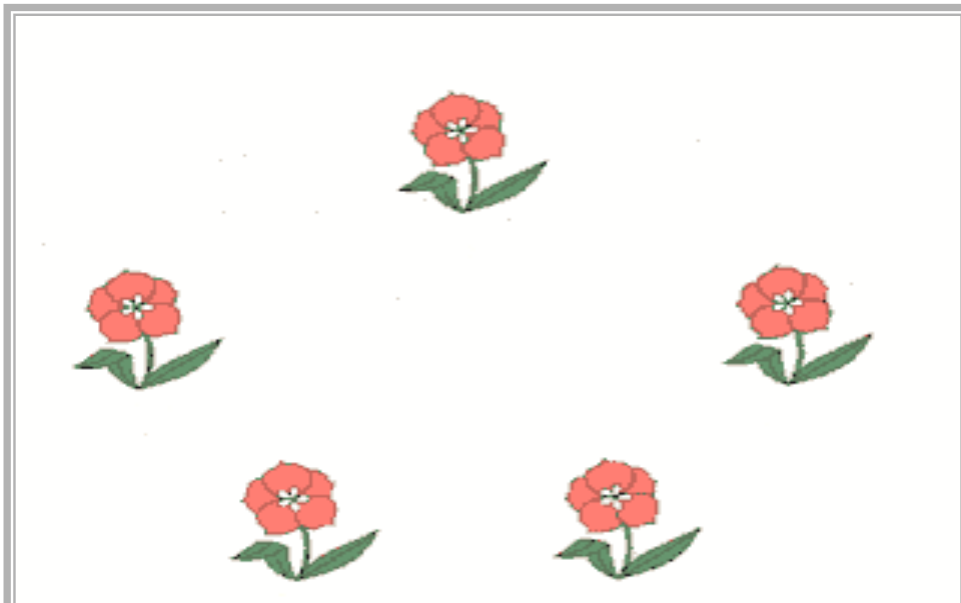


DNA

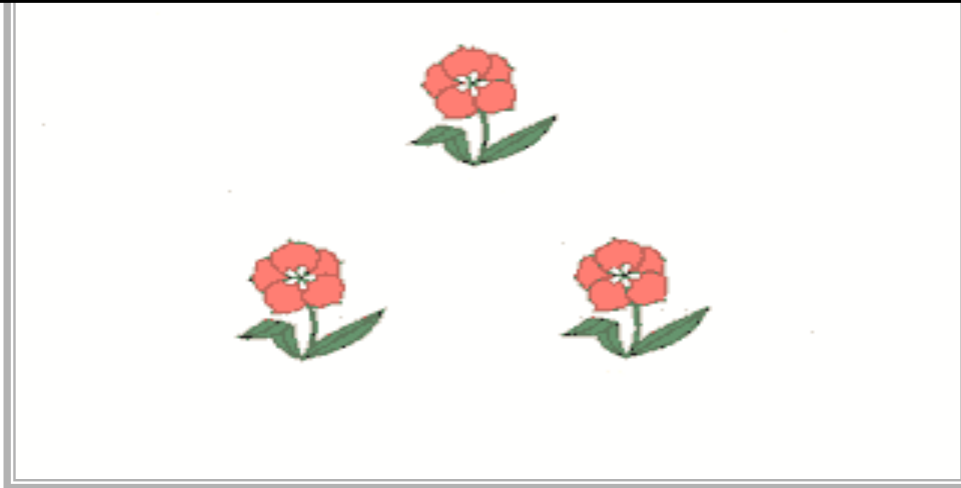


DNA
READILY
UNDERGOES
MUTATIONS

DEOXYRIBONUCLEIC ACID



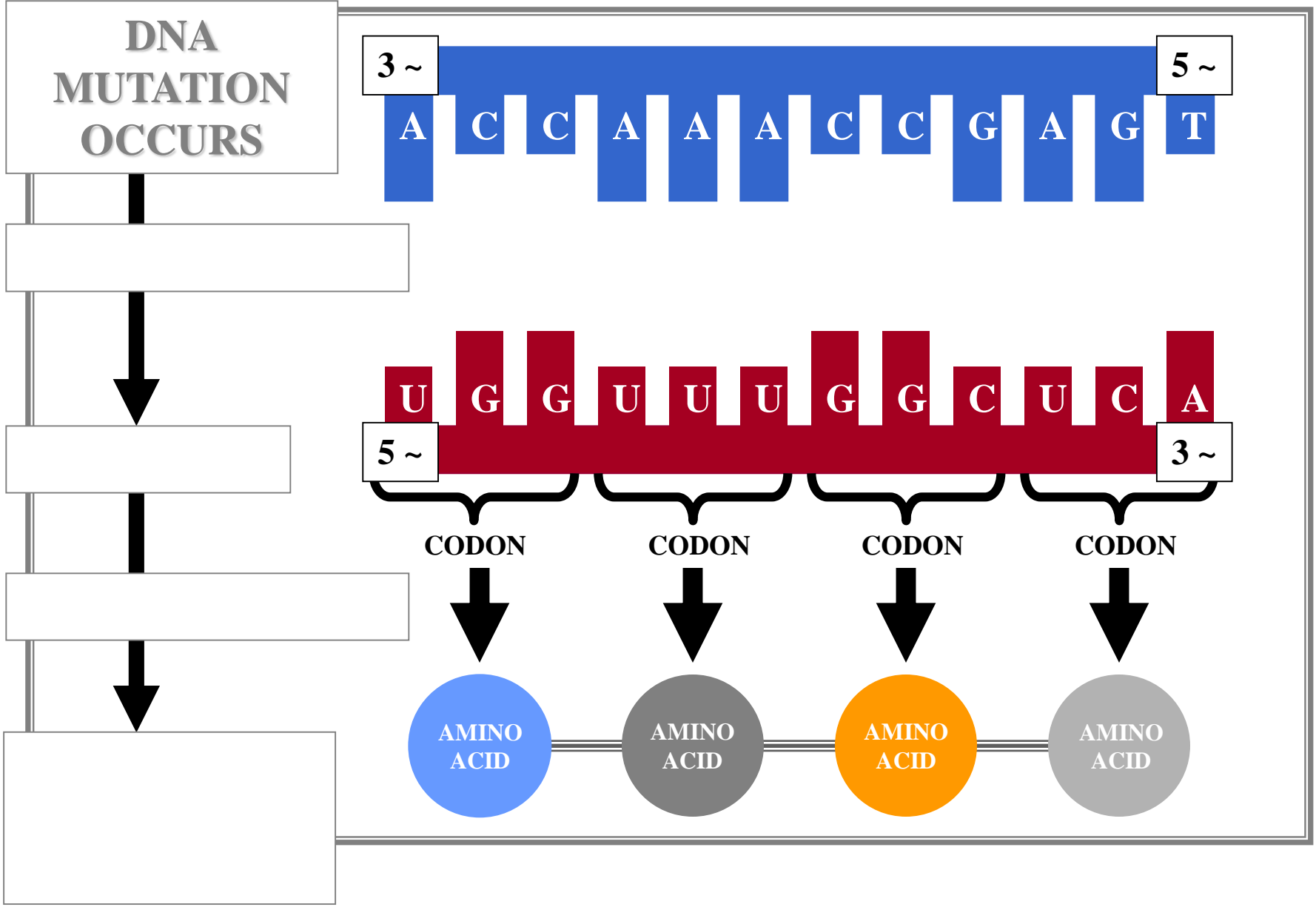
PLANT POPULATION



RED FLOWERED PLANTS

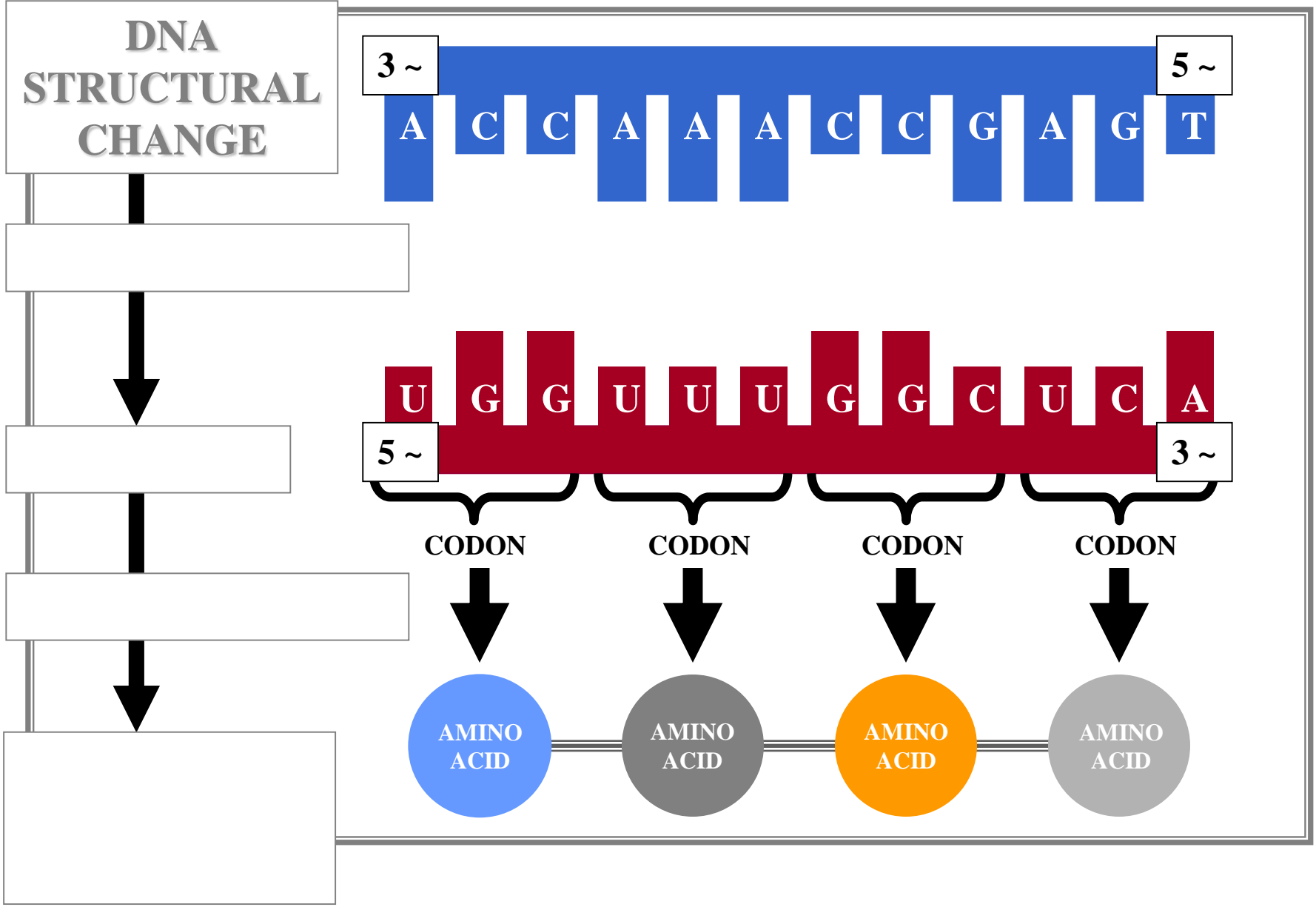


PROTEIN SYNTHESIS



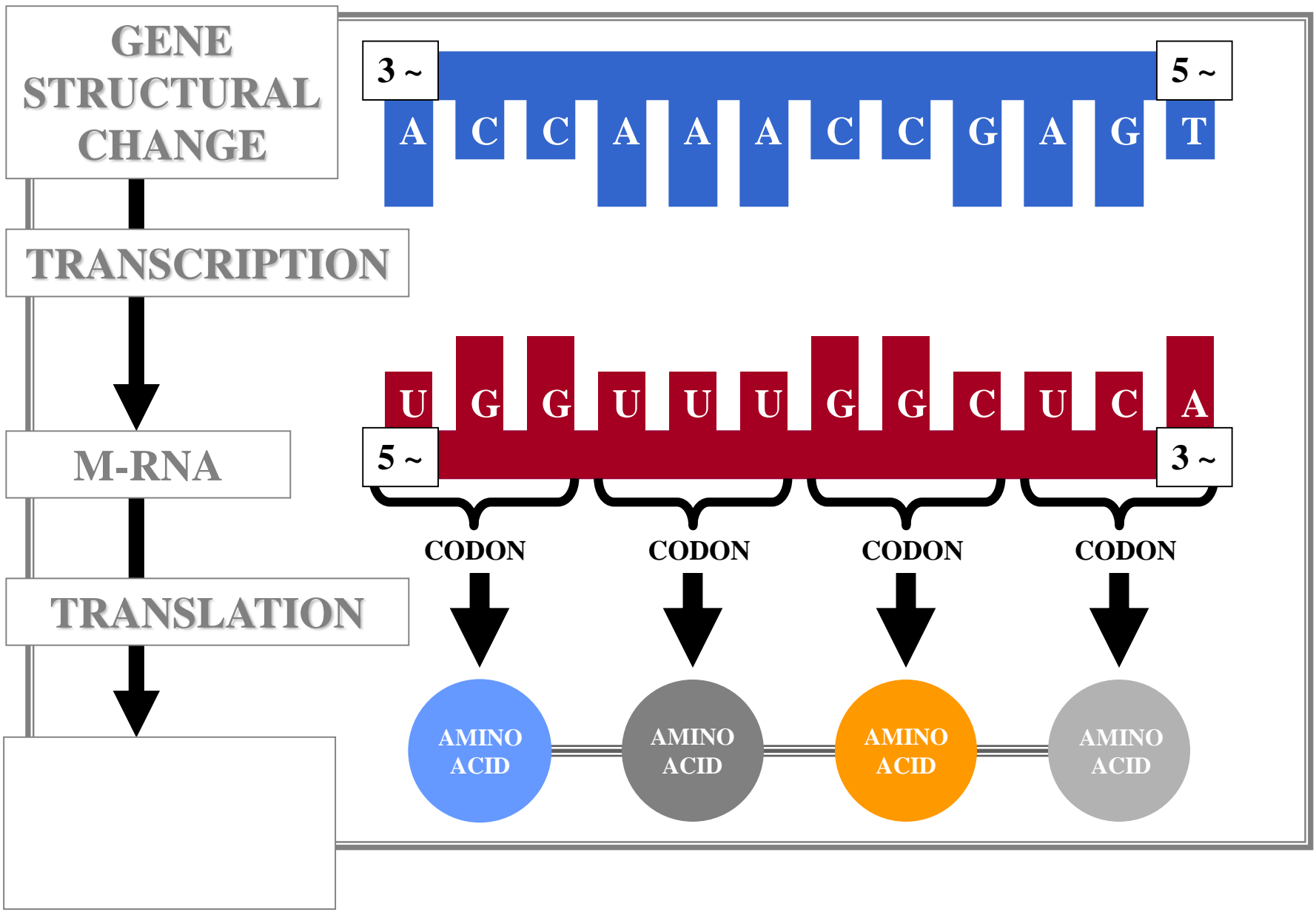


PROTEIN SYNTHESIS



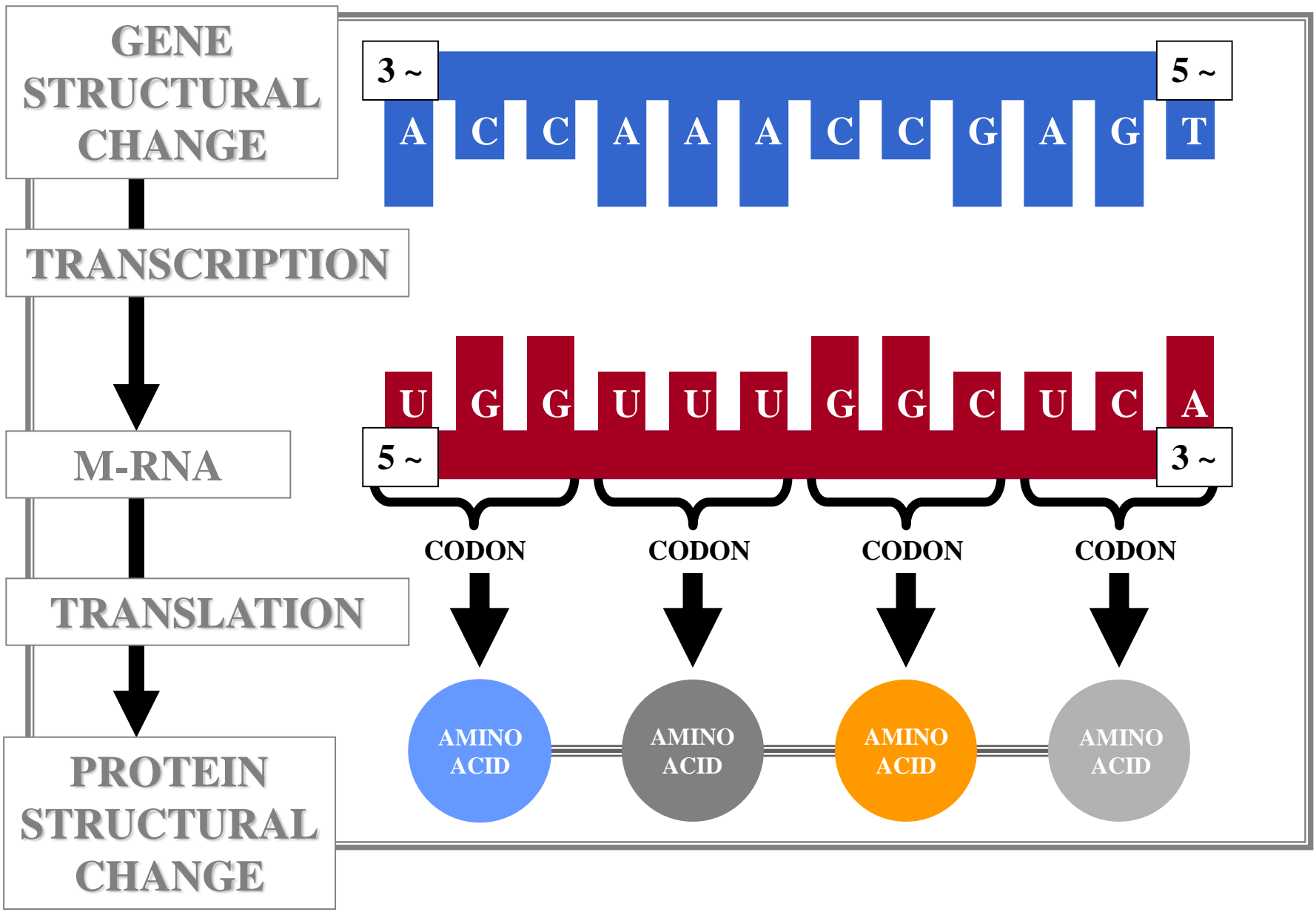


PROTEIN SYNTHESIS



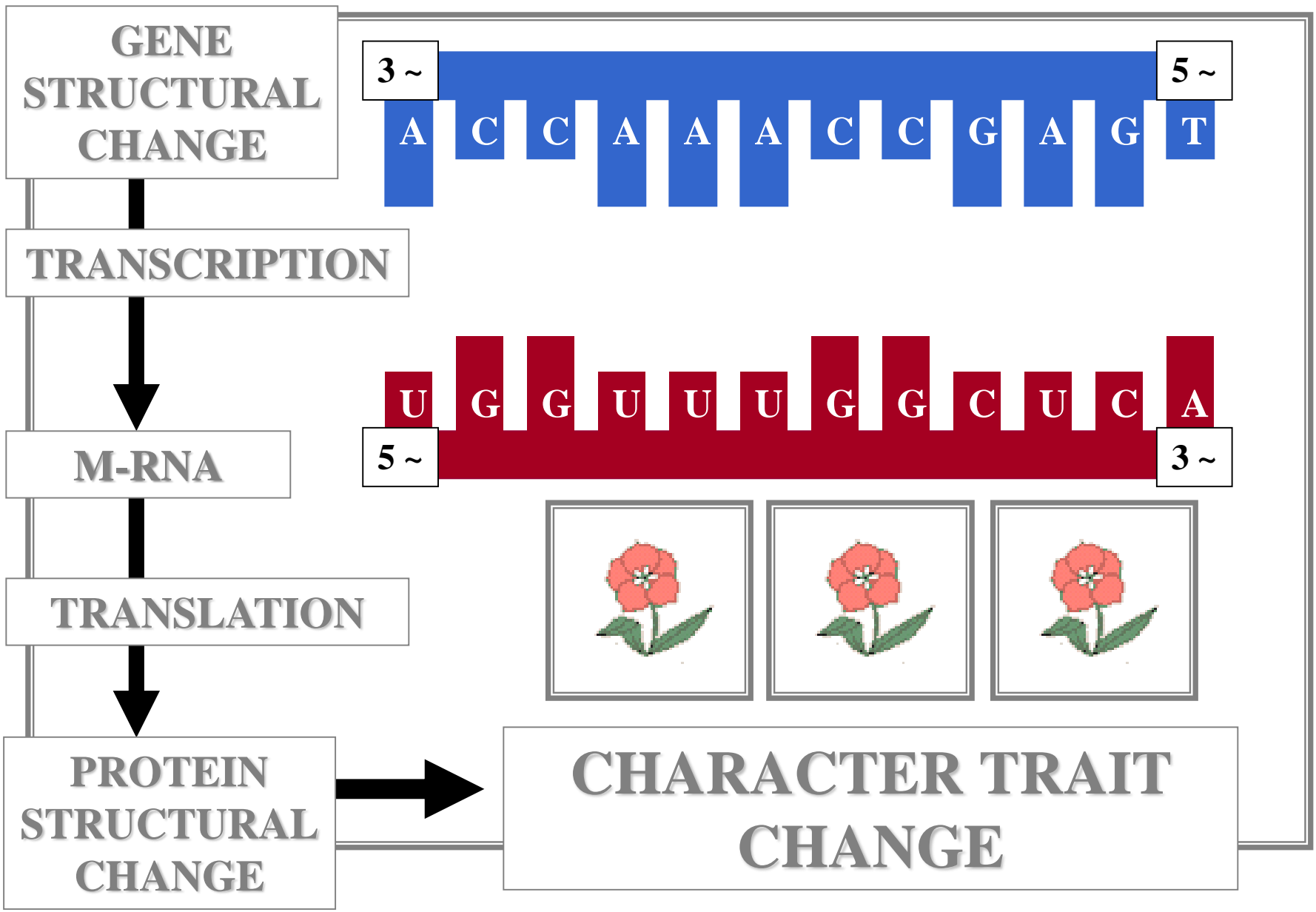


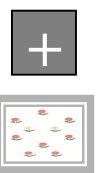
PROTEIN SYNTHESIS



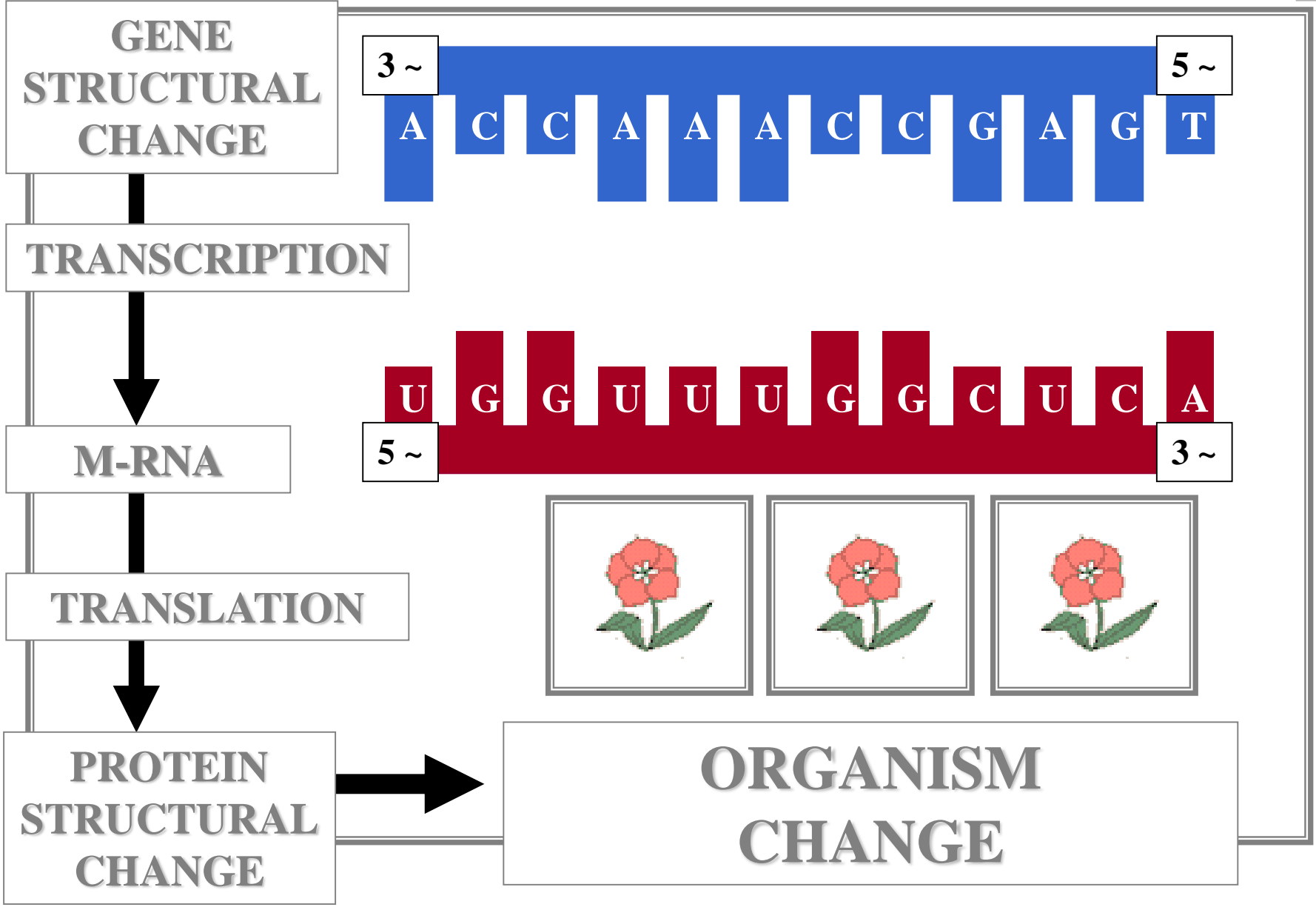


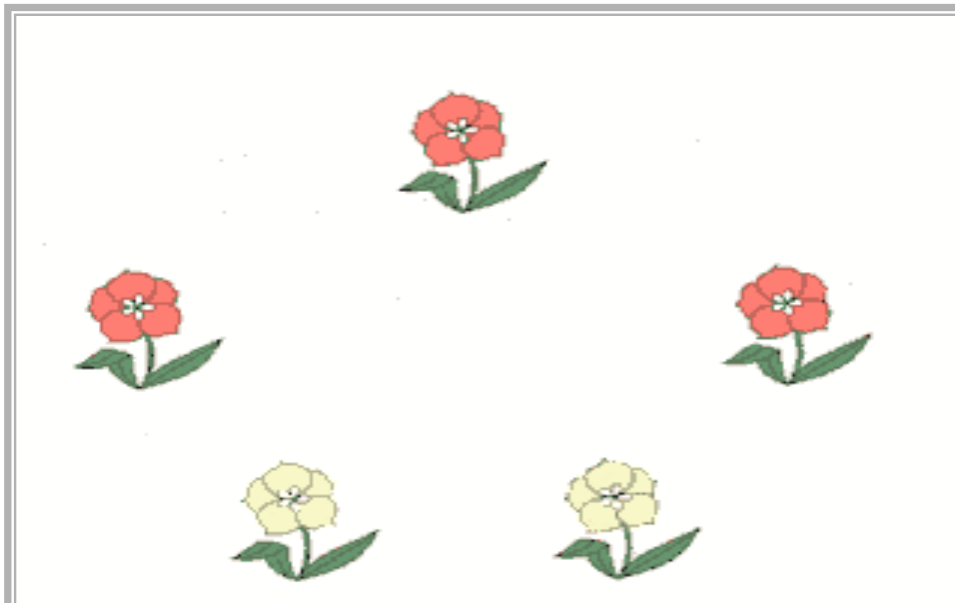
PROTEIN SYNTHESIS



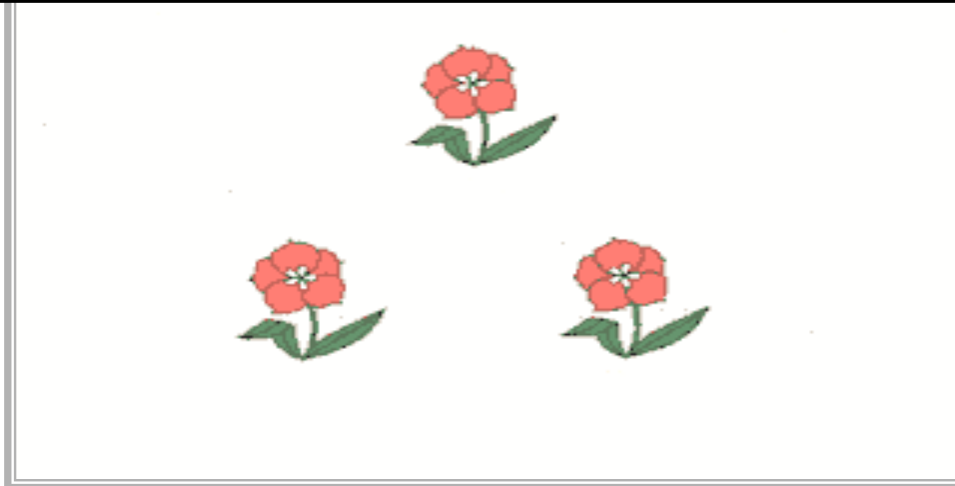


PROTEIN SYNTHESIS

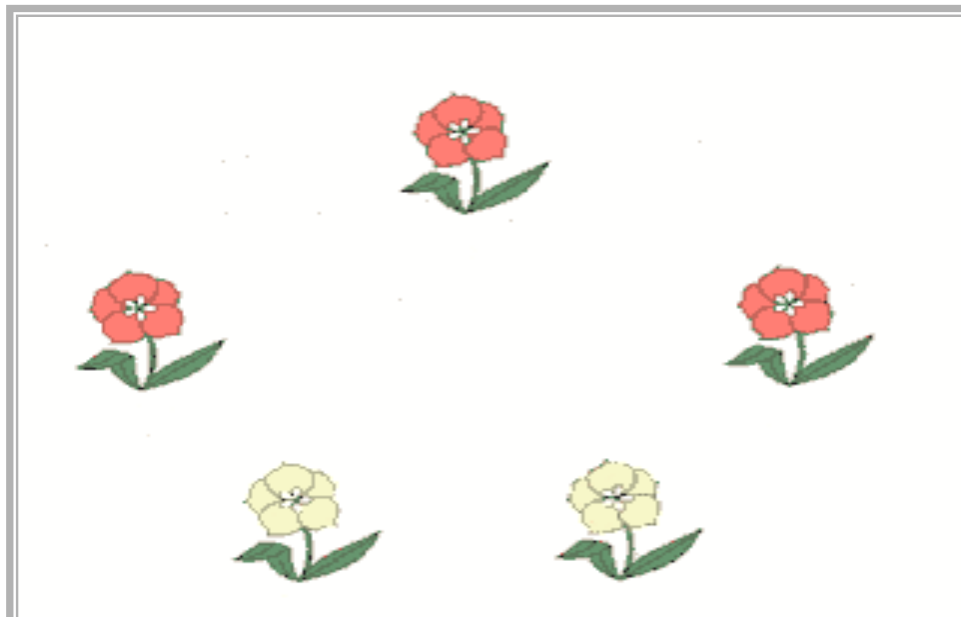




ORGANISM CHANGE



MUTATION: WHITE FLOWERED PLANTS



**MUTATION
UNDERGOES
ENVIRONMENTAL
SURVIVAL TEST**

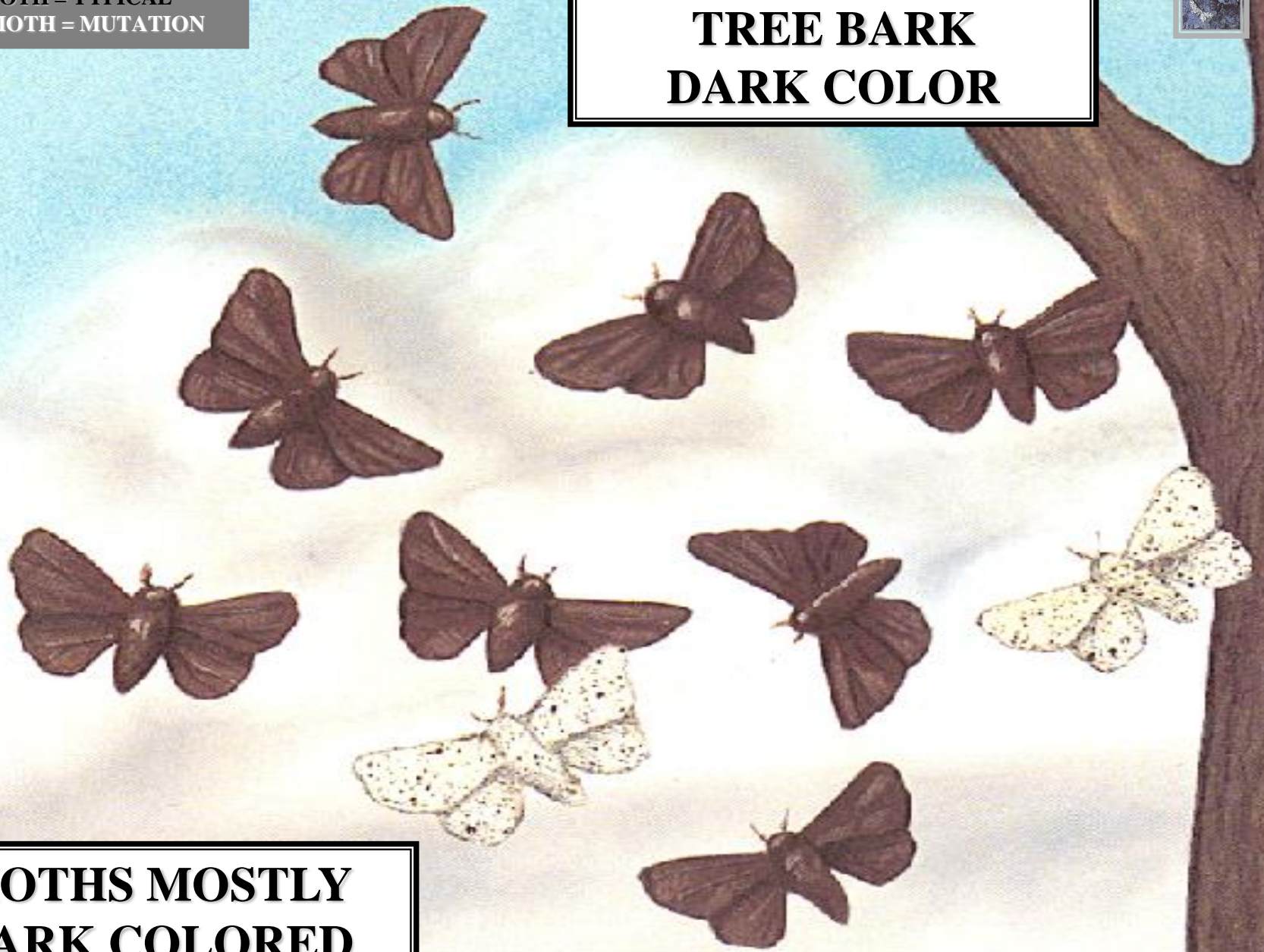
MUTATION: WHITE FLOWERED PLANTS



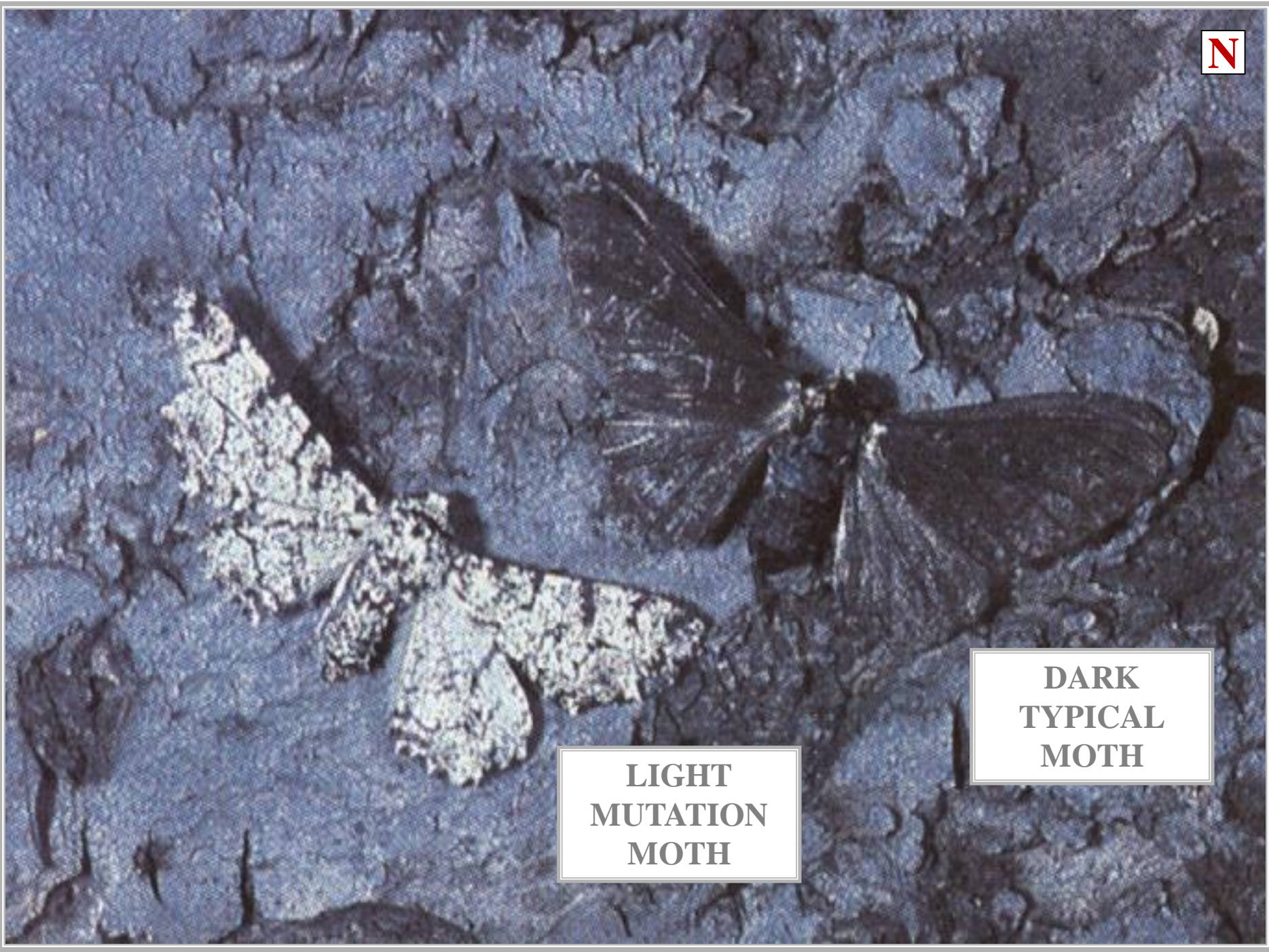
NON-BENEFICIAL MUTATIONS

DARK MOTH = TYPICAL
LIGHT MOTH = MUTATION

TREE BARK
DARK COLOR



MOTHS MOSTLY
DARK COLORED

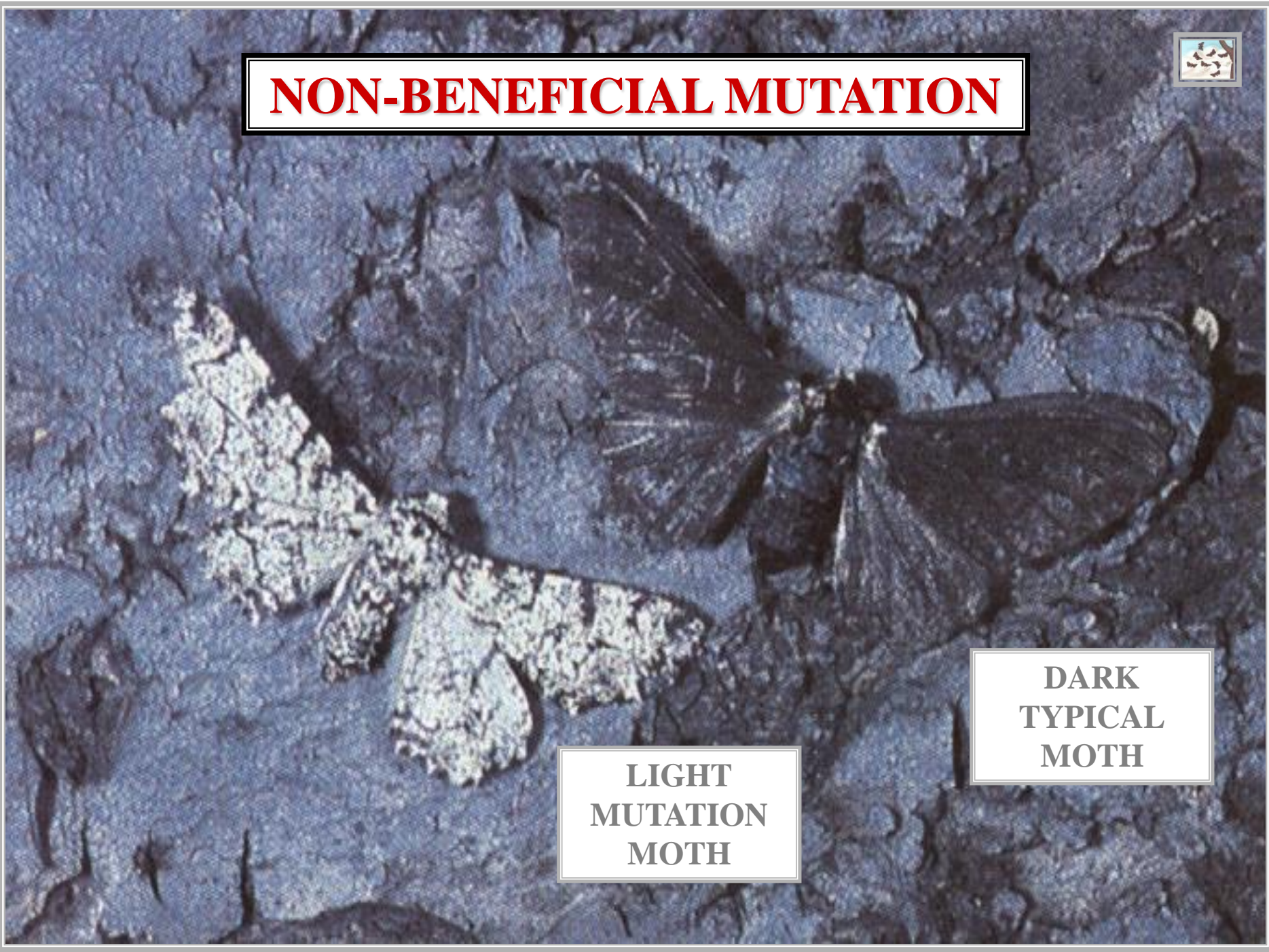


**LIGHT
MUTATION
MOTH**

**DARK
TYPICAL
MOTH**



NON-BENEFICIAL MUTATION

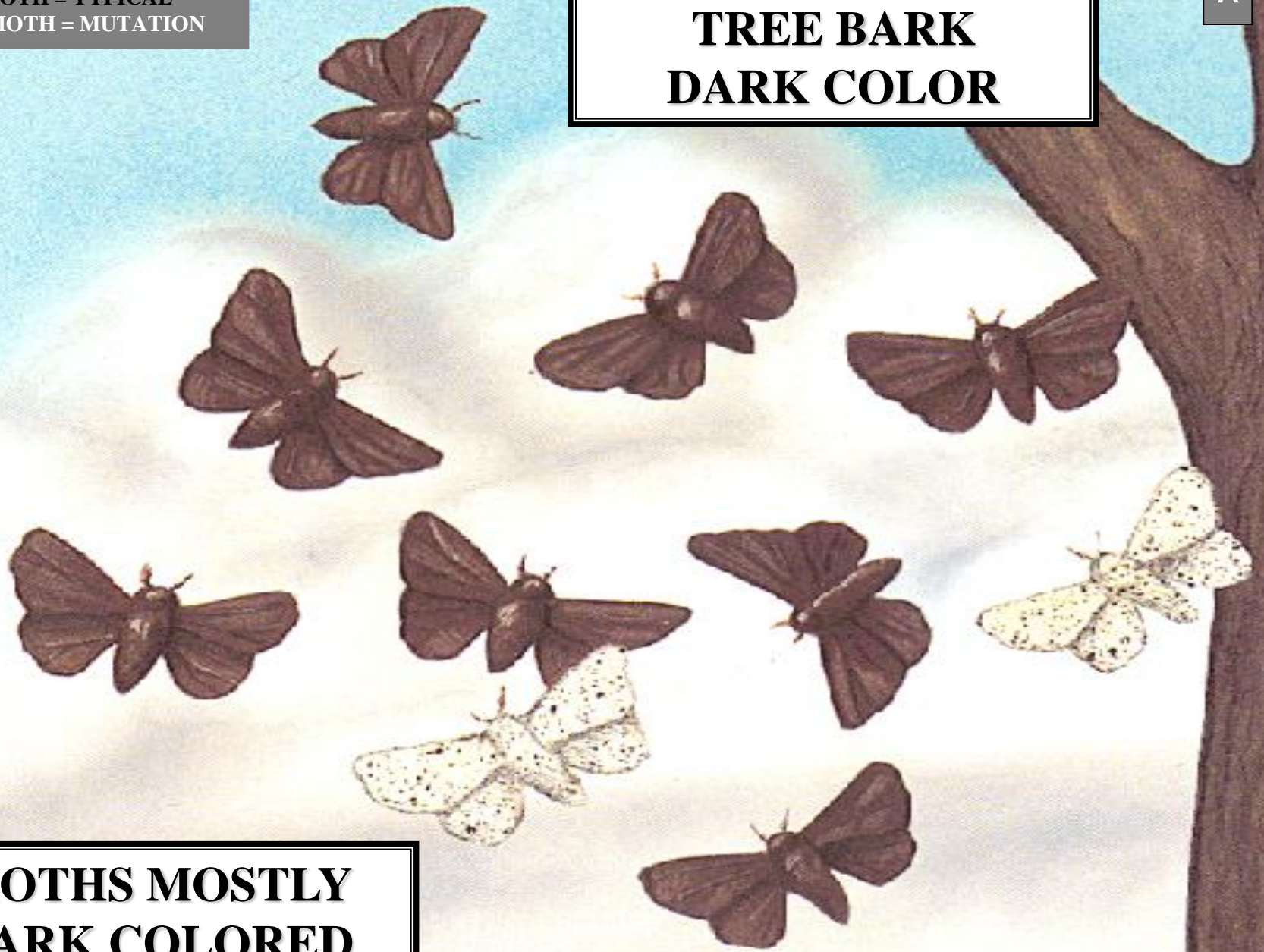


**LIGHT
MUTATION
MOTH**

**DARK
TYPICAL
MOTH**

DARK MOTH = TYPICAL
LIGHT MOTH = MUTATION

TREE BARK
DARK COLOR



MOTHS MOSTLY
DARK COLORED

BENEFICIAL MUTATIONS



TREE BARK LIGHT COLORED

DARK MOTH = TYPICAL
LIGHT MOTH = MUTATION





**DARK
TYPICAL
MOTH**



**LIGHT
MUTATION
MOTH**

BENEFICIAL MUTATION



**DARK
TYPICAL
MOTH**

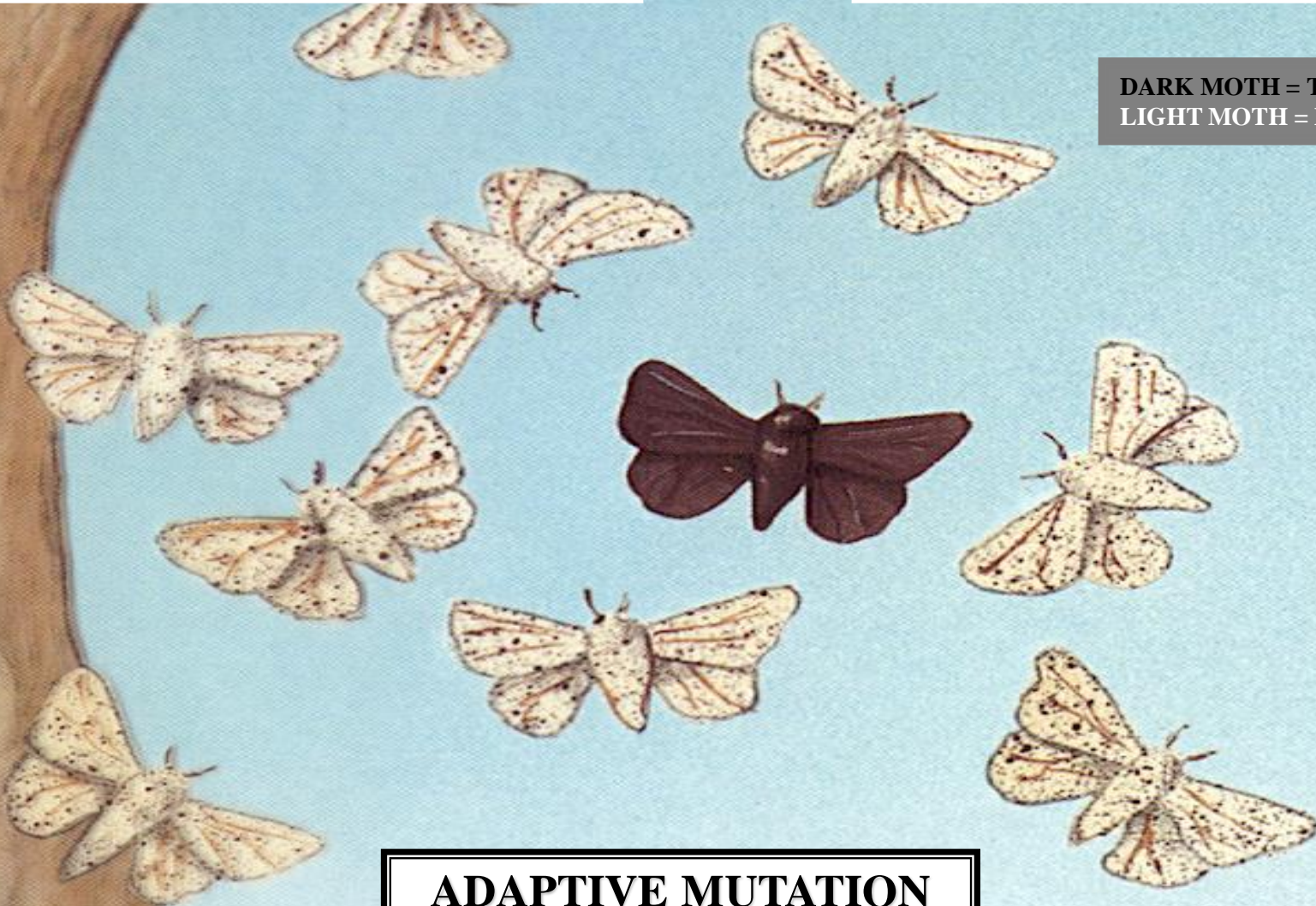
**LIGHT
MUTATION
MOTH**

**TREE BARK
LIGHT COLORED**

**MOTHS MOSTLY
LIGHT COLORED**

DARK MOTH = TYPICAL
LIGHT MOTH = MUTATION

A



ADAPTIVE MUTATION

ADAPTIVE MUTATION



ADAPTIVE MUTATION

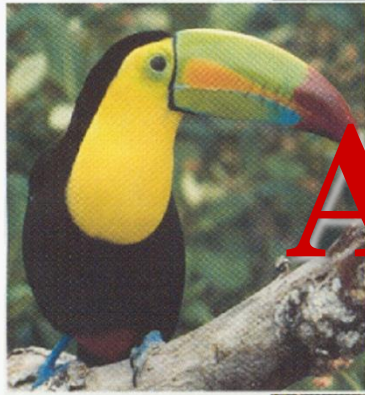
**ASSISTS ORGANISM
SURVIVAL**

ADAPTIVE MUTATION

QUESTION

WHAT DO BIOLOGISTS
CALL THE MUTATION
ENVIRONMENTAL
SURVIVAL TEST?

QUESTION



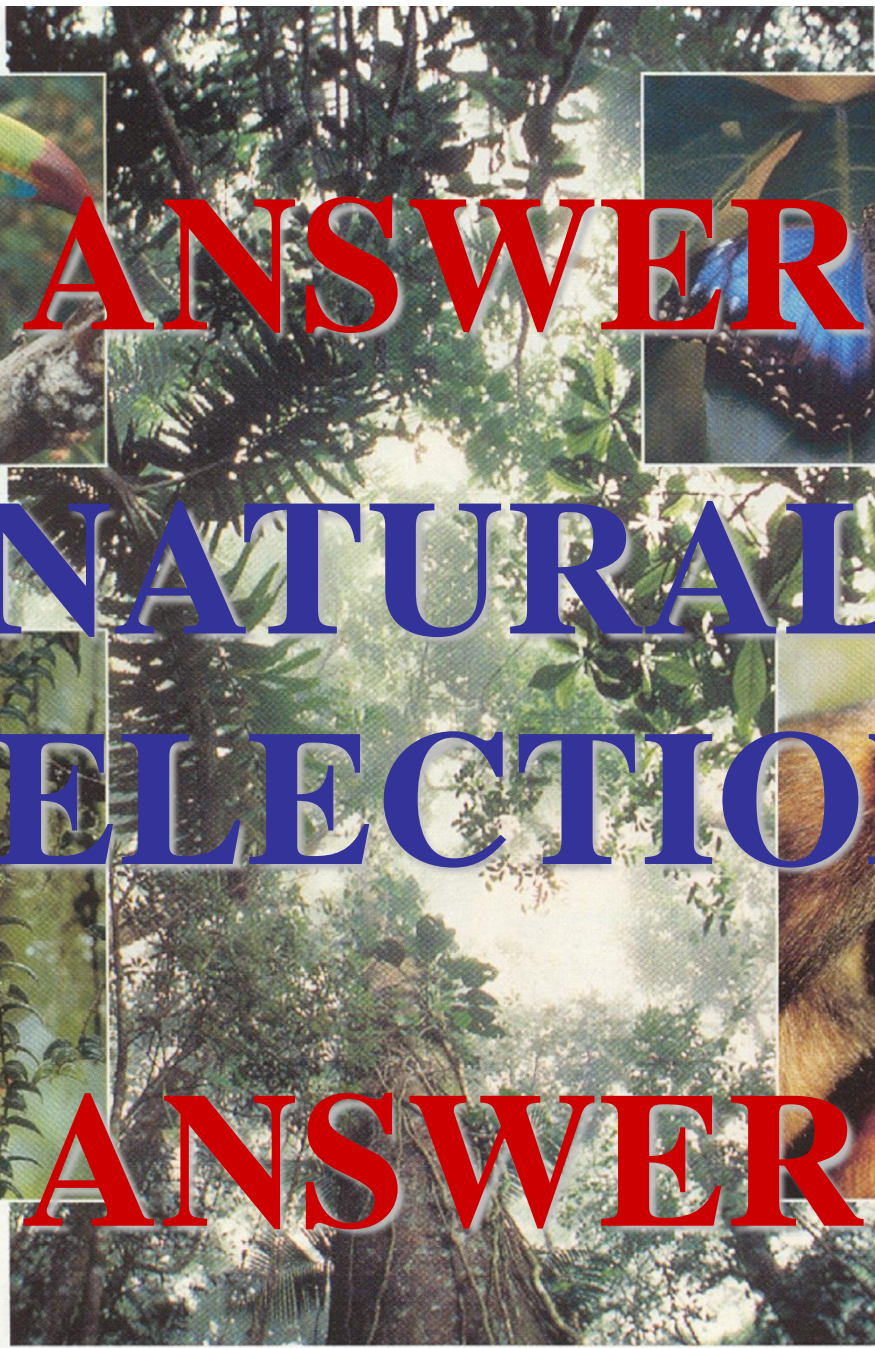
ANSWER

NATURAL

SELECTION



ANSWER



NATURAL SELECTION