!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

ATTENTION STUDENTS

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

BIOLOGY 460 / 560

PLANT PHYSIOLOGY

DR. MENAPACE

SPRING 2022

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

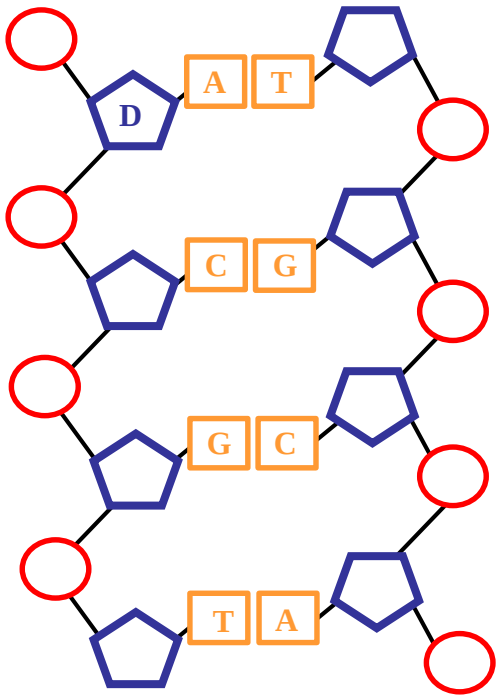
ATTENTION STUDENTS

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

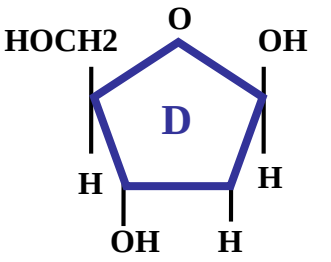
SCREEN #2
LECTURE SLIDES

NUCLEIC ACIDS

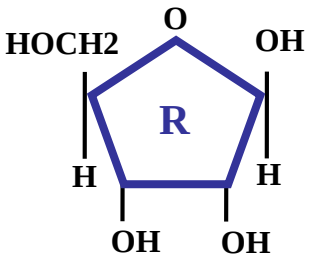
CARRIERS GENETIC INFORMATION



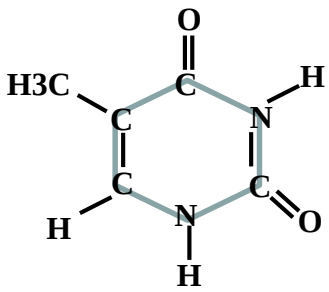
NUCLEIC ACID



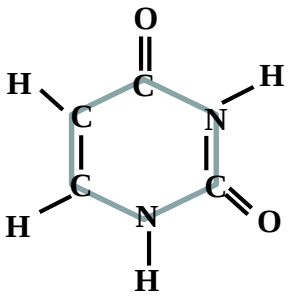
DEOXYRIBOSE



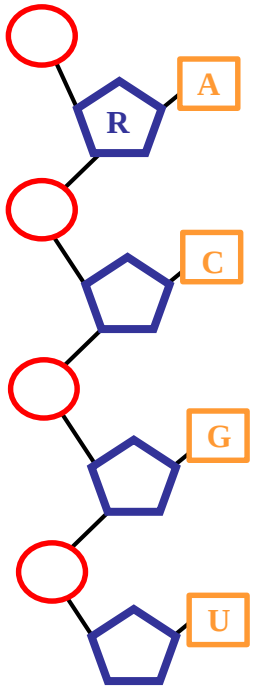
RIBOSE



THYMINE



URACIL



NUCLEIC ACID

INTRODUCTION BIOLOGY & INTRODUCTION BOTANY

B

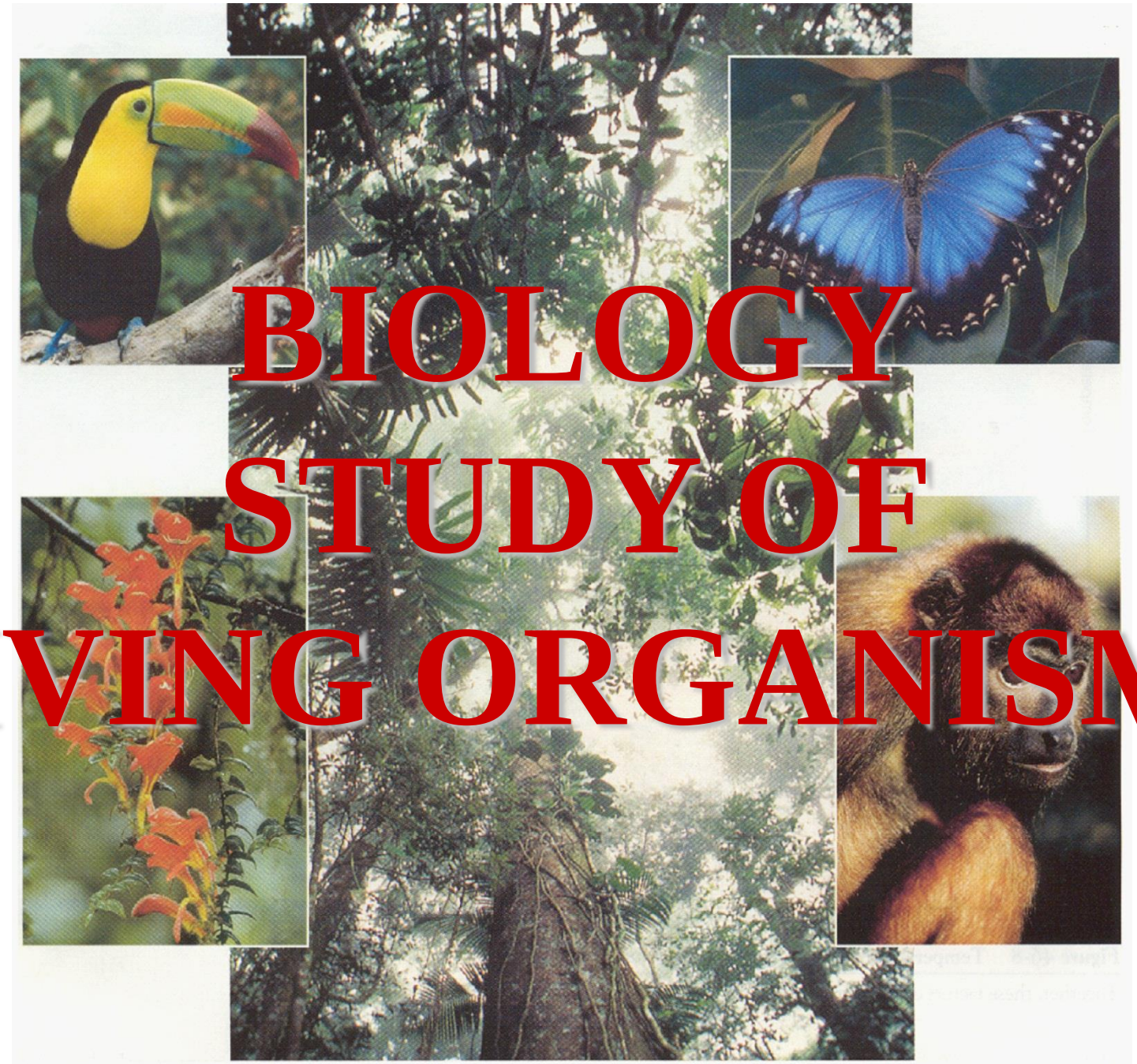
INTRODUCTION BIOLOGY

BIOLOGY

BIOLOGY

STUDY OF LIVING ORGANISMS

BIOLOGY



BIOLOGY
STUDY OF
LIVING ORGANISMS

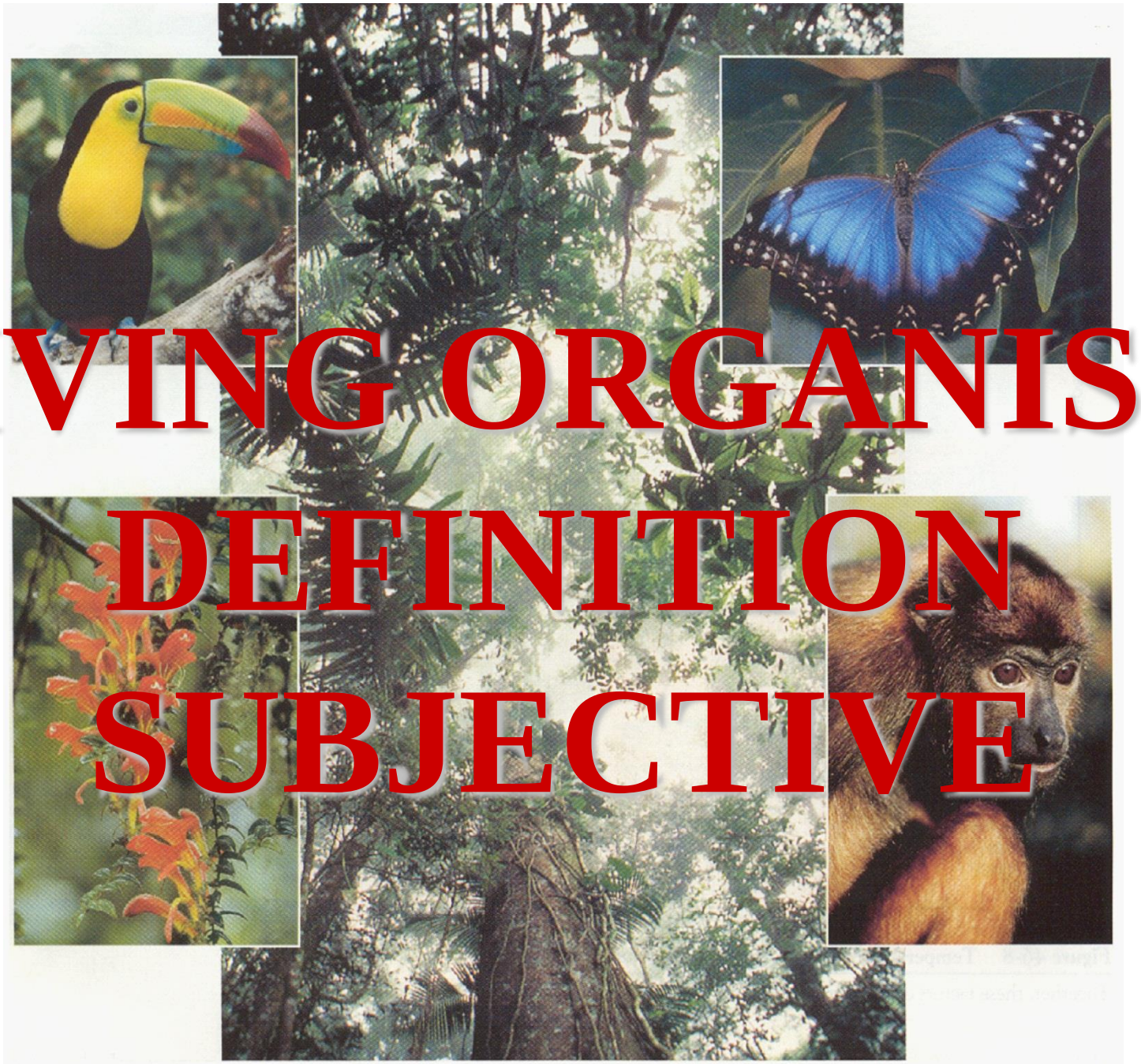
LIVING ORGANISM DEFINITION

LIVING ORGANISM

NO

COMMON DEFINITION

AMONGST BIOLOGISTS



LIVING ORGANISM

DEFINITION

SUBJECTIVE

L

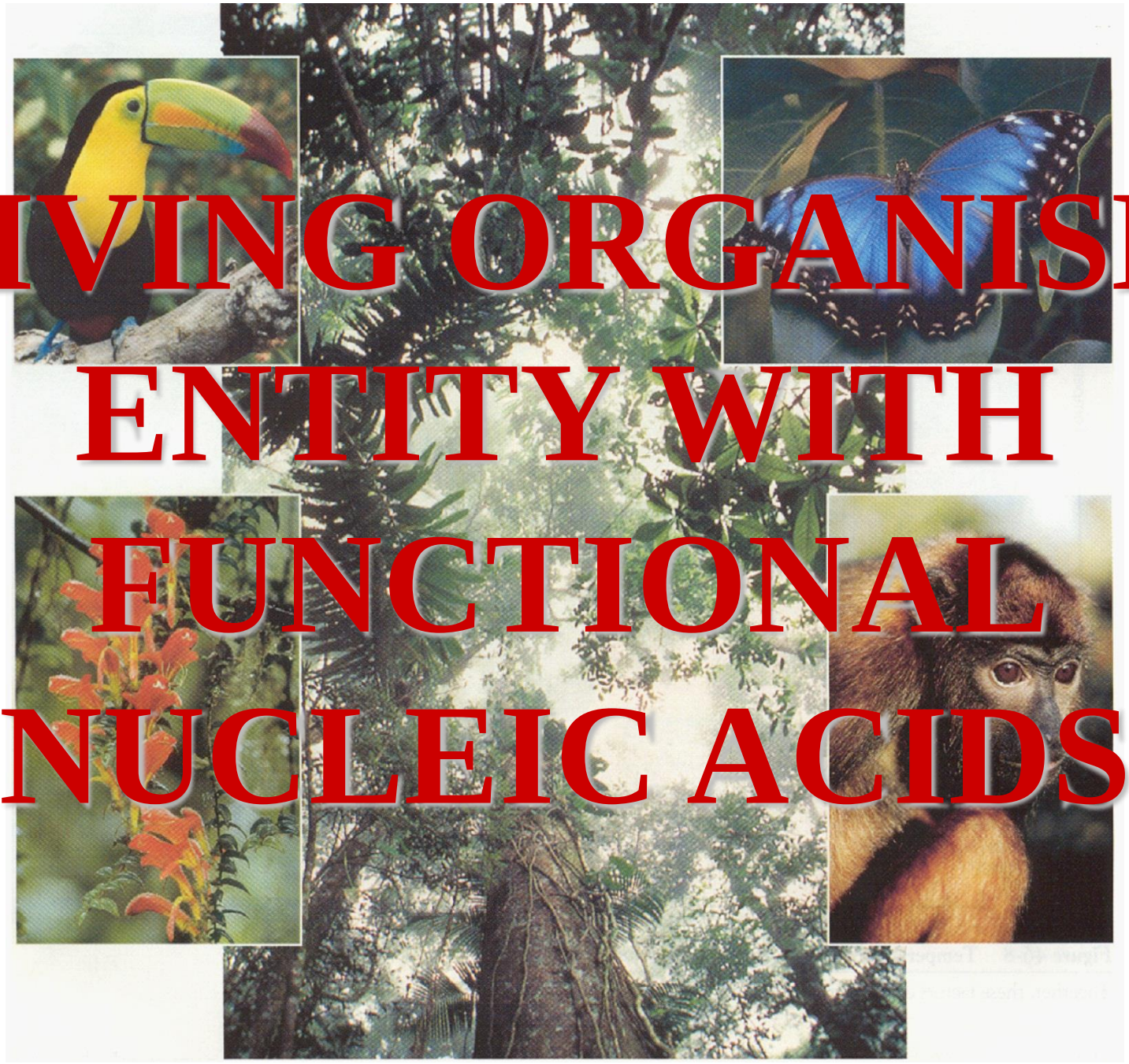
LIVING ORGANISM CLASS DEFINITION

LIVING ORGANISM

LIVING ORGANISM

ENTITY WITH FUNCTIONAL NUCLEIC ACIDS

LIVING ORGANISM



LIVING ORGANISM

ENTITY WITH

FUNCTIONAL

NUCLEIC ACIDS

FUNCTIONAL NUCLEIC ACIDS

NUCLEIC ACIDS

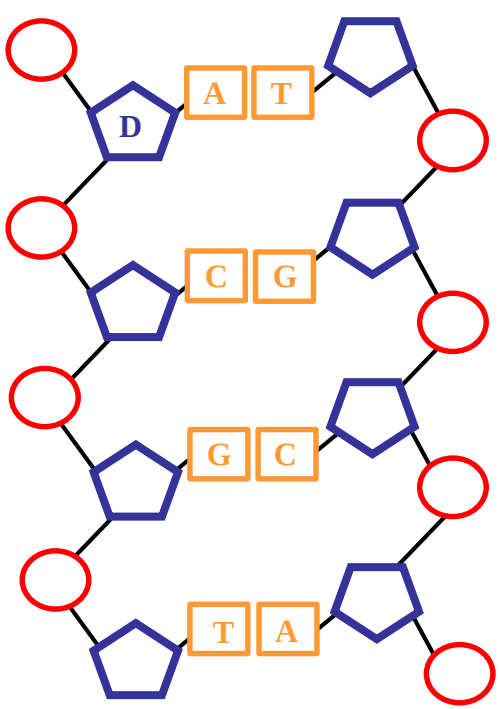
NUCLEIC ACIDS

CARRIERS GENETIC INFORMATION

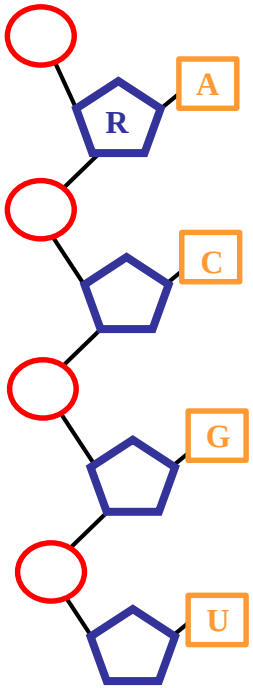
NUCLEIC ACIDS

NUCLEIC ACIDS

CARRIERS GENETIC INFORMATION



NUCLEIC ACID



NUCLEIC ACID

NUCLEIC ACID TYPES

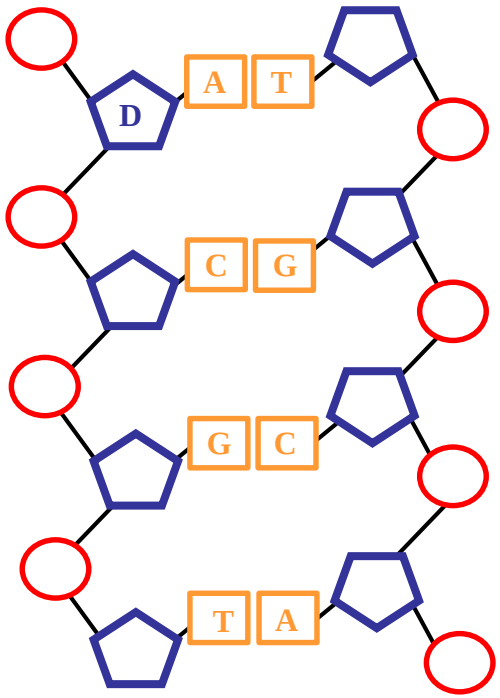
NUCLEIC ACIDS

L D

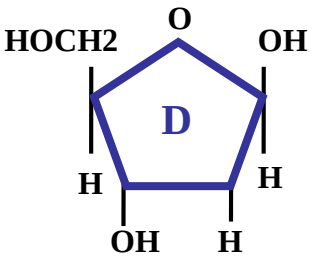
?

CARRIERS GENETIC INFORMATION

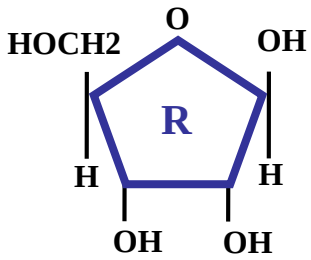
?



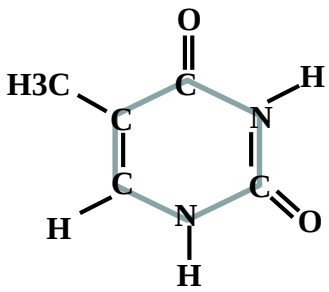
NUCLEIC ACID



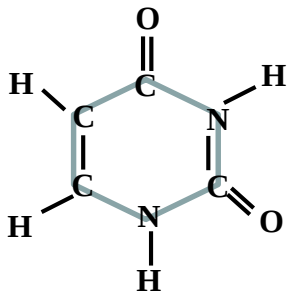
DEOXYRIBOSE



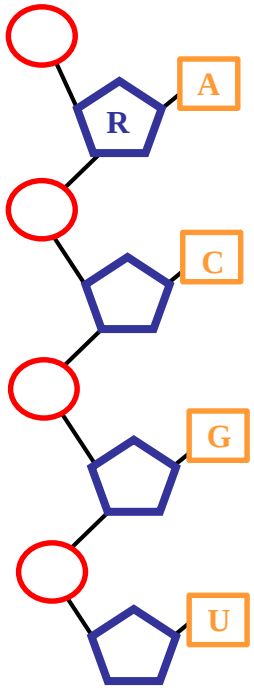
RIBOSE



THYMINE



URACIL



NUCLEIC ACID

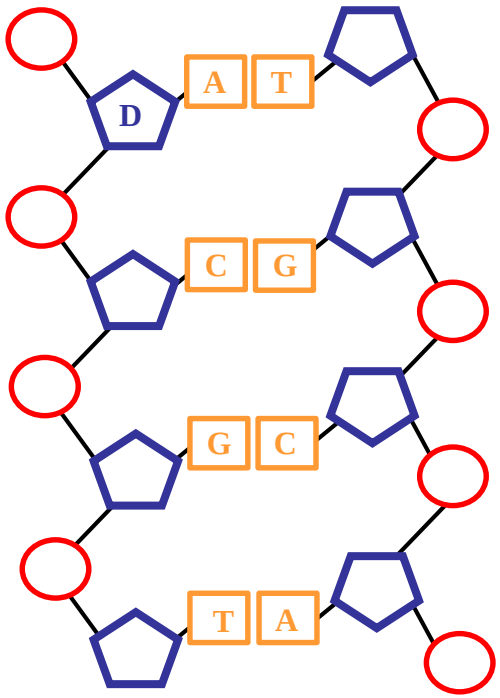
NUCLEIC ACIDS

R

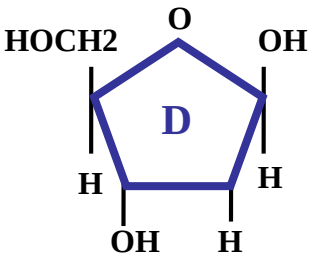
DNA

CARRIERS GENETIC INFORMATION

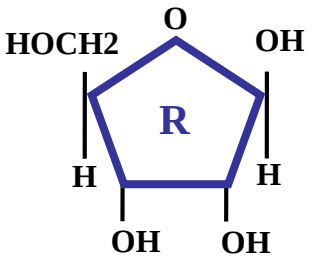
?



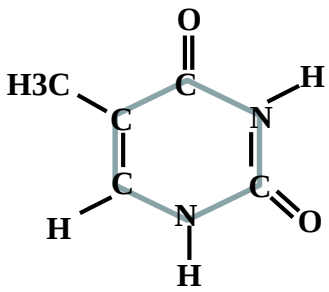
NUCLEIC ACID



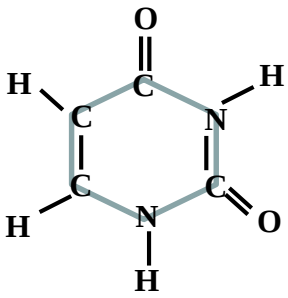
DEOXYRIBOSE



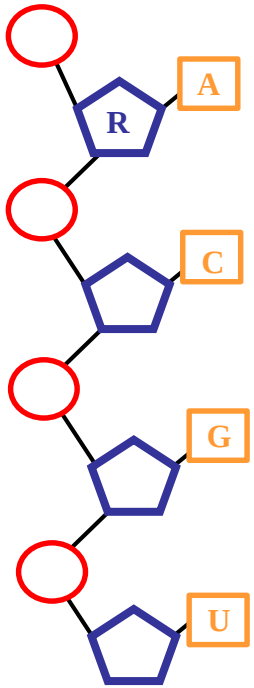
RIBOSE



THYMINE



URACIL



NUCLEIC ACID

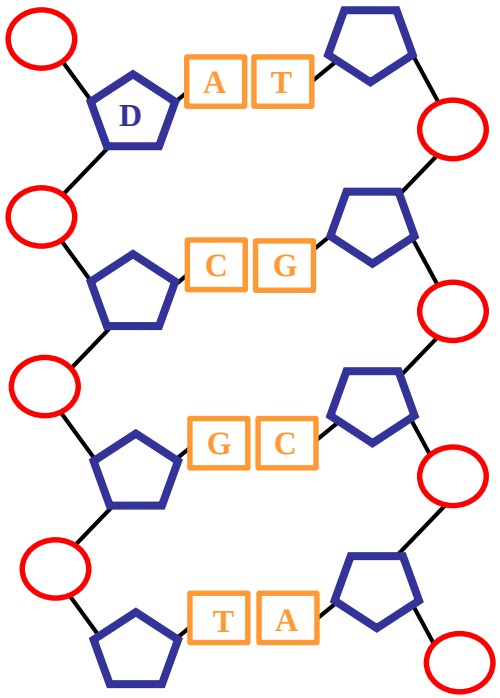
NUCLEIC ACIDS

+ D

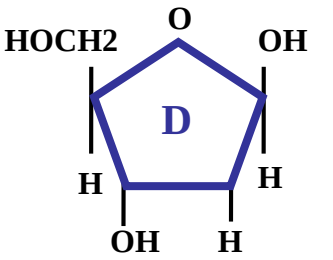
DNA

CARRIERS GENETIC INFORMATION

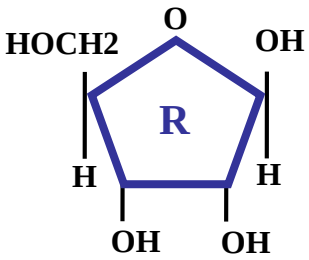
RNA



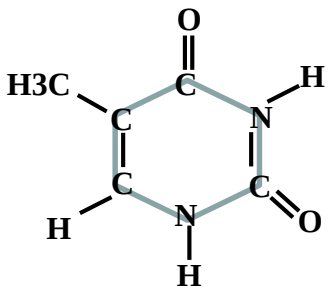
NUCLEIC ACID



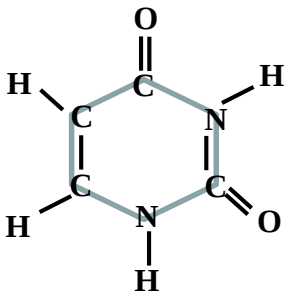
DEOXYRIBOSE



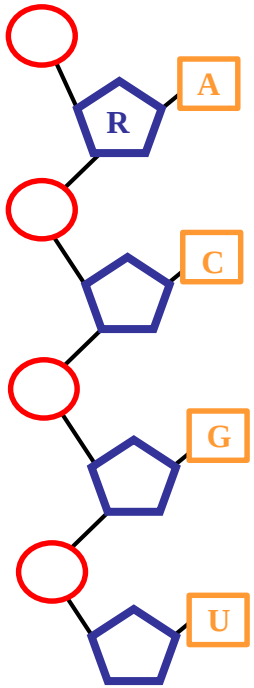
RIBOSE



THYMINE



URACIL



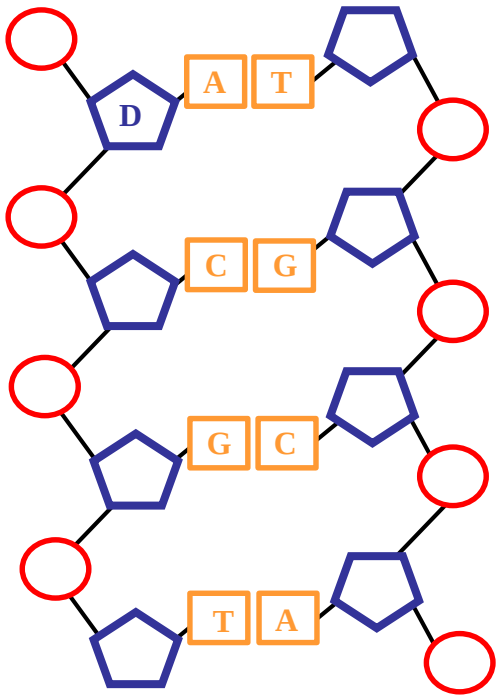
NUCLEIC ACID

NUCLEIC ACIDS

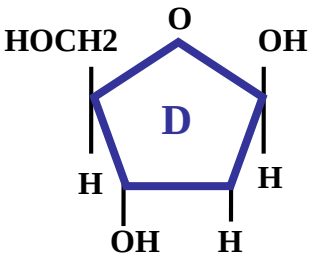
+ R

DEOXYRIBONUCLEIC ACID

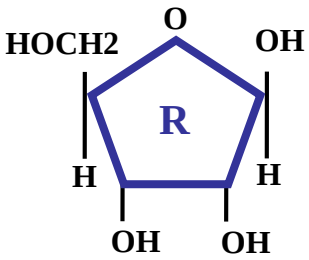
RNA



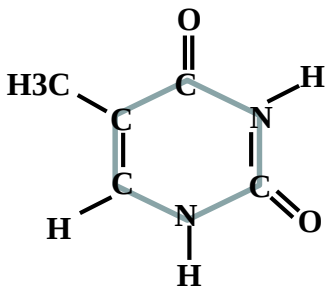
NUCLEIC ACID



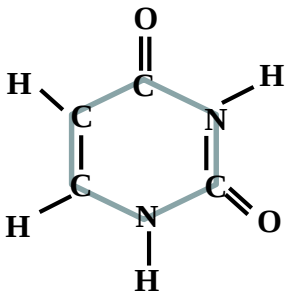
DEOXYRIBOSE



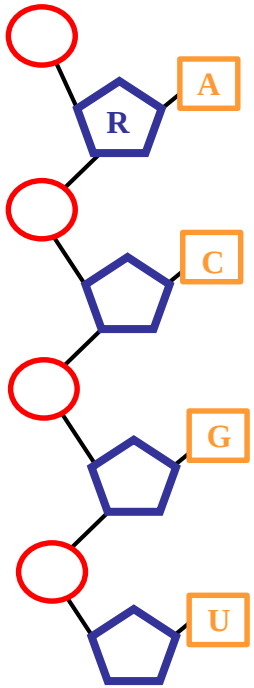
RIBOSE



THYMINE



URACIL



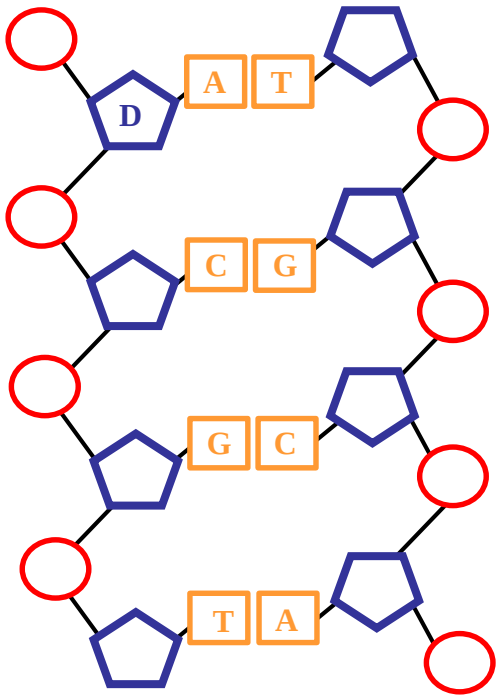
NUCLEIC ACID

NUCLEIC ACIDS

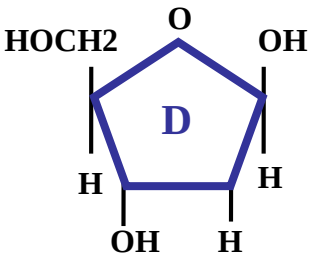
+ S

DNA

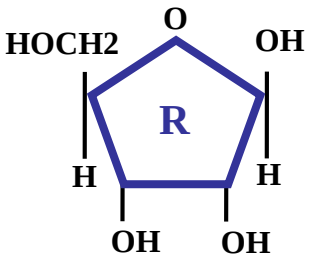
RIBONUCLEIC ACID



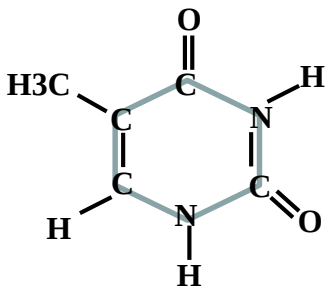
NUCLEIC ACID



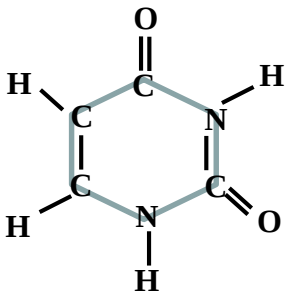
DEOXYRIBOSE



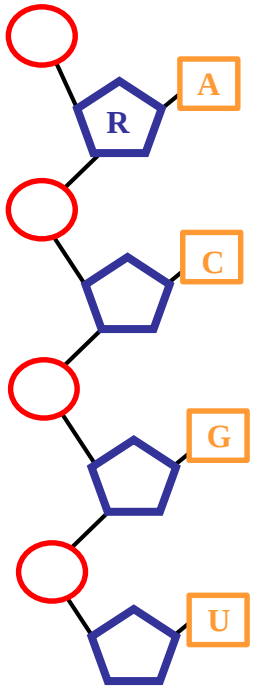
RIBOSE



THYMINE



URACIL



NUCLEIC ACID

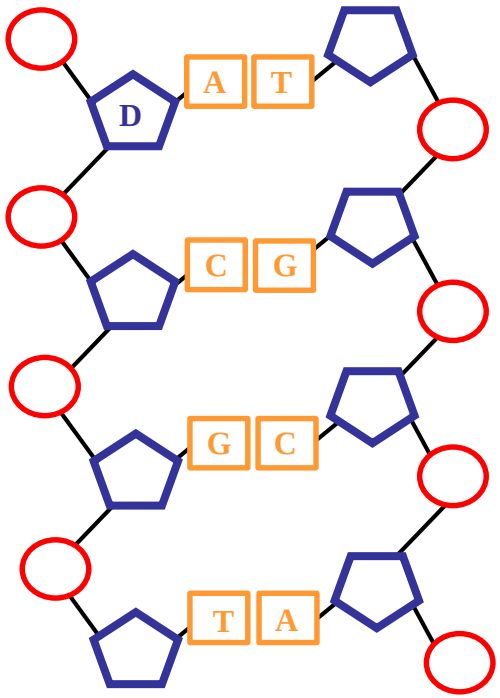
NUCLEIC ACIDS

D

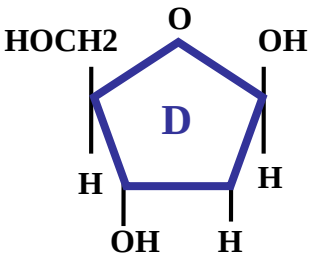
DNA

CARRIERS GENETIC INFORMATION

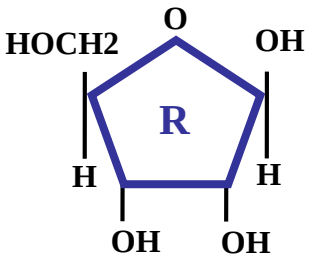
RNA



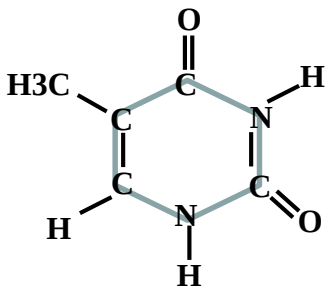
NUCLEIC ACID



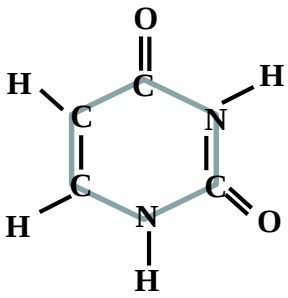
DEOXYRIBOSE



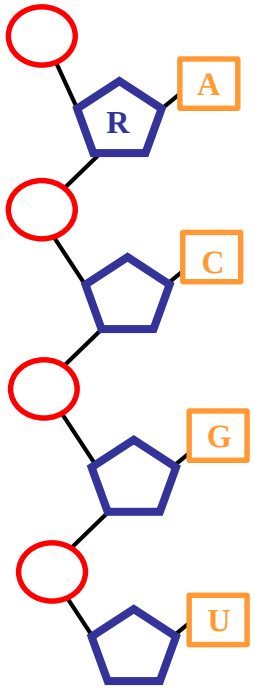
RIBOSE



THYMINE

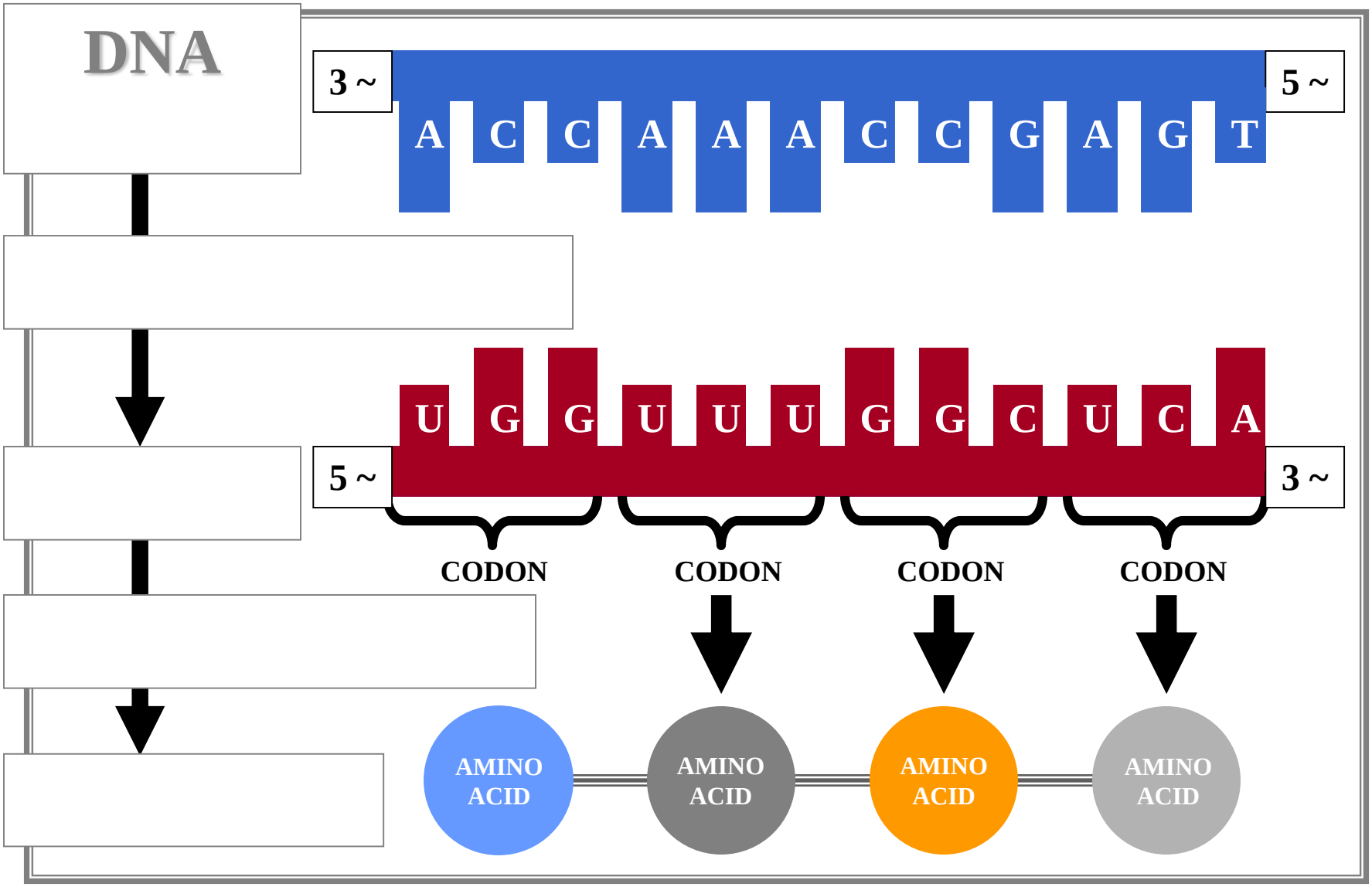


URACIL

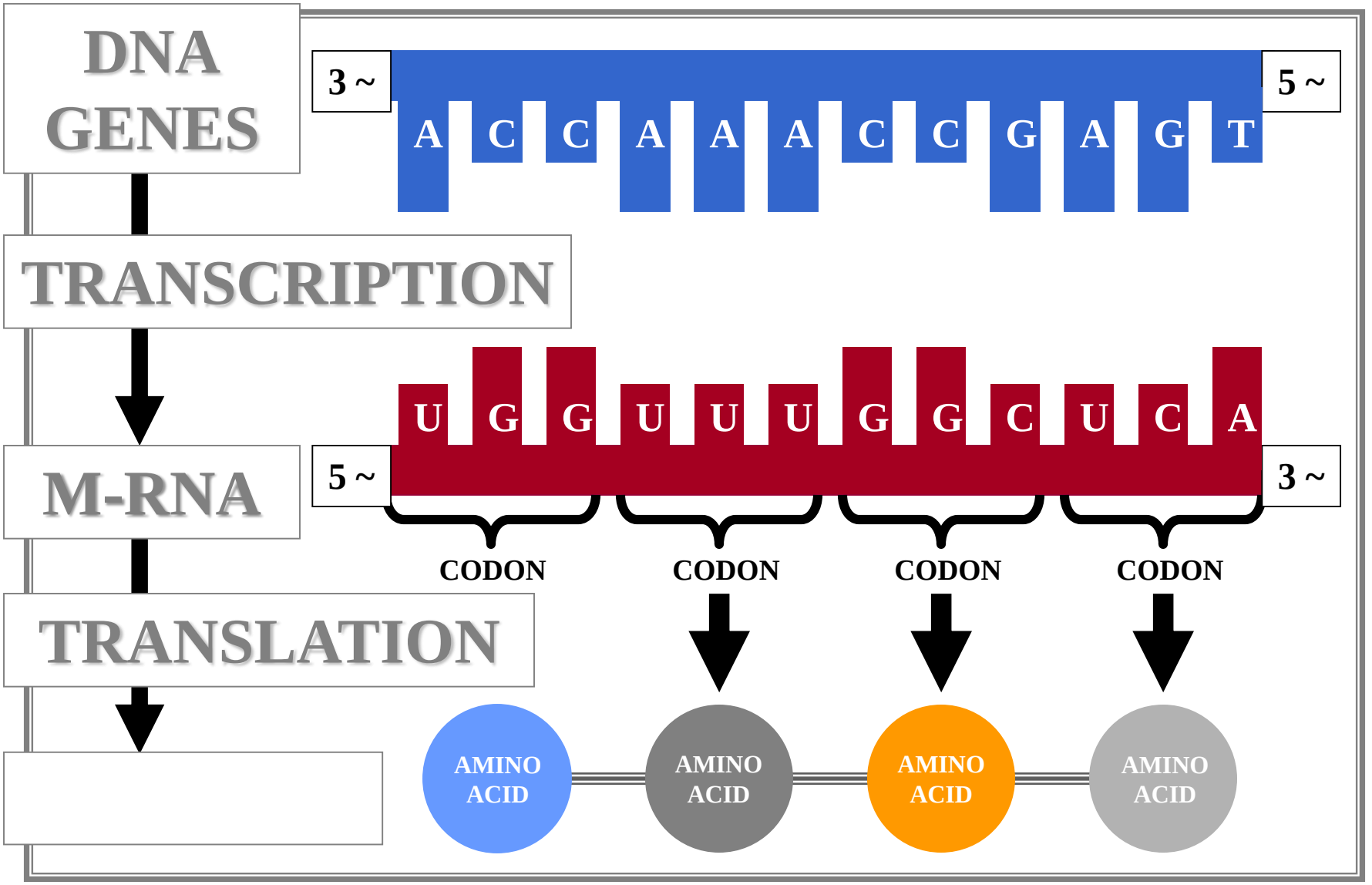


NUCLEIC ACID

PROTEIN SYNTHESIS

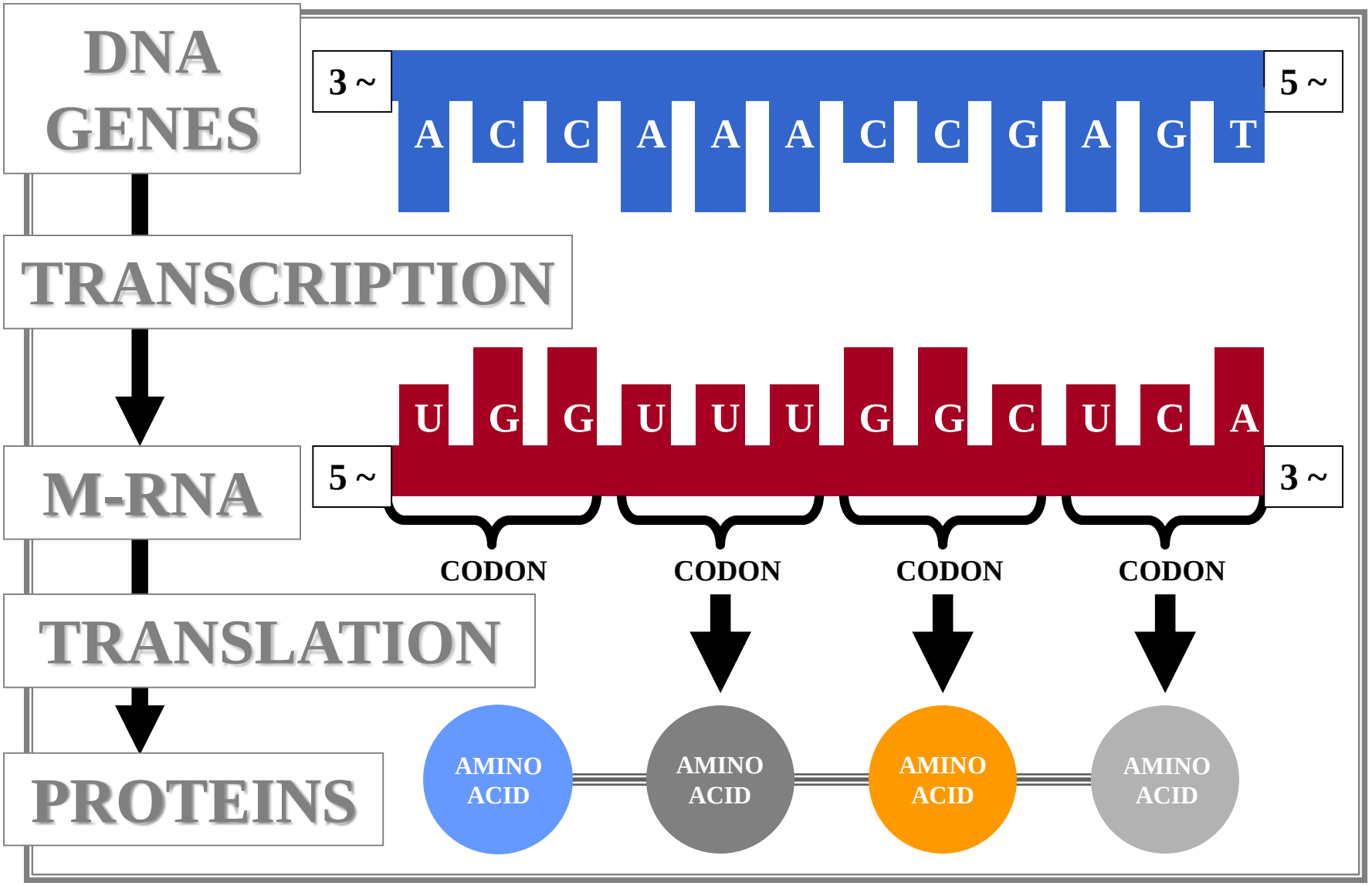


PROTEIN SYNTHESIS



C

PROTEIN SYNTHESIS



PROTEIN SYNTHESIS

DNA
GENES

3 ~ A C C A A A C C G A G T 5 ~

TRANSCRIPTION

M-RNA

5 ~ U G G U U U G G C U C A 3 ~

TRANSLATION



PROTEINS → CHARACTER TRAITS

PROTEIN SYNTHESIS

DNA
GENES

3 ~ A C C A A A C C G A G T 5 ~

TRANSCRIPTION

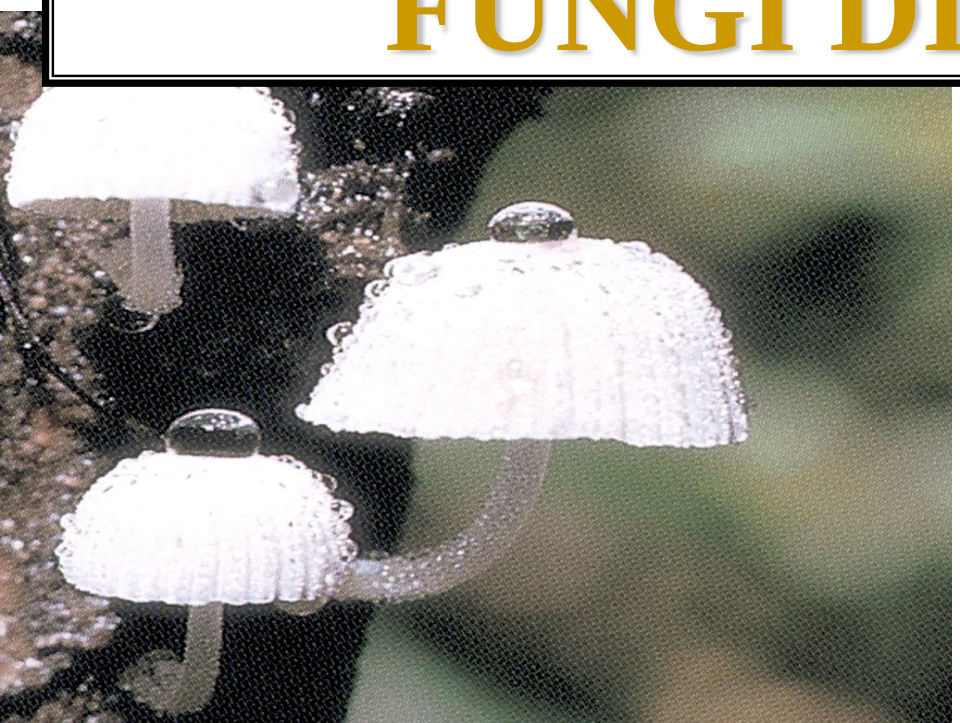
M-RNA

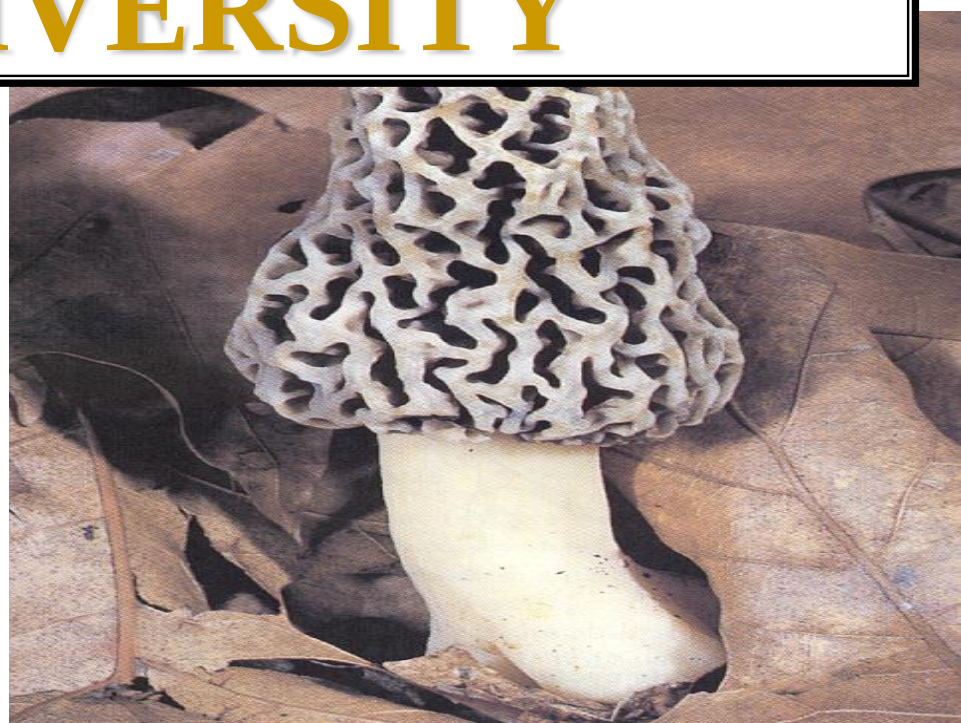
5 ~ U G G U U U G G C U C A 3 ~

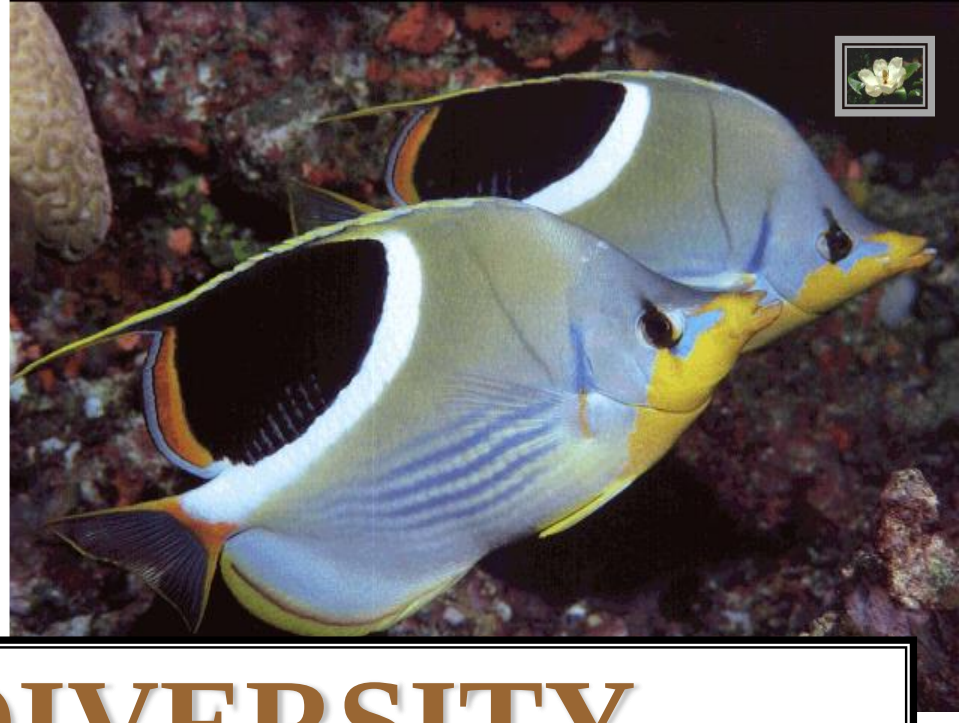
TRANSLATION

PROTEINS → ORGANISM

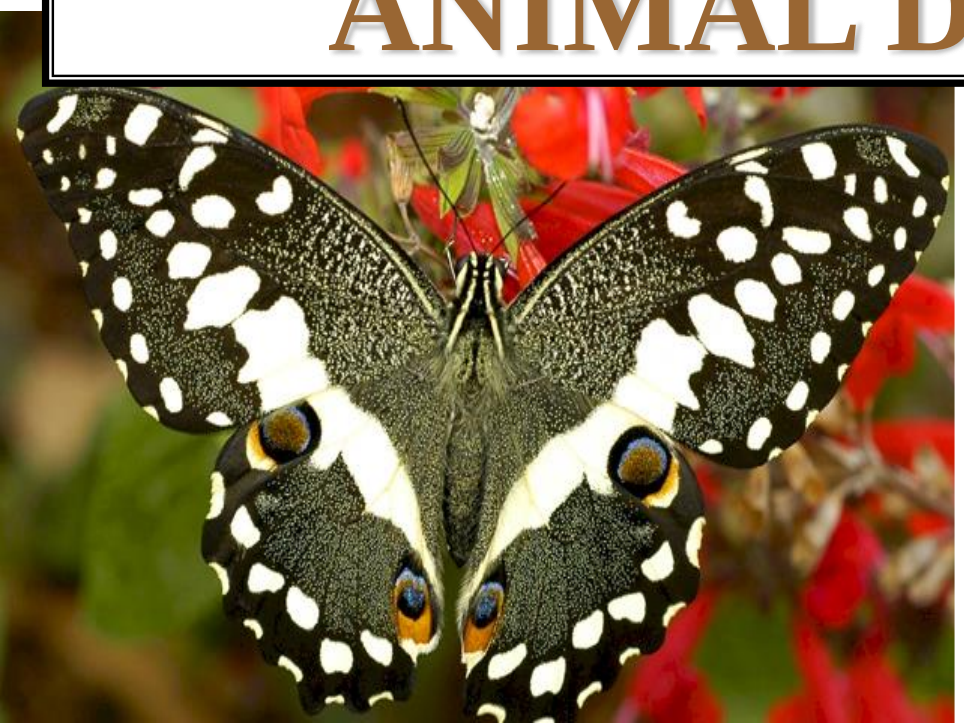
FUNGI DIVERSITY

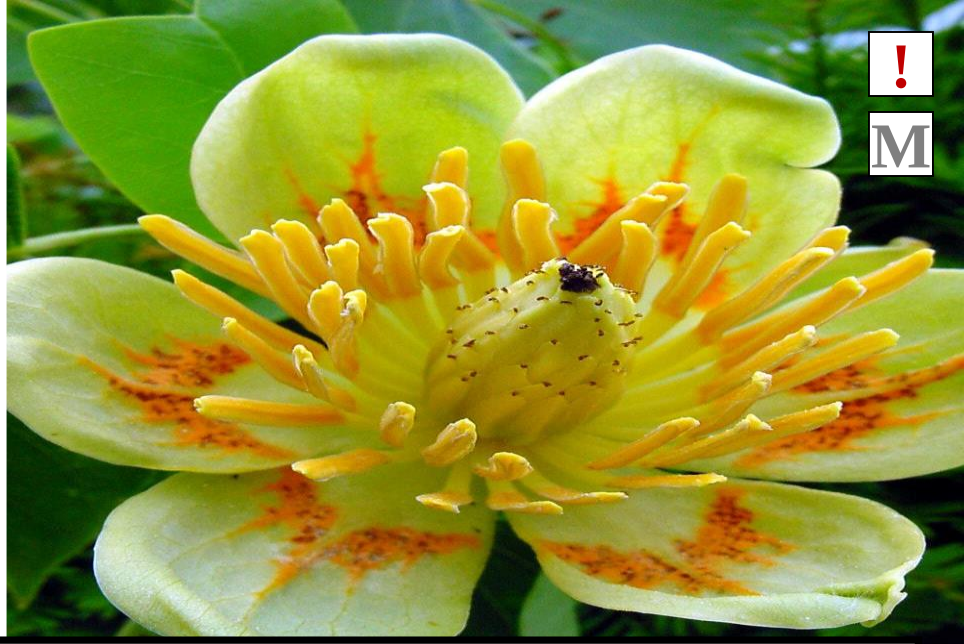






ANIMAL DIVERSITY

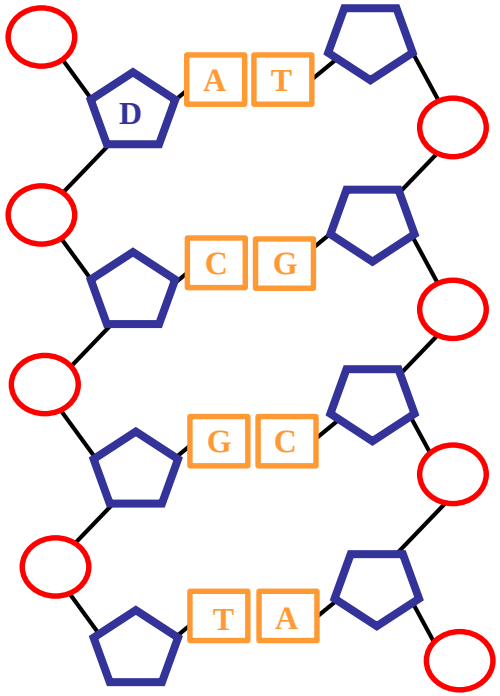




PLANT DIVERSITY

NUCLEIC ACIDS

DNA



DNA UNDERGOES MUTATIONAL CHANGES

MUTATION

MUTATION

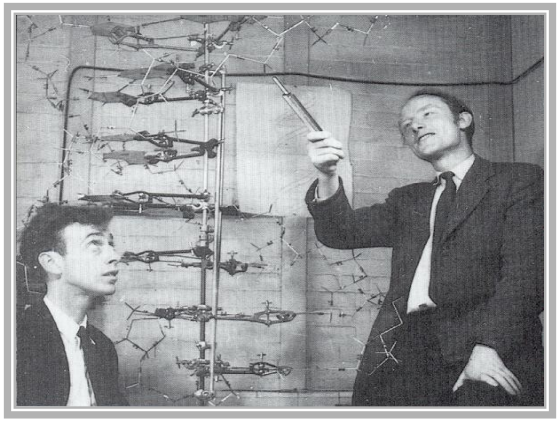
MUTATION

DNA
STRUCTURAL
CHANGE

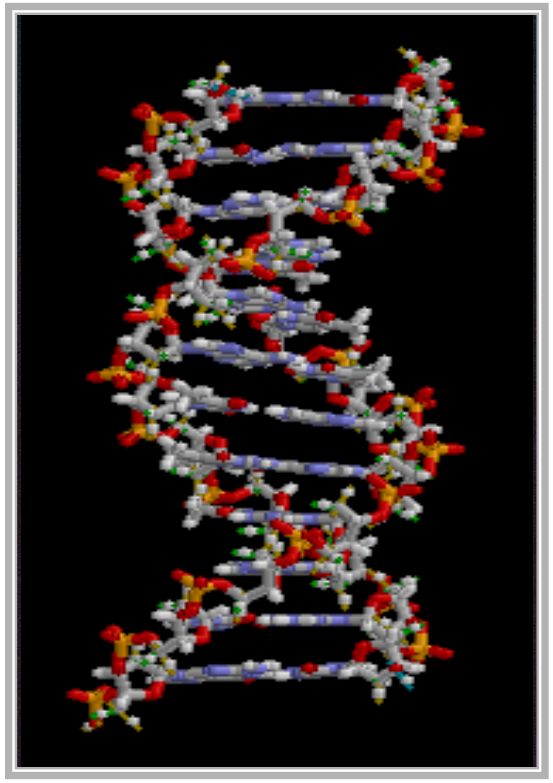
MUTATION

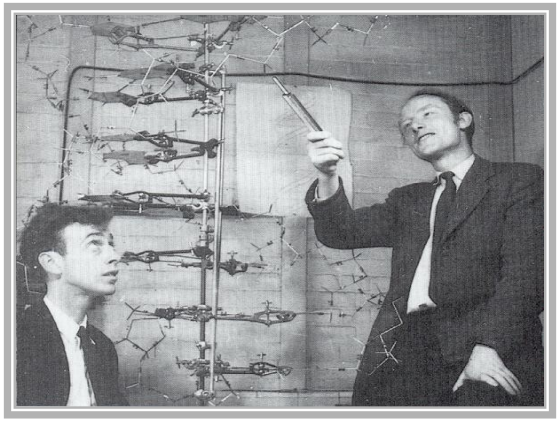
DNA
DEOXYRIBONUCLEIC ACID

D



JAMES WATSON
&
FRANCIS CRICK



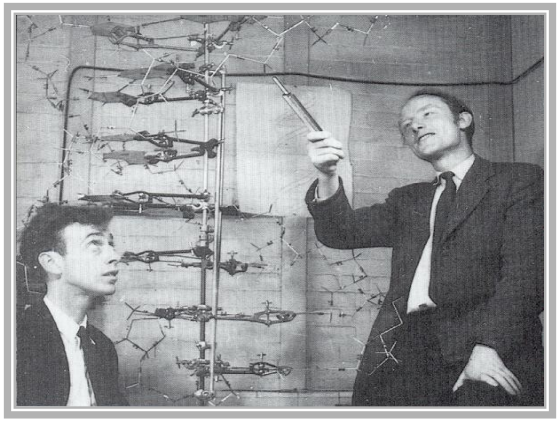


JAMES WATSON
&
FRANCIS CRICK

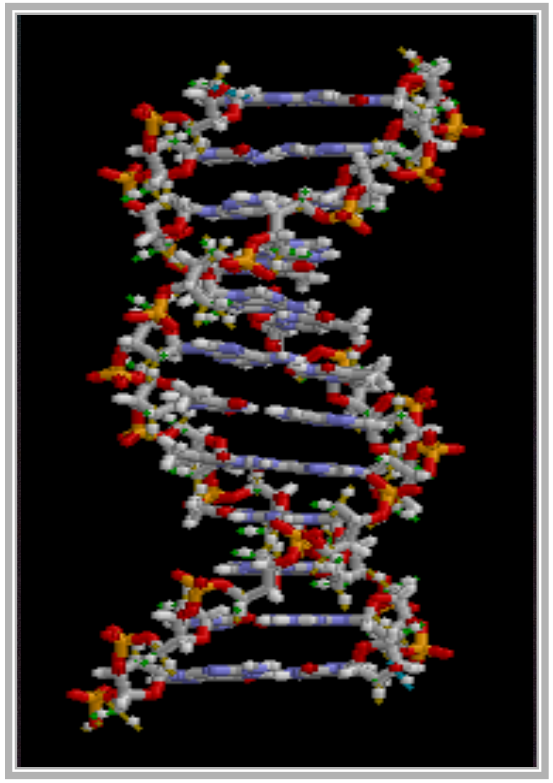
?

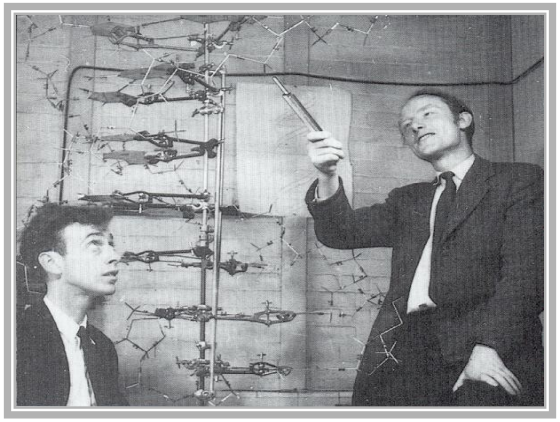
DNA
DEOXYRIBONUCLEIC ACID

P



JAMES WATSON
&
FRANCIS CRICK



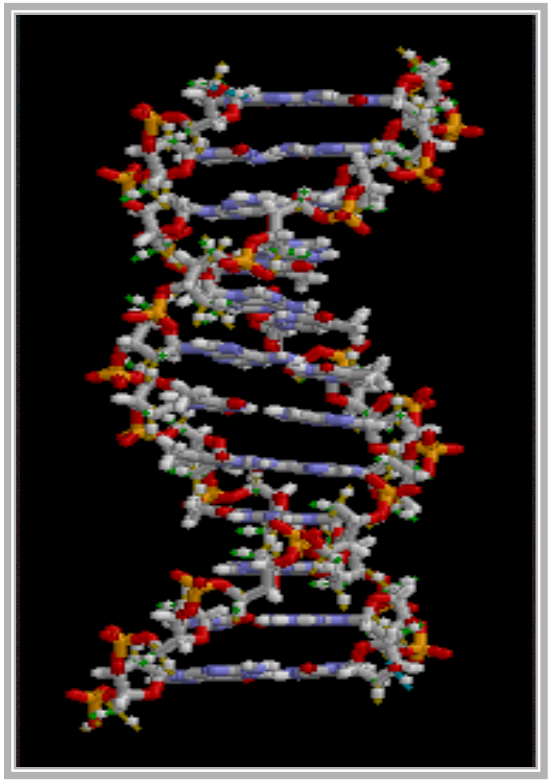


JAMES WATSON
&
FRANCIS CRICK

DOUBLE HELIX MODEL

DNA
DEOXYRIBONUCLEIC ACID

DOUBLE HELIX MODEL



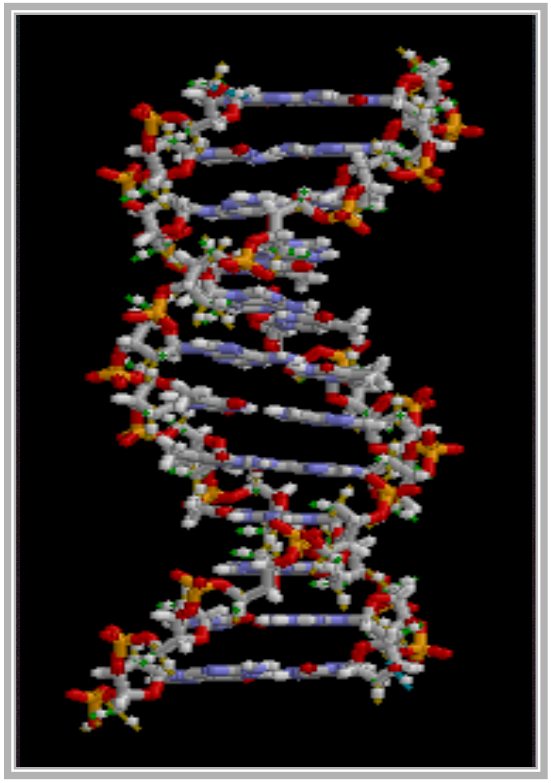
DOUBLE HELIX MODEL

POLYMER

DNA
DEOXYRIBONUCLEIC ACID

N

DOUBLE HELIX MODEL



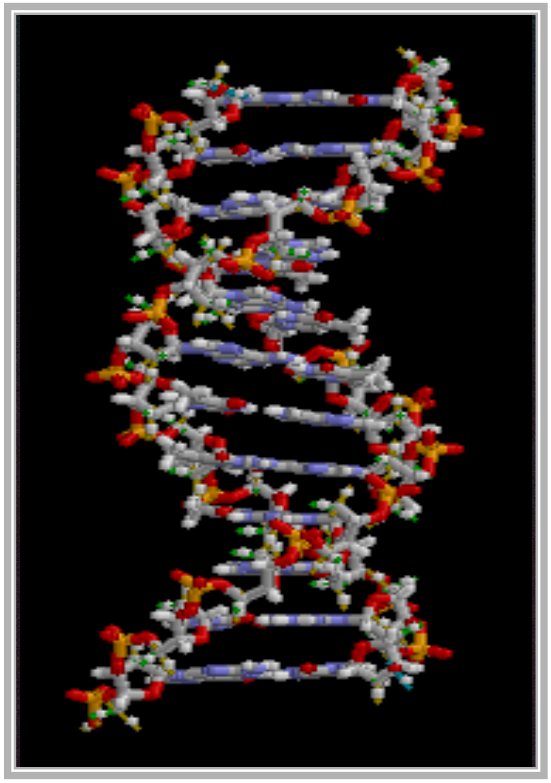
DOUBLE HELIX MODEL

MONOMERS

DNA
DEOXYRIBONUCLEIC ACID

A

DOUBLE HELIX MODEL

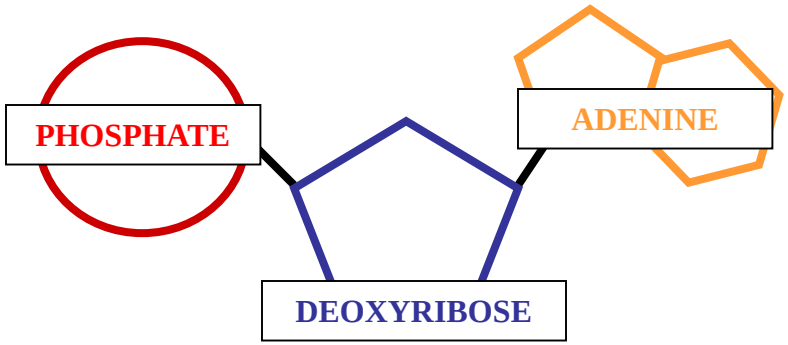


DOUBLE HELIX MODEL

NUCLEOTIDES

DNA NUCLEOTIDE MONOMERS

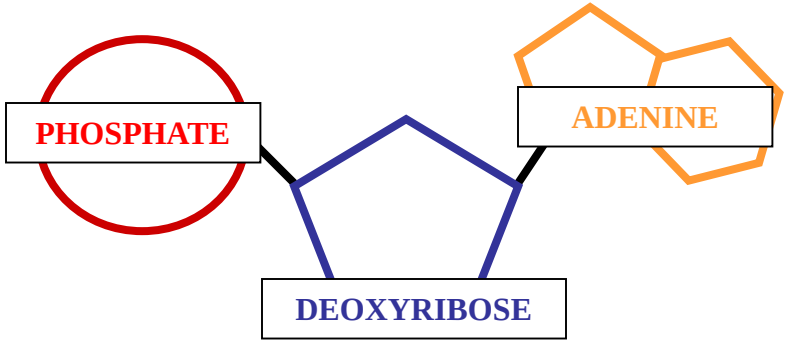
G



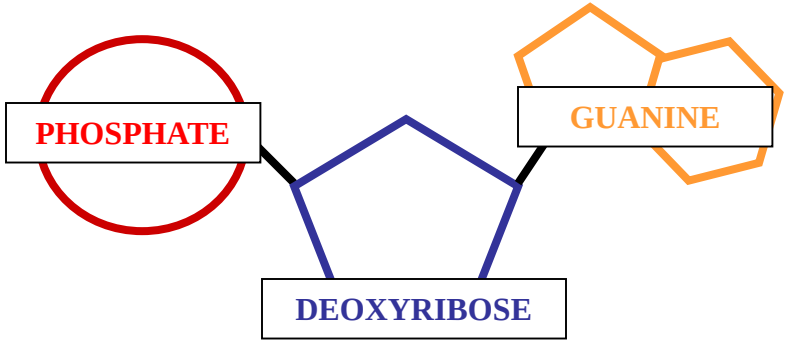
ADENINE

DNA NUCLEOTIDE MONOMERS

T



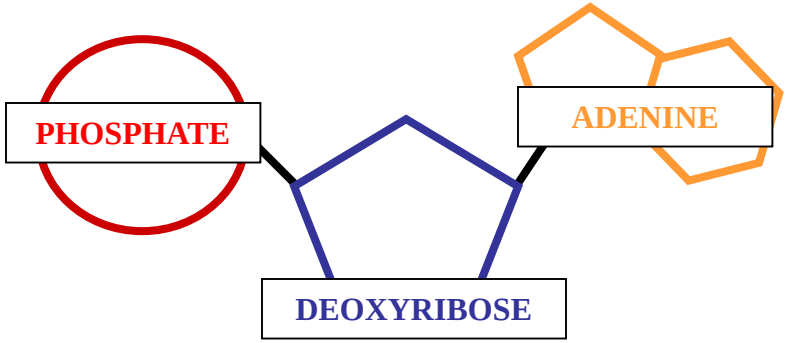
ADENINE



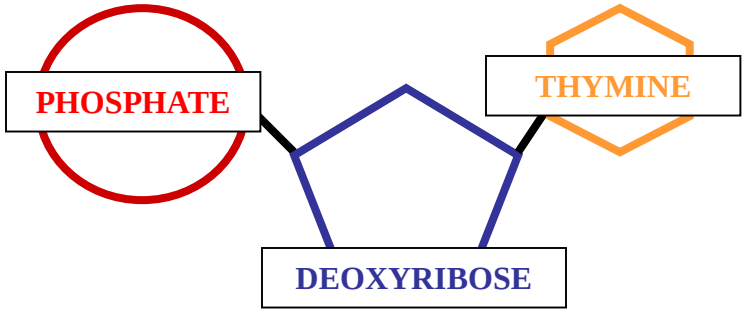
GUANINE

DNA NUCLEOTIDE MONOMERS

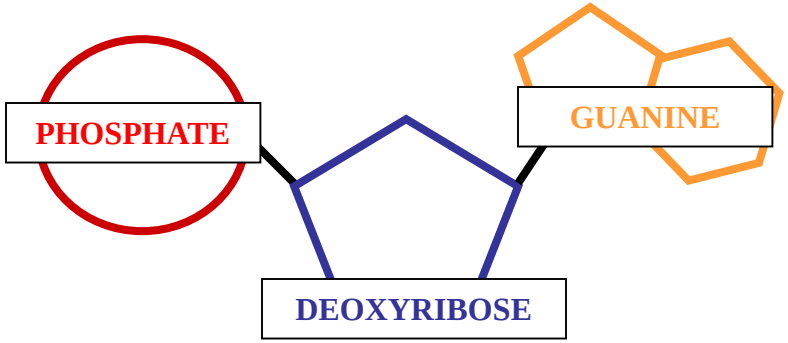
C



ADENINE



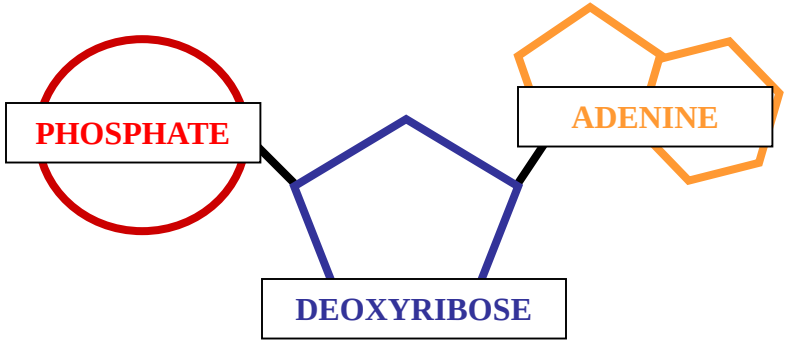
THYMINE



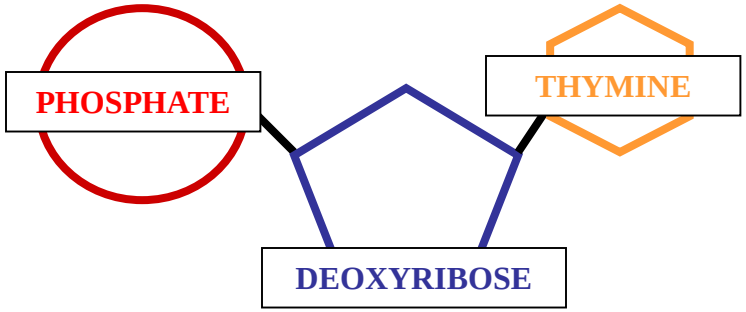
GUANINE

DNA NUCLEOTIDE MONOMERS

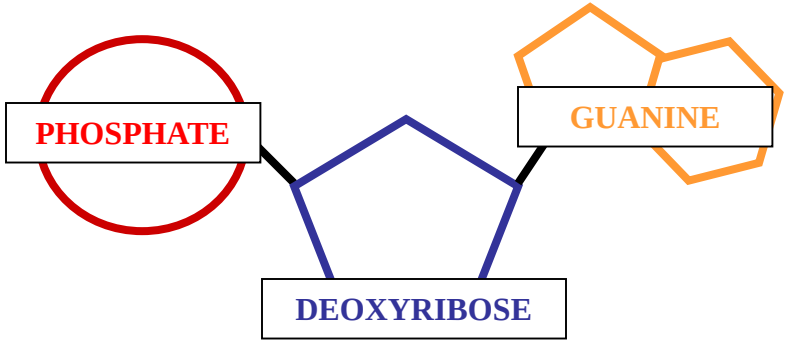
A-T



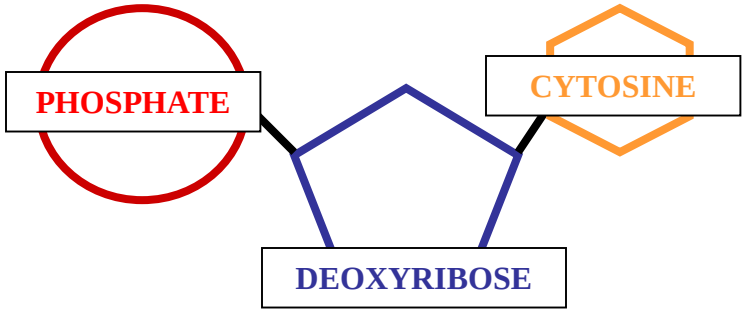
ADENINE



THYMINE

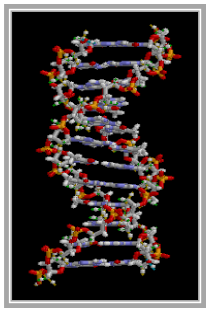


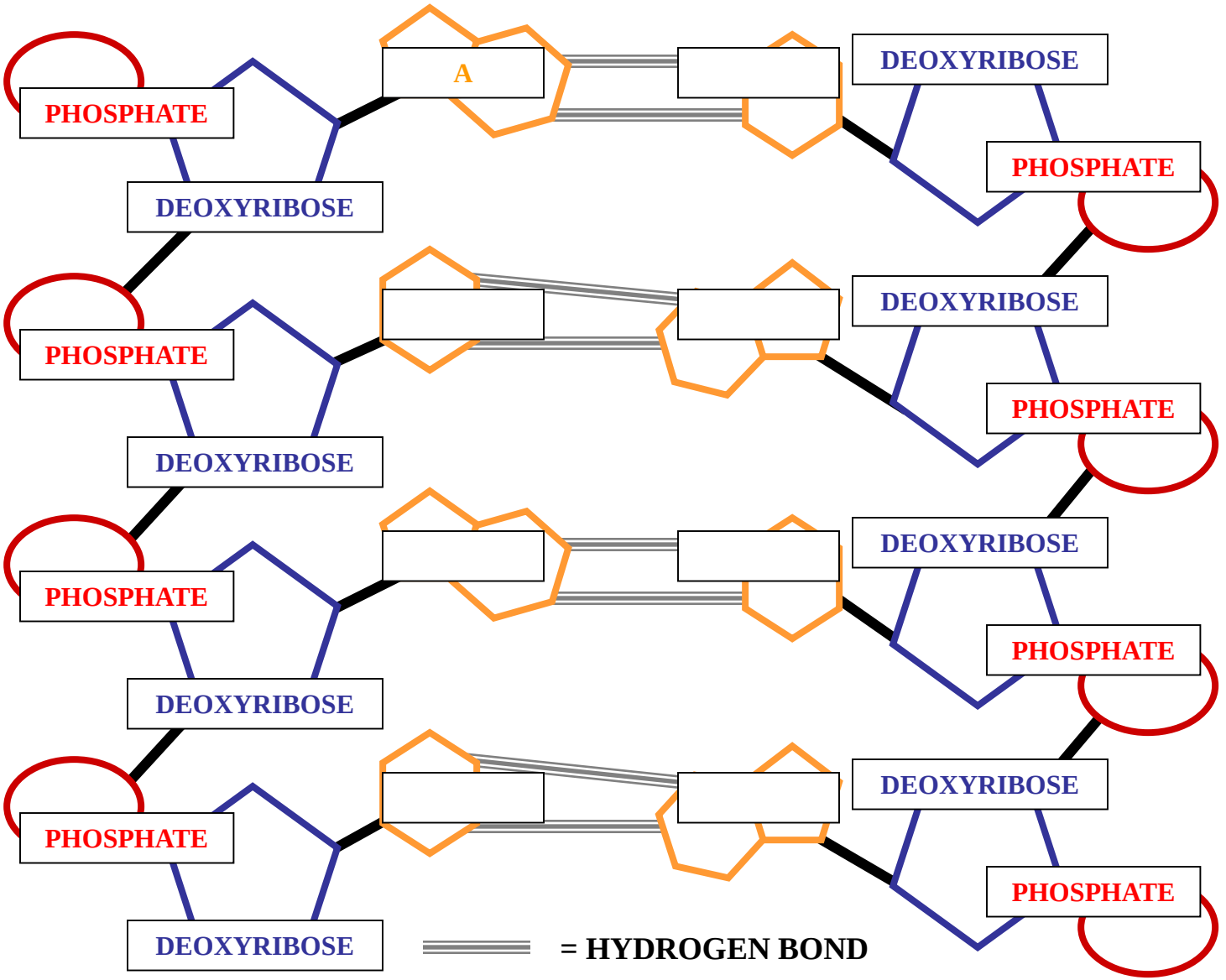
GUANINE



CYTOSINE

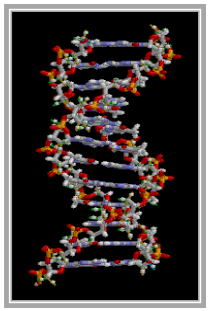
DNA DOUBLE HELIX MODEL / NUCLEOTIDE BASE PAIRS

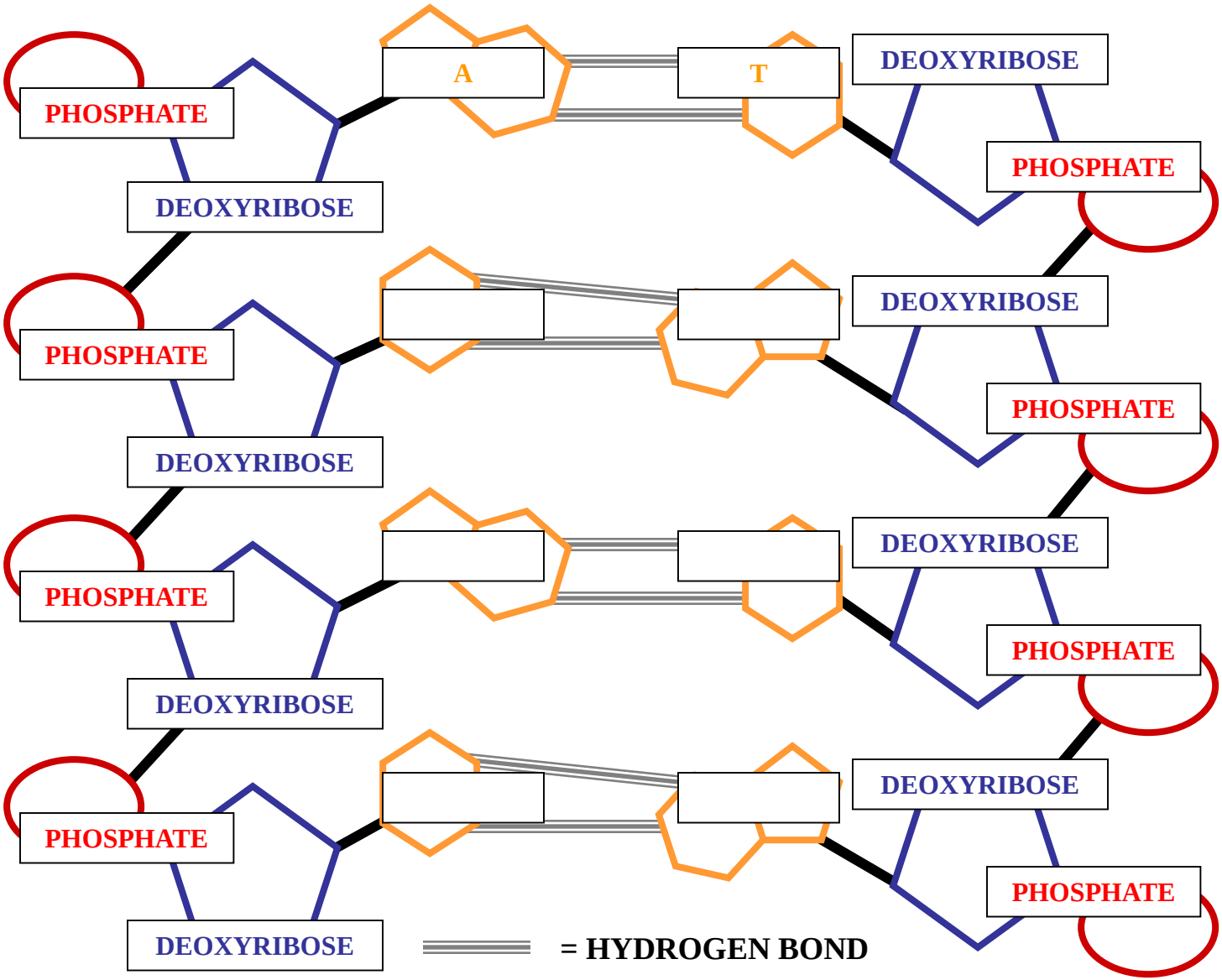




DNA DOUBLE HELIX MODEL / NUCLEOTIDE BASE PAIRS

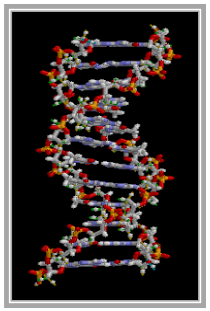
G

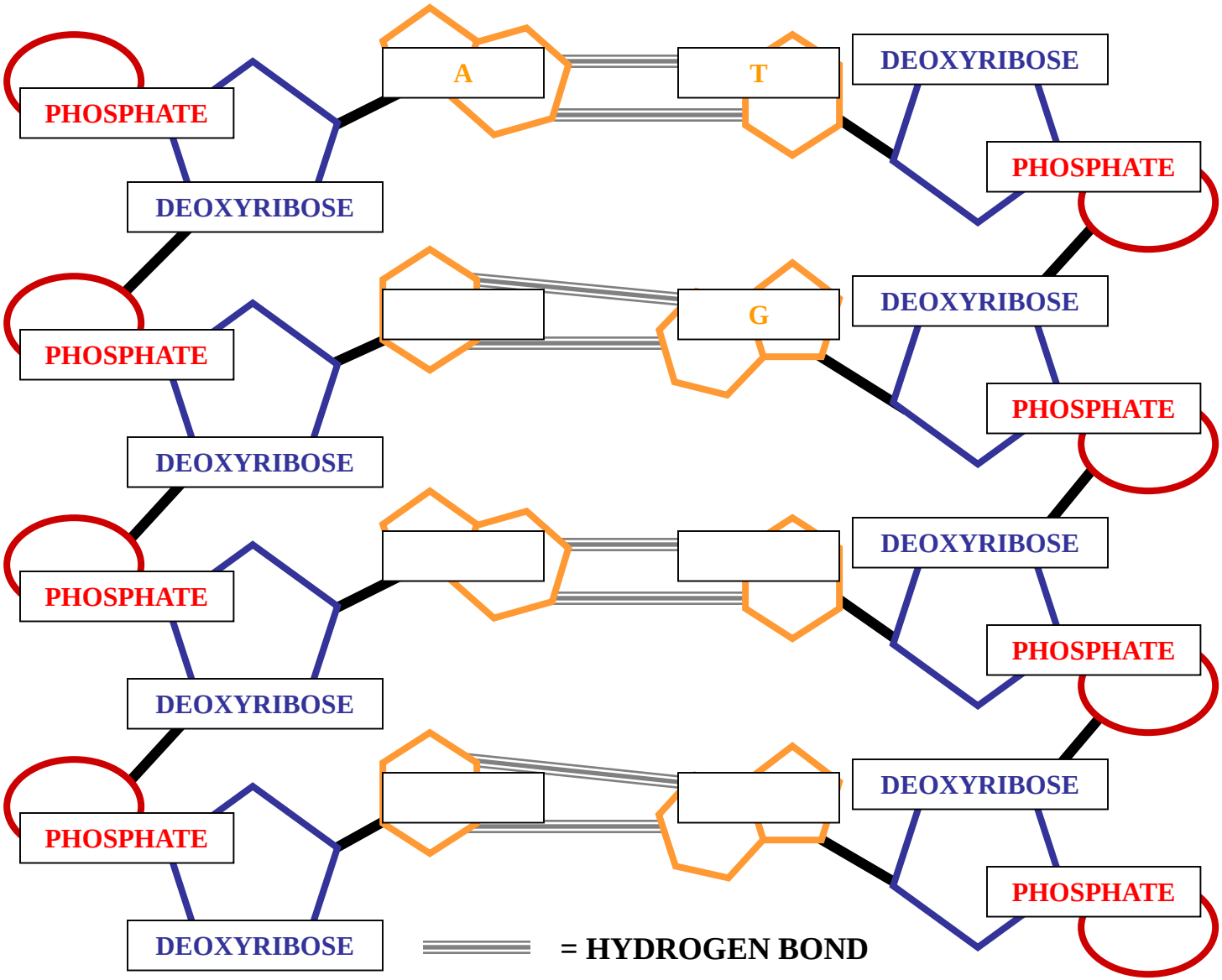




DNA DOUBLE HELIX MODEL / NUCLEOTIDE BASE PAIRS

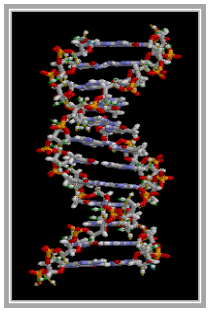
C

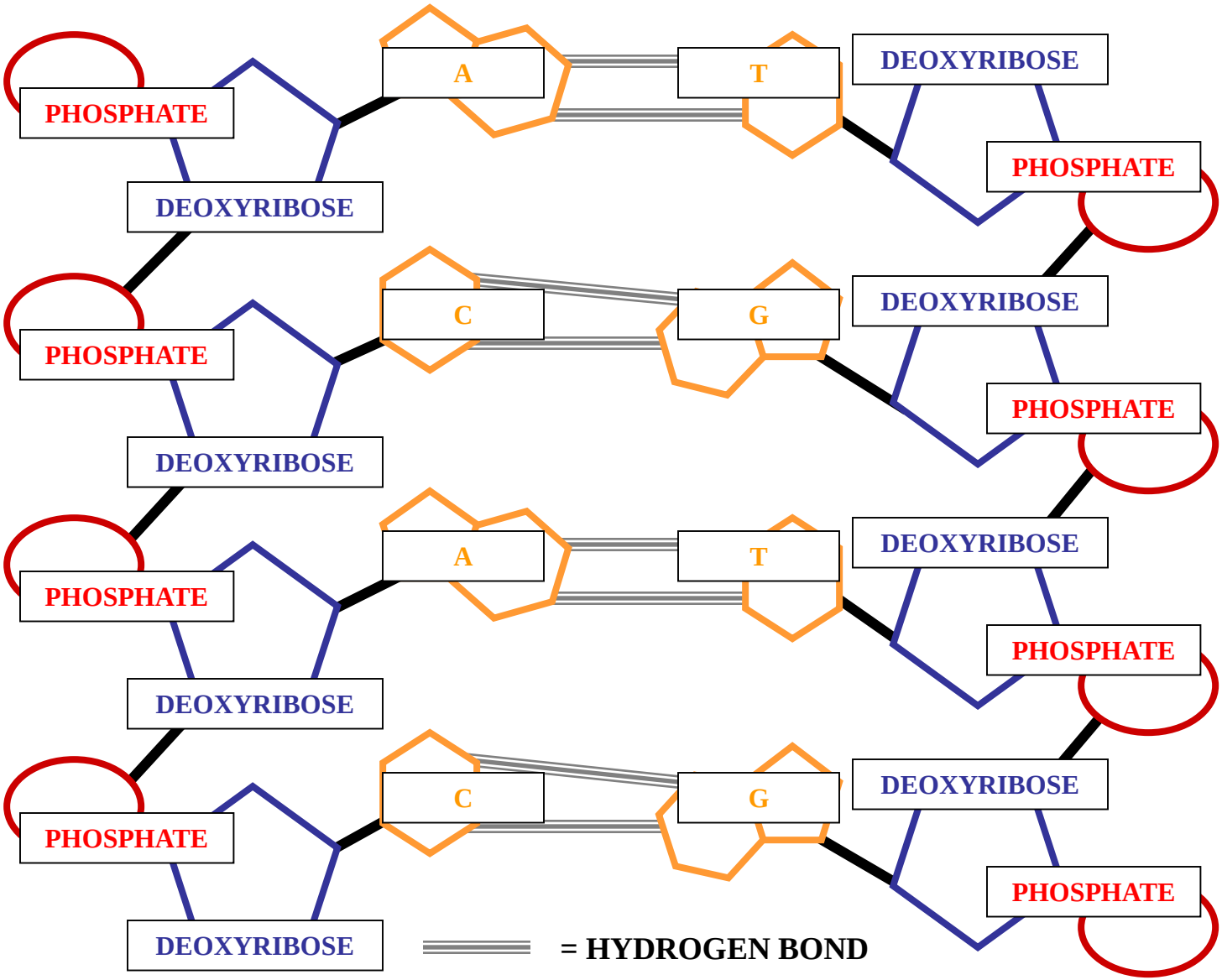




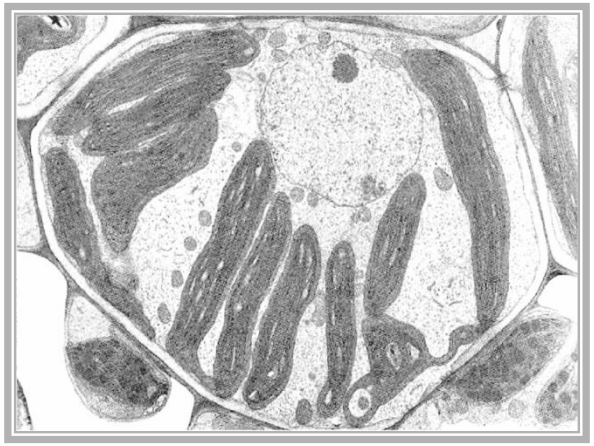
DNA DOUBLE HELIX MODEL / NUCLEOTIDE BASE PAIRS

CC

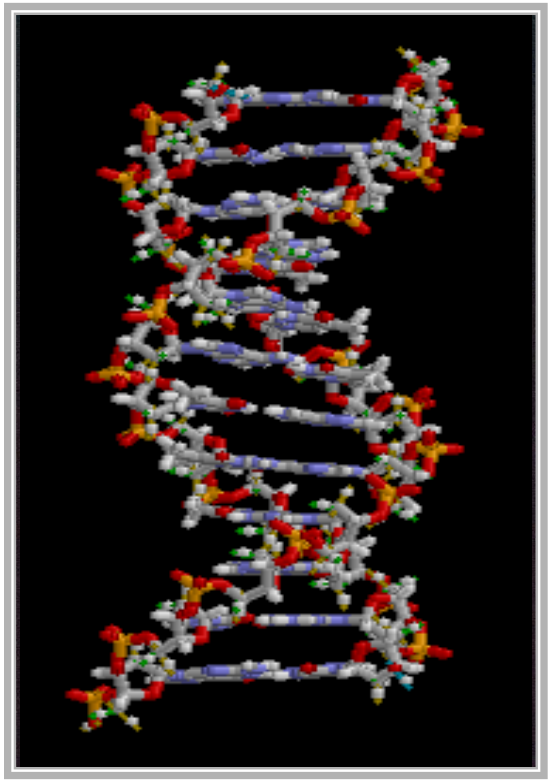




DNA
DEOXYRIBONUCLEIC ACID



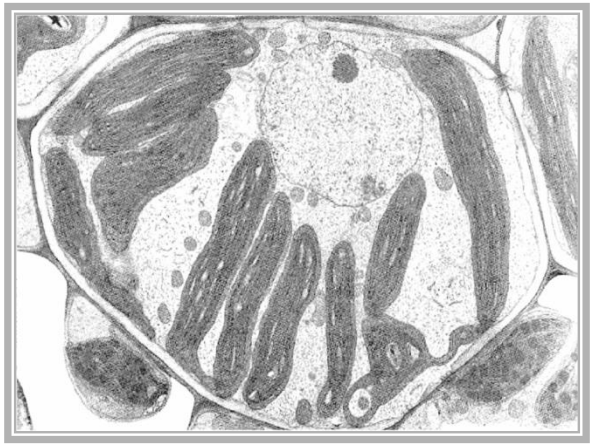
PLANT CELL



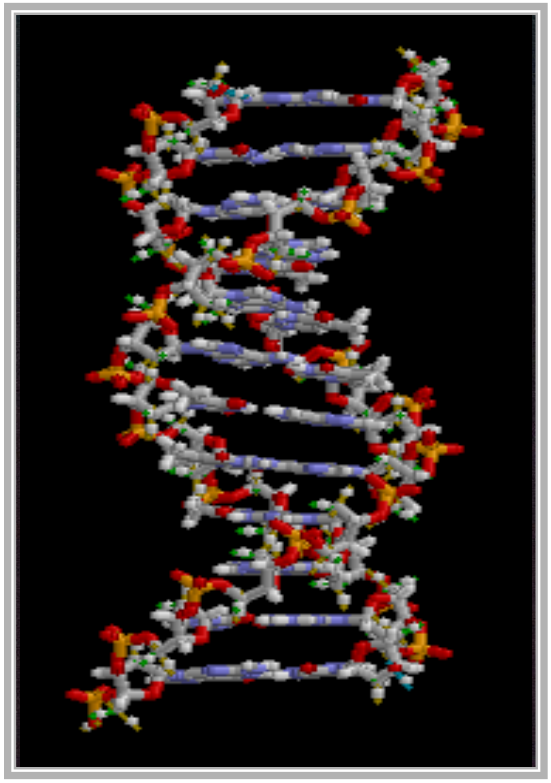
PLANT CELL

CELL CYCLE

DNA
DEOXYRIBONUCLEIC ACID



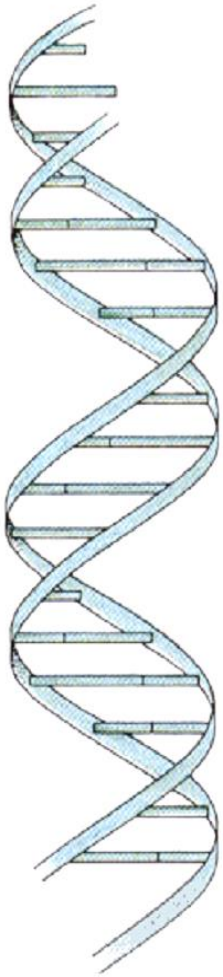
PLANT CELL



PLANT CELL

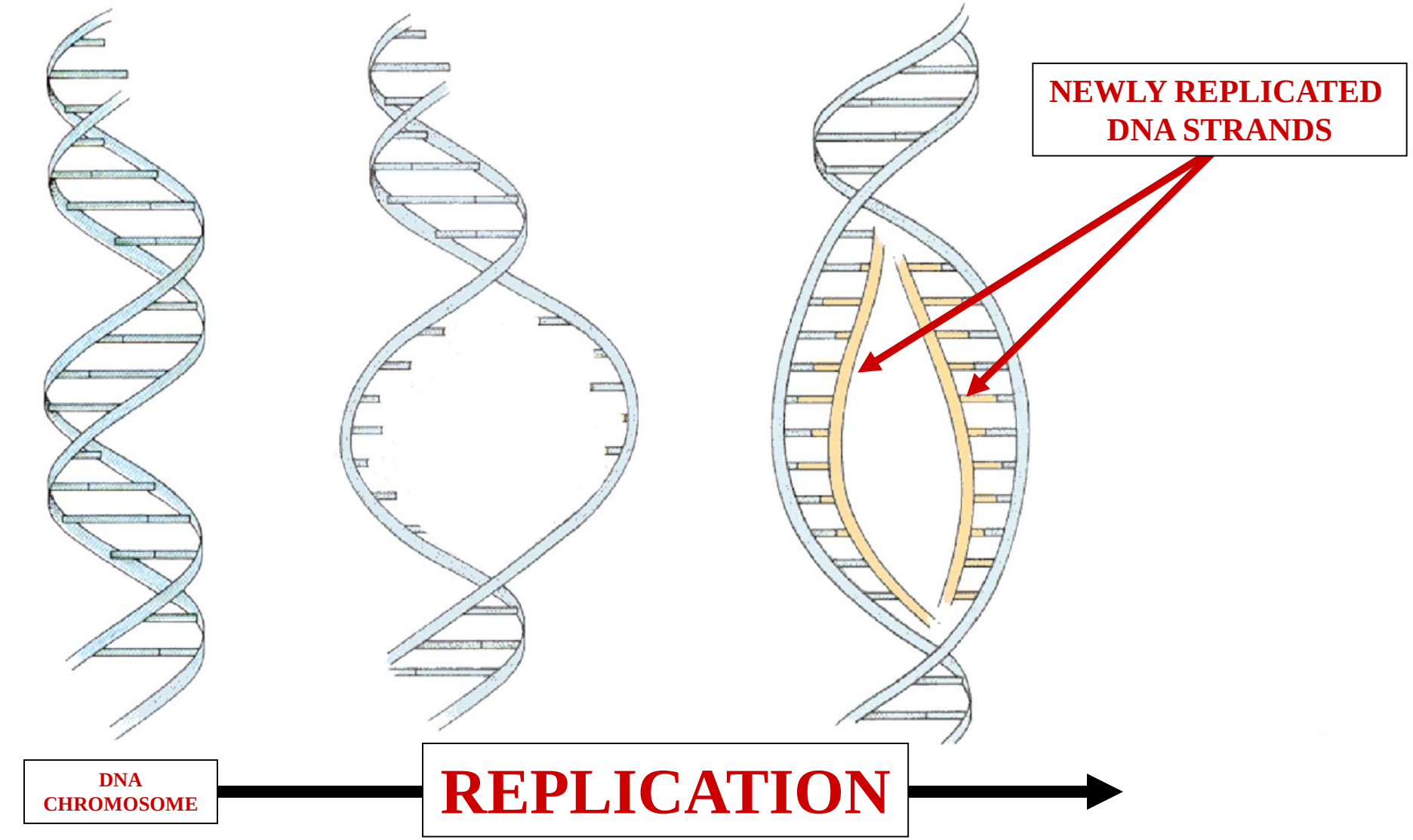
REPLICATION

DNA REPLICATION

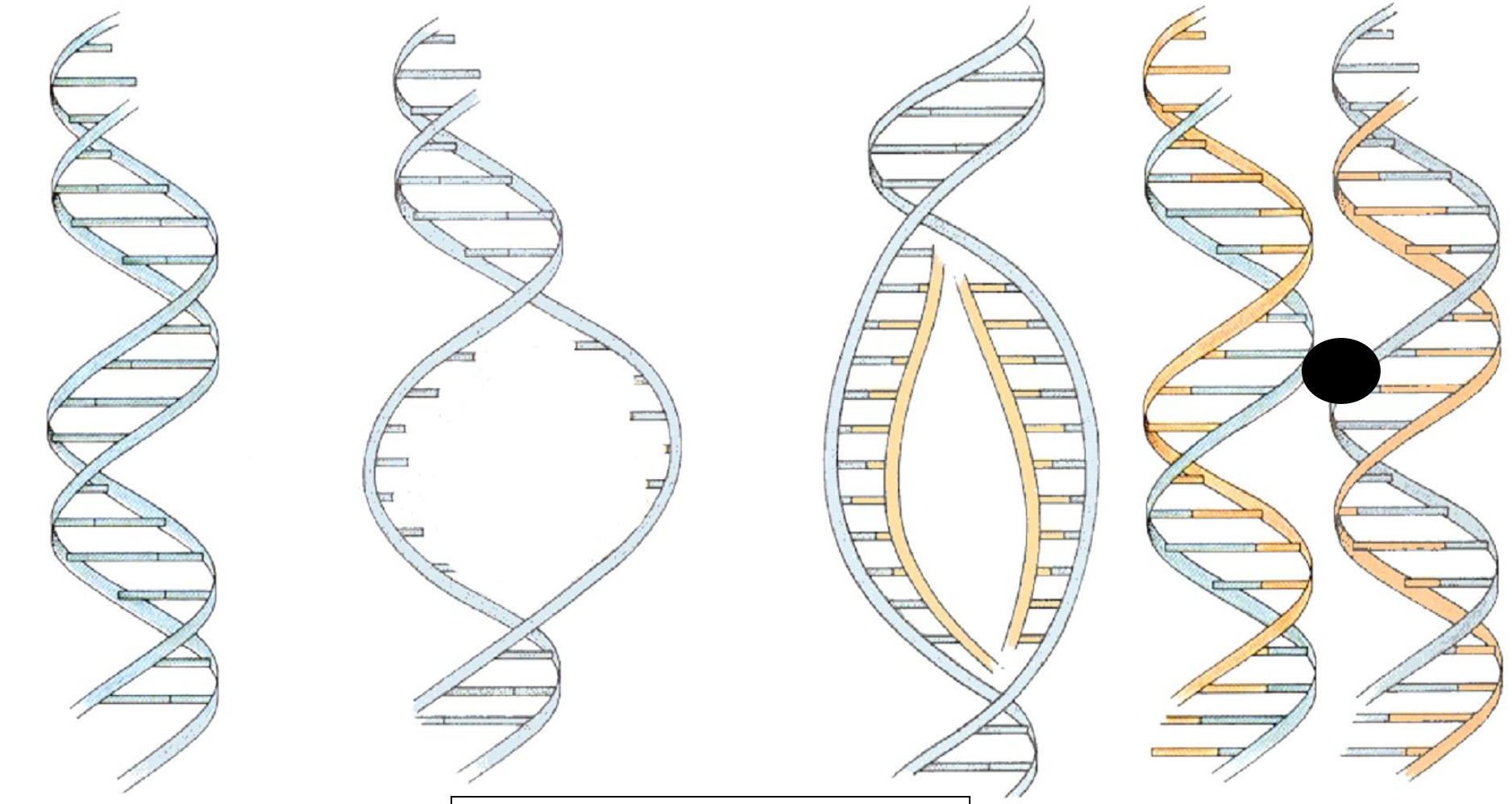


DNA
CHROMOSOME

DNA REPLICATION



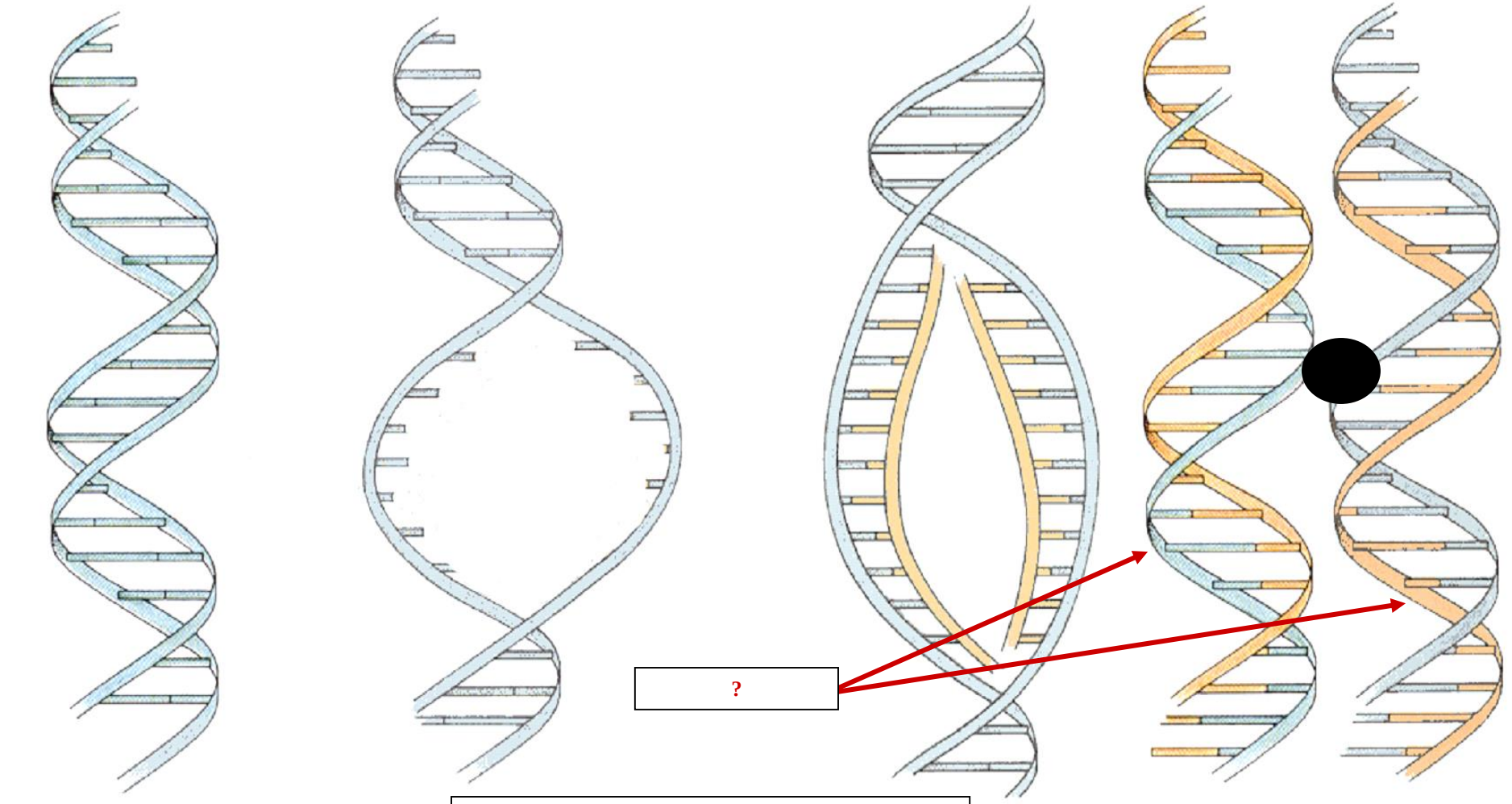
DNA REPLICATION



DNA CHROMOSOME → **REPLICATION** → REPLICATED DNA CHROMOSOME

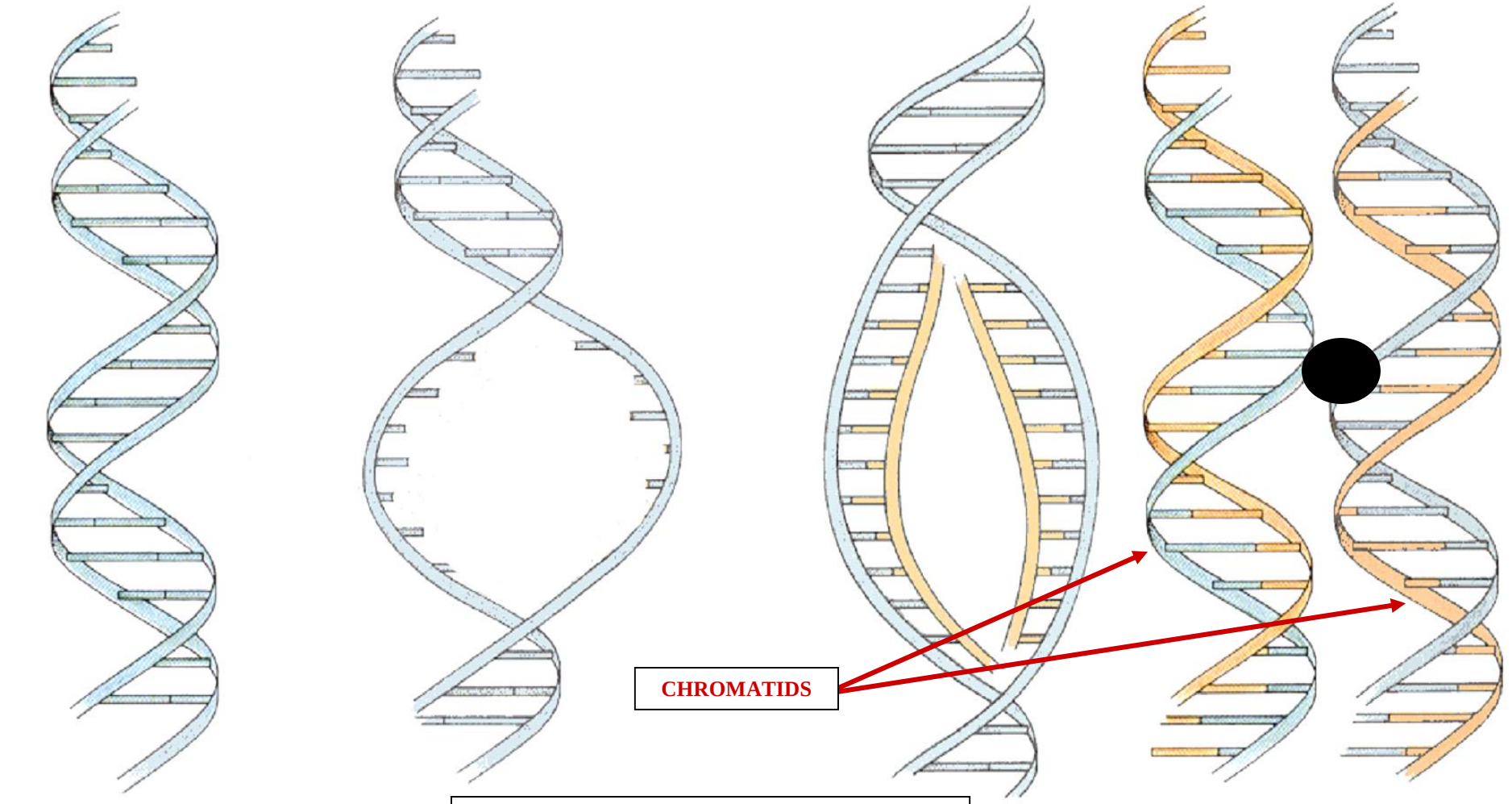
DNA REPLICATION

C



DNA CHROMOSOME → **REPLICATION** → REPLICATED DNA CHROMOSOME

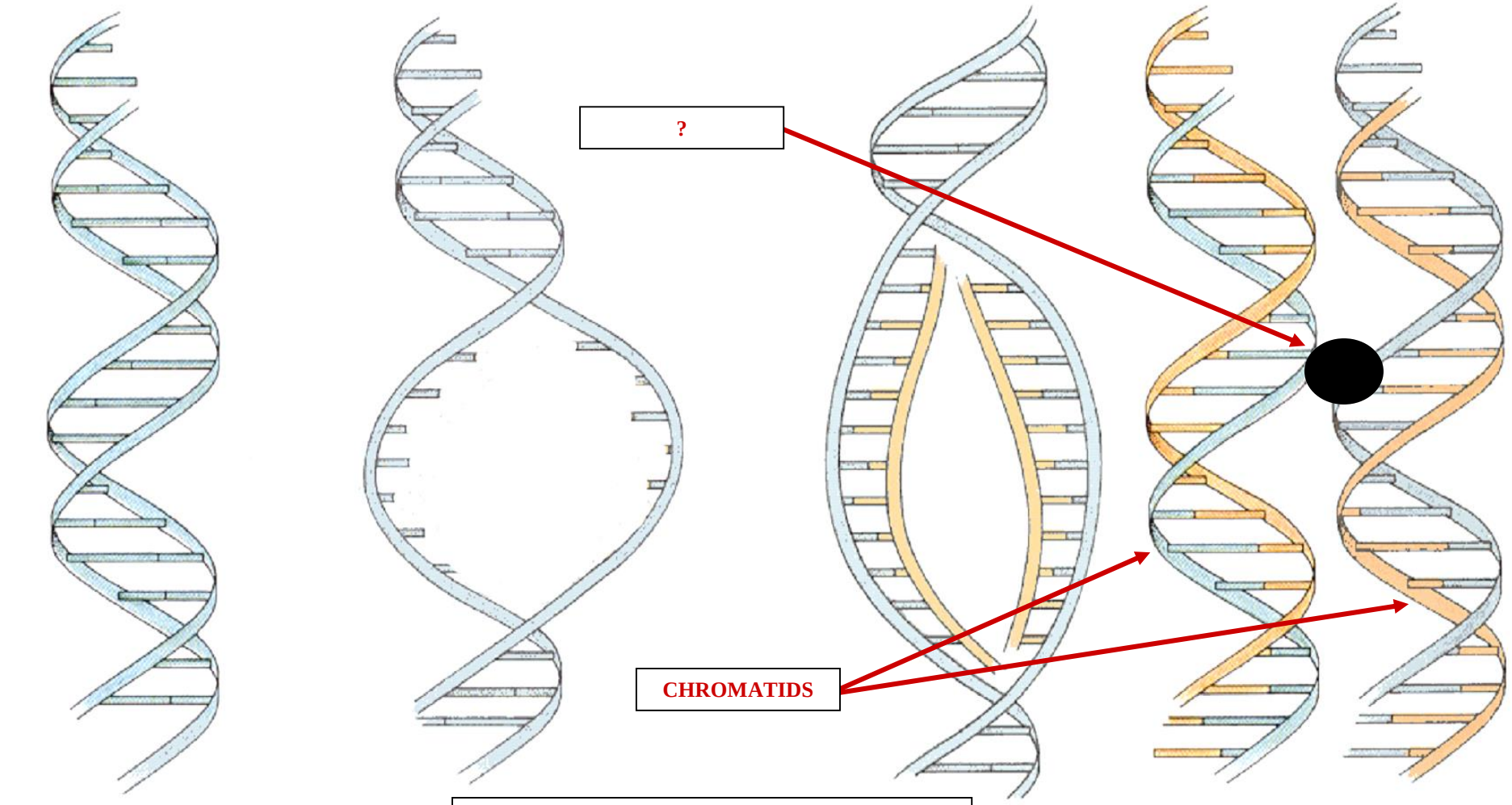
DNA REPLICATION



DNA CHROMOSOME → **REPLICATION** → REPLICATED DNA CHROMOSOME

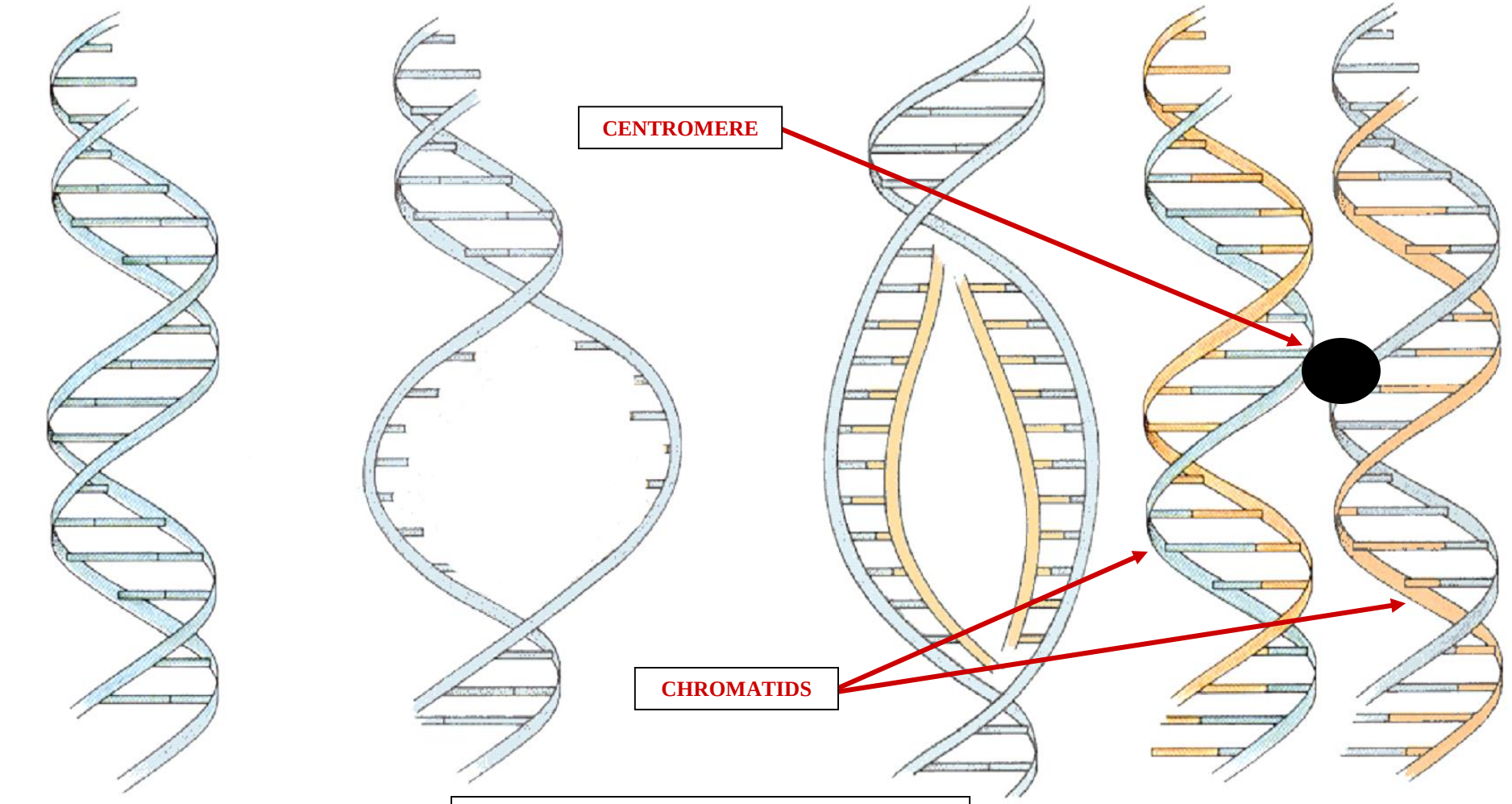
DNA REPLICATION

C



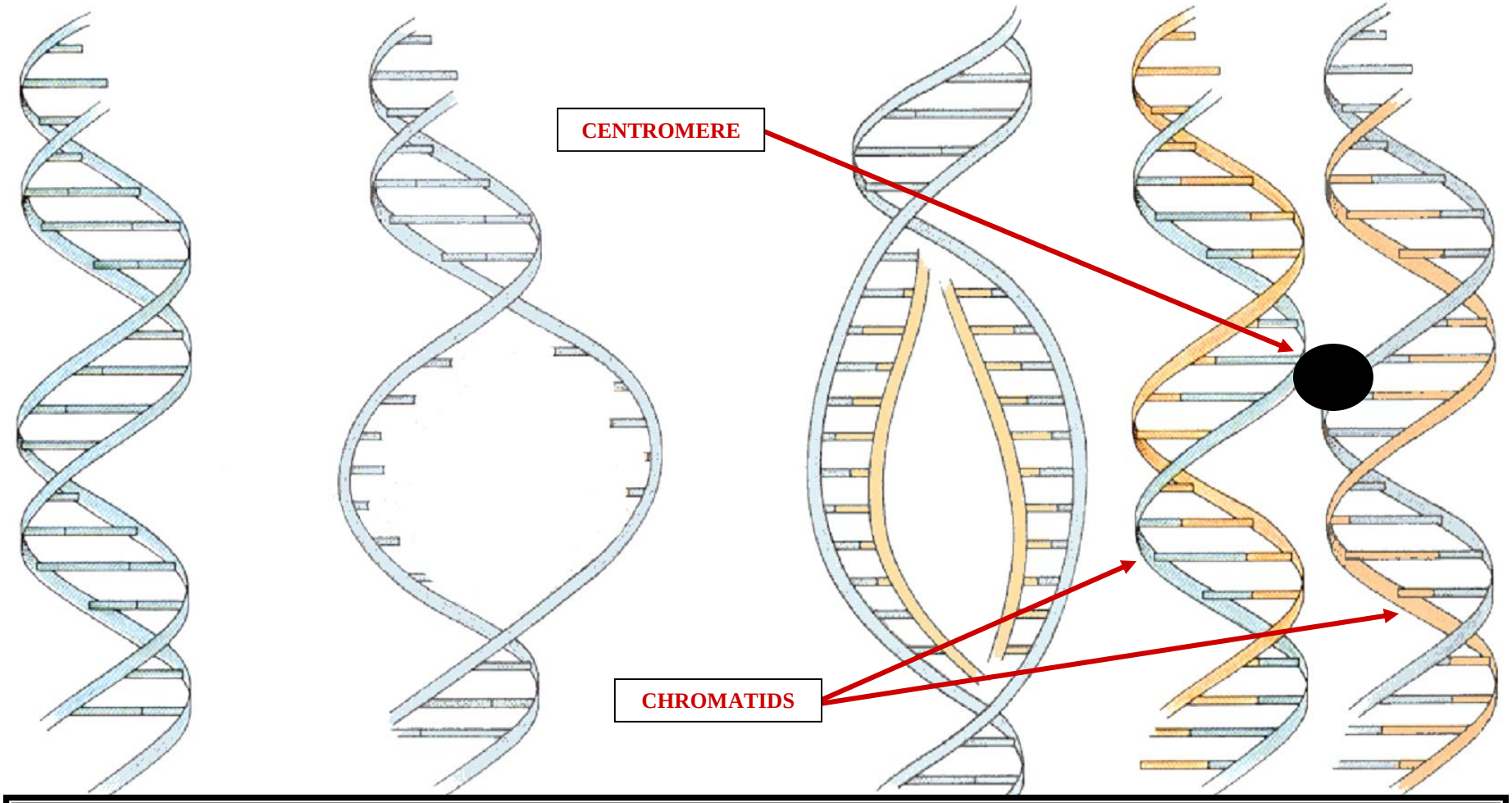
DNA CHROMOSOME → **REPLICATION** → REPLICATED DNA CHROMOSOME

DNA REPLICATION

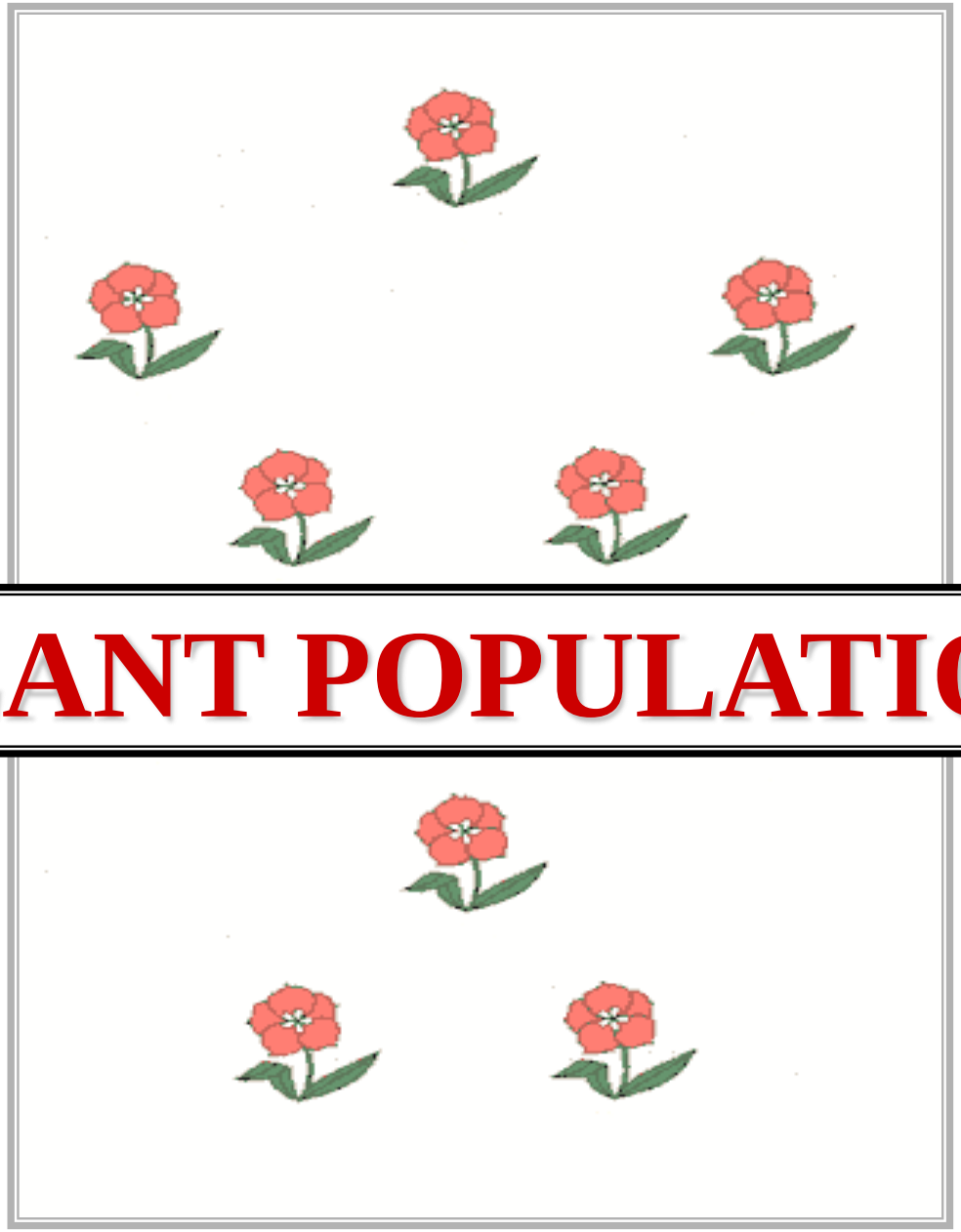


DNA CHROMOSOME → **REPLICATION** → REPLICATED DNA CHROMOSOME

DURING REPLICATION



DNA UNDERGOES MUTATIONS



PLANT POPULATION

RED FLOWERED PLANTS

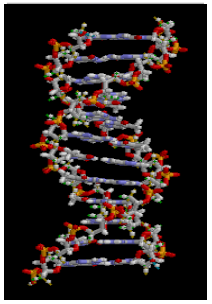
A

UNDERGOES MUTATION

RED FLOWERED PLANTS

DNA DOUBLE HELIX MODEL

DNA REPILCATION

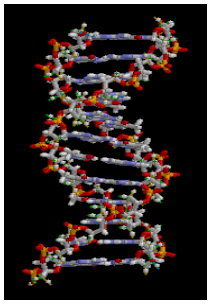


PHOSPHATE
DEOXYRIBOSE
A
T
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
C
G
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
A
T
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
C
G
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
= HYDROGEN BOND

DNA DOUBLE HELIX MODEL

DNA REPILCATION

G

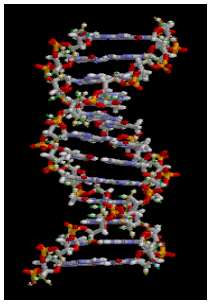


PHOSPHATE
DEOXYRIBOSE
A
T
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
C
G
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
A
T
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
C
G
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
= HYDROGEN BOND

DNA DOUBLE HELIX MODEL

DNA REPILCATION

C



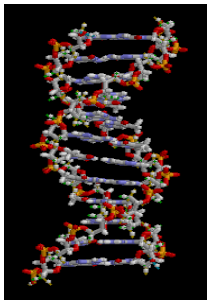
PHOSPHATE
DEOXYRIBOSE
G
T
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
C
G
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
A
T
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
C
G
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE

= HYDROGEN BOND

DNA DOUBLE HELIX MODEL

DNA REPILCATION

DNA STRUCTURAL CHANGE



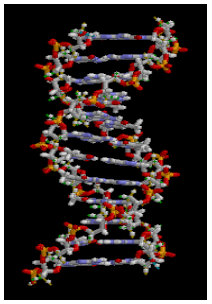
PHOSPHATE
DEOXYRIBOSE
G
C
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
C
G
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
A
T
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
C
G
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
= HYDROGEN BOND

DNA DOUBLE HELIX MODEL

DNA REPILCATION

MUTATION

D

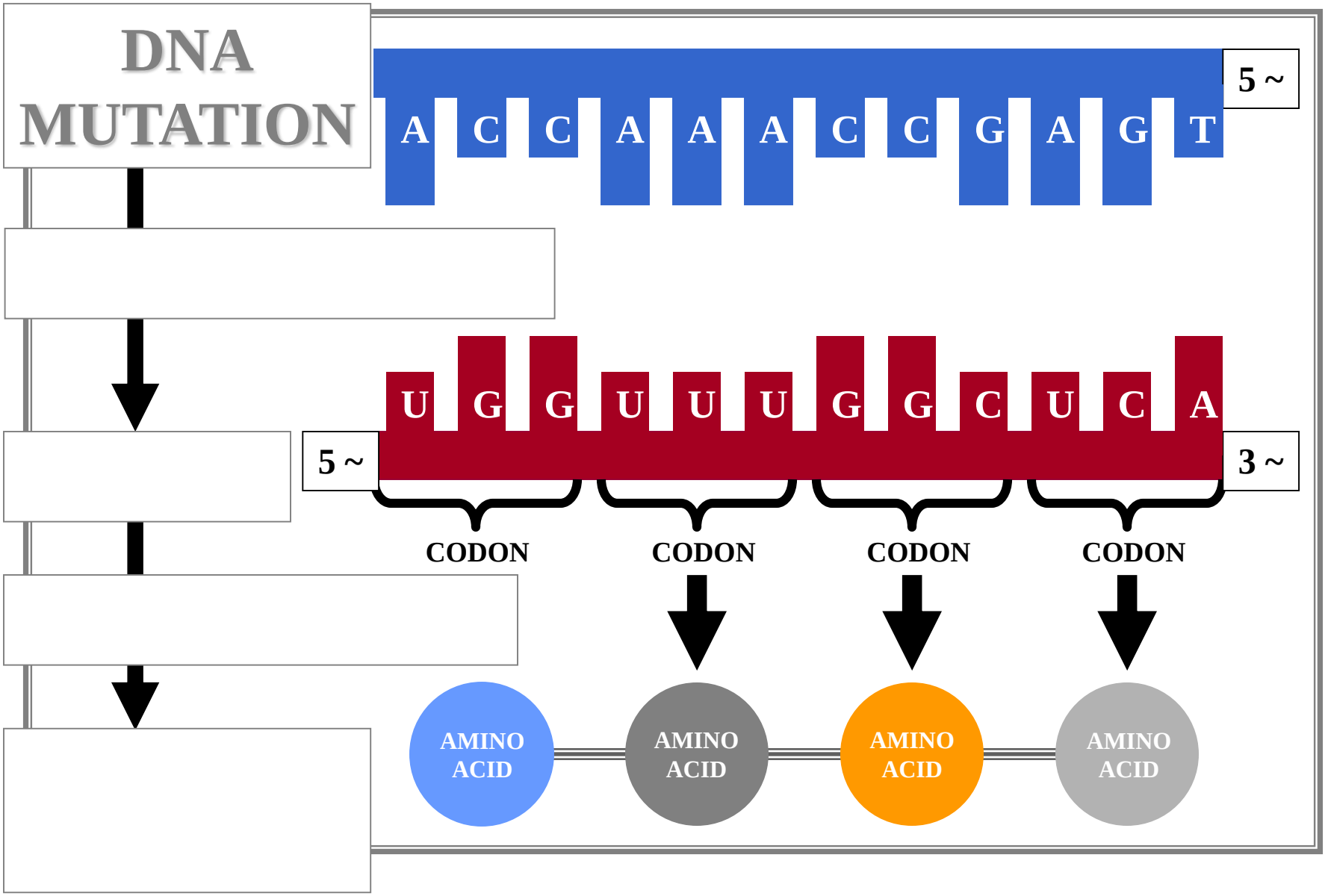


PHOSPHATE
DEOXYRIBOSE
G
C
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
C
G
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
A
T
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE
C
G
DEOXYRIBOSE
PHOSPHATE
PHOSPHATE
DEOXYRIBOSE

= HYDROGEN BOND

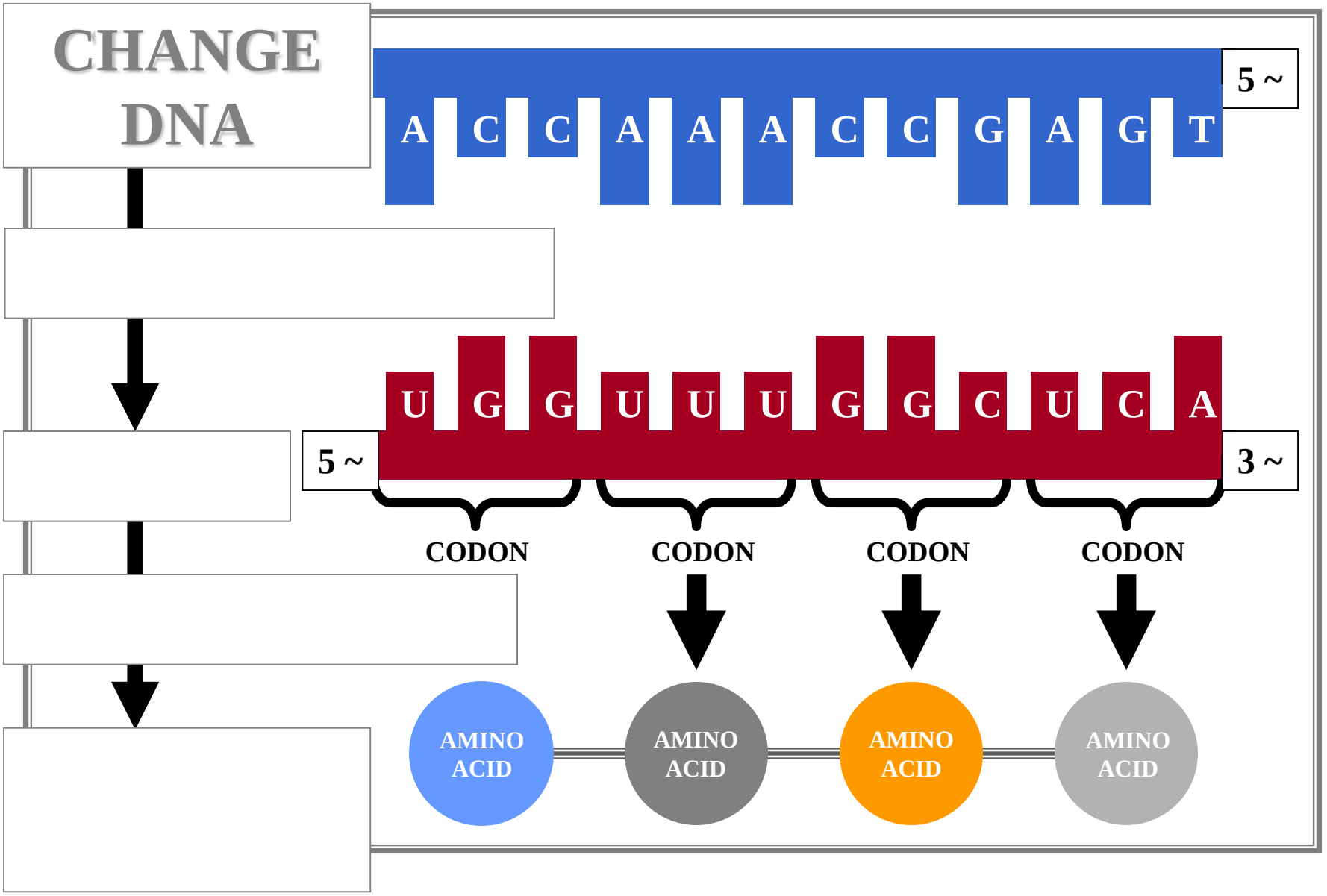
PROTEIN SYNTHESIS

C

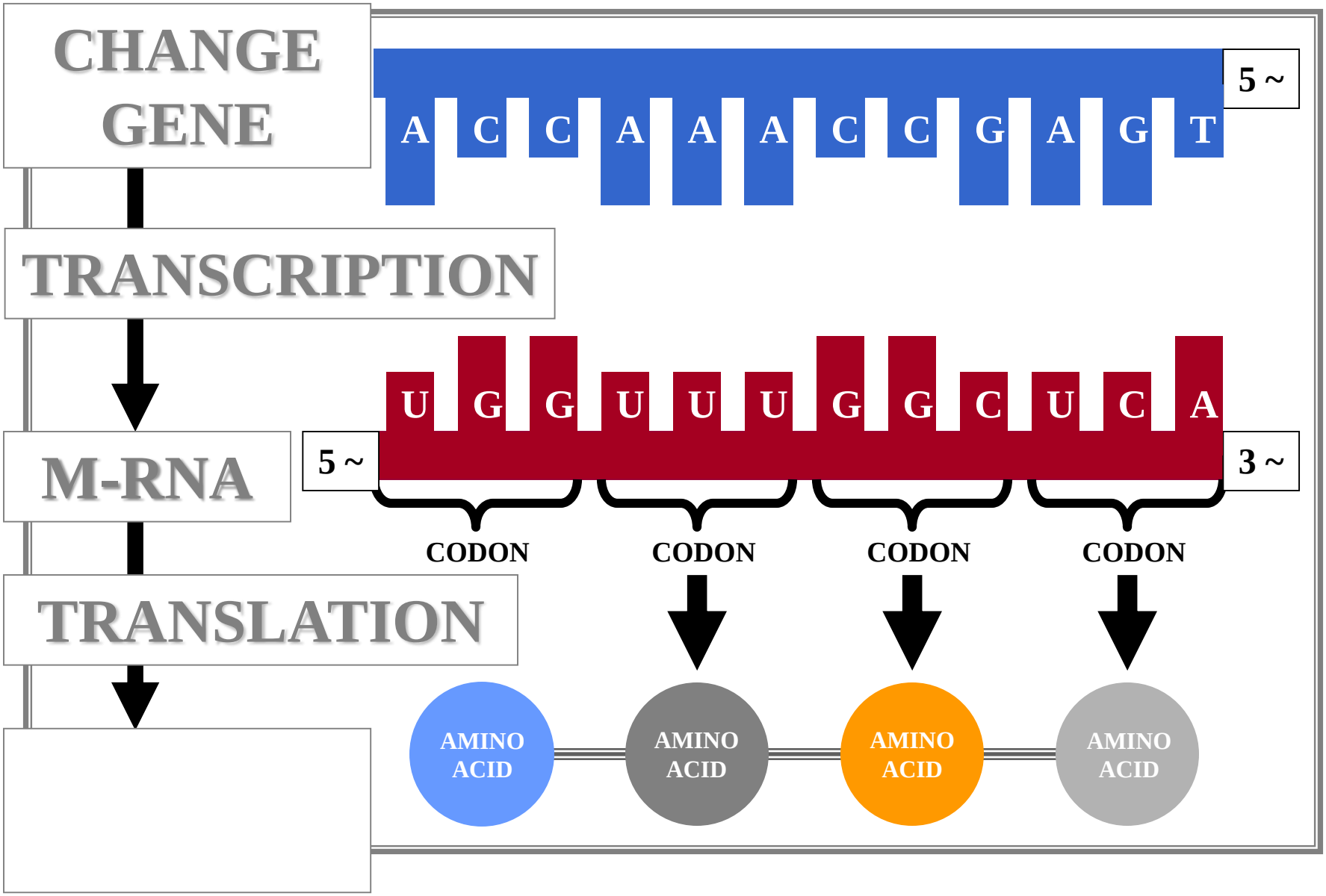


PROTEIN SYNTHESIS

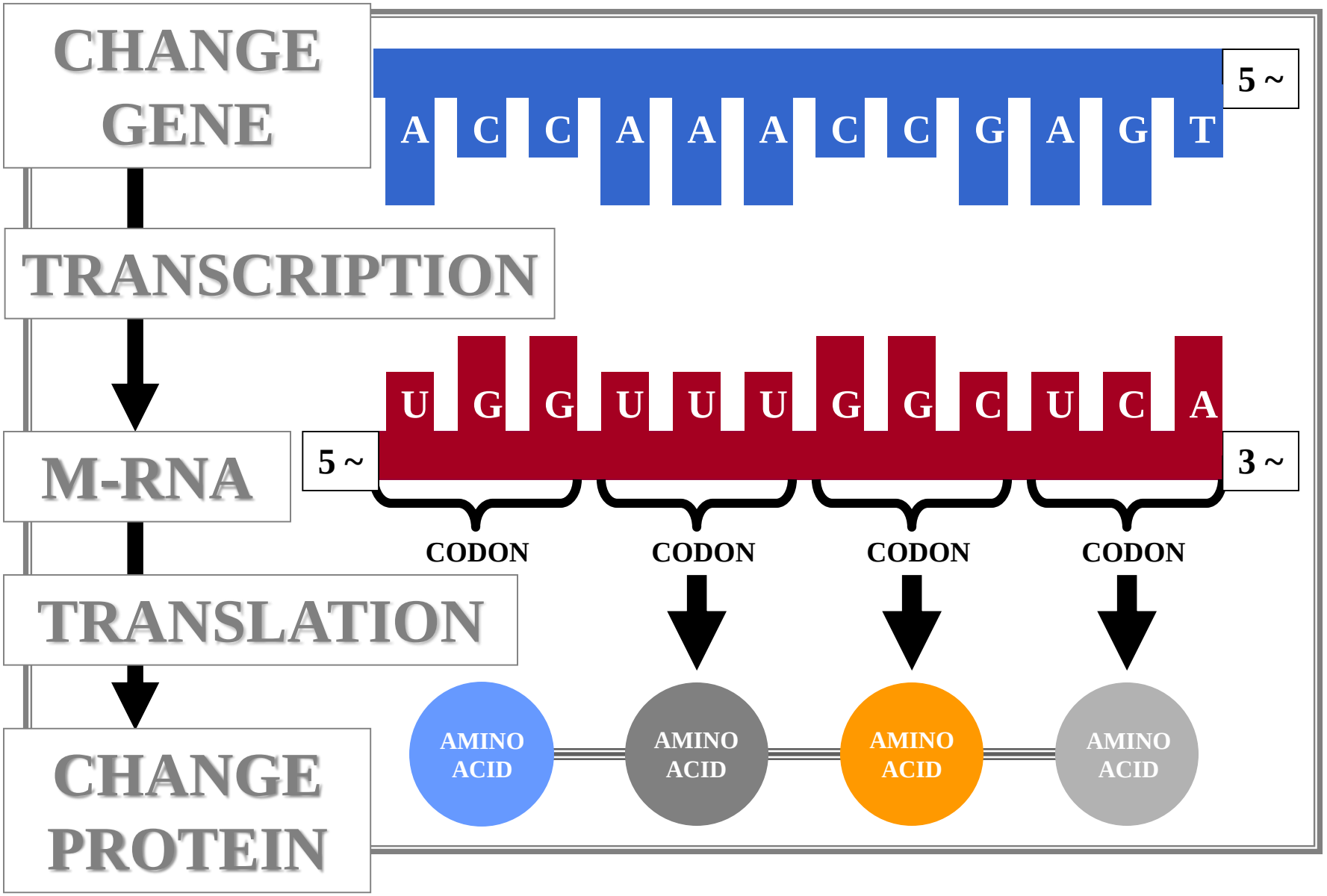
C



PROTEIN SYNTHESIS



PROTEIN SYNTHESIS



PROTEIN SYNTHESIS

C

CHANGE GENE

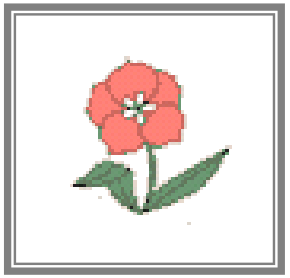
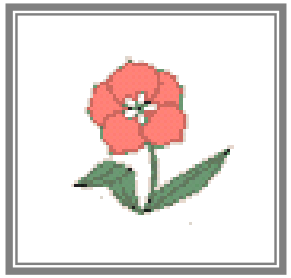
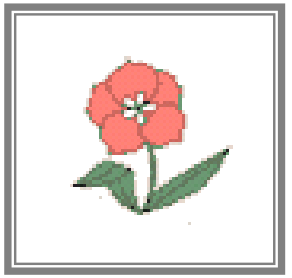
5 ~ A C C A A A C C G A G T

TRANSCRIPTION

5 ~ U G G U U U G G C U C A 3 ~

M-RNA

TRANSLATION

CHANGE PROTEIN

CHANGE CHARACTER TRAIT

PROTEIN SYNTHESIS

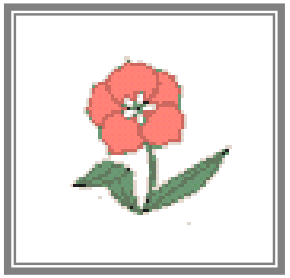
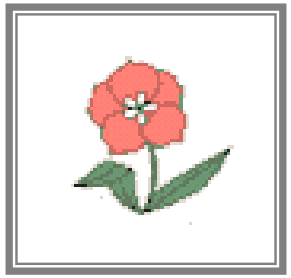
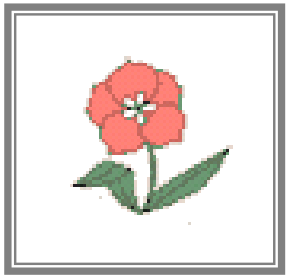
CHANGE GENE

5 ~ A C C A A A C C G A G T

TRANSCRIPTION

5 ~ U G G U U U G G C U C A 3 ~

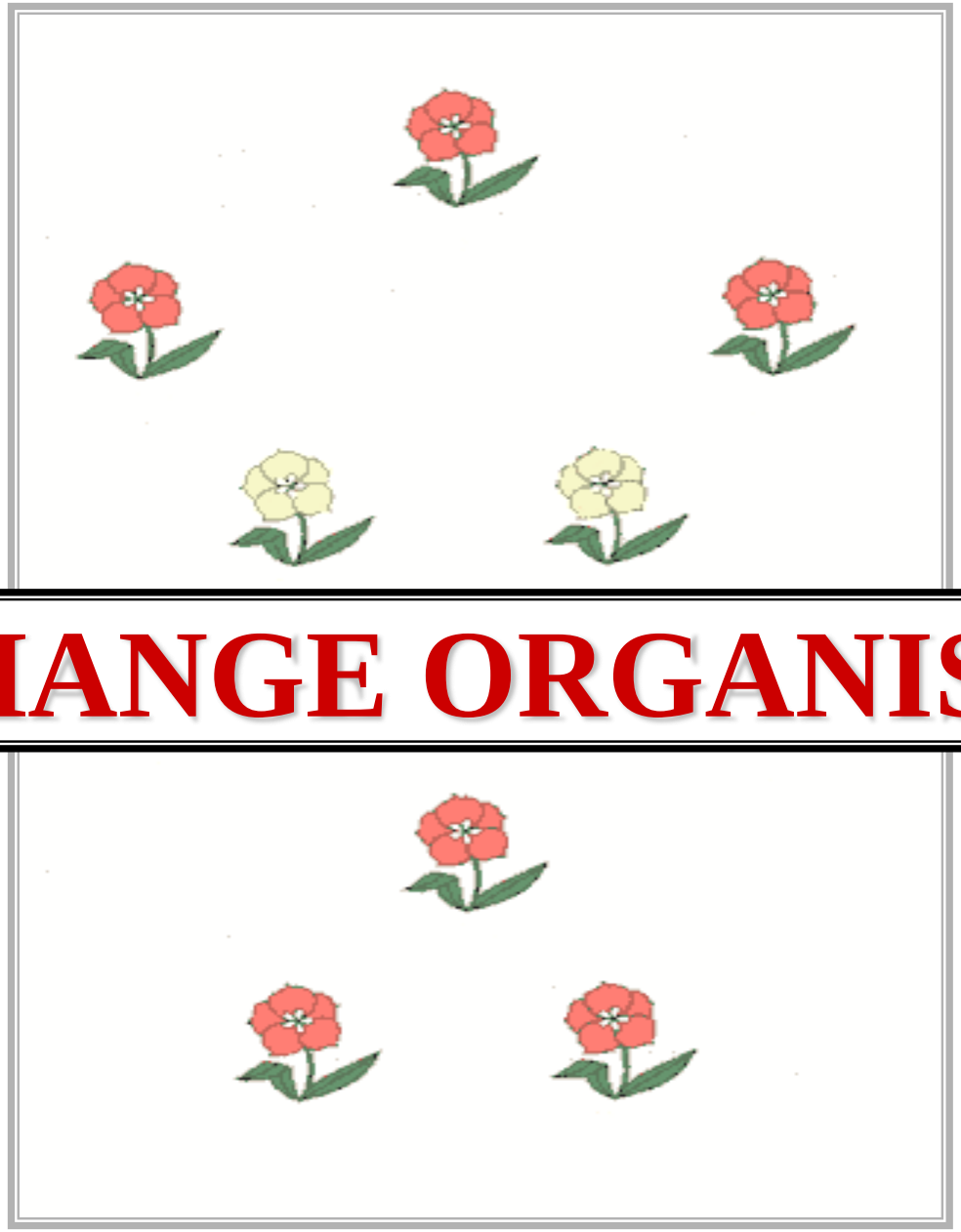
M-RNA

TRANSLATION

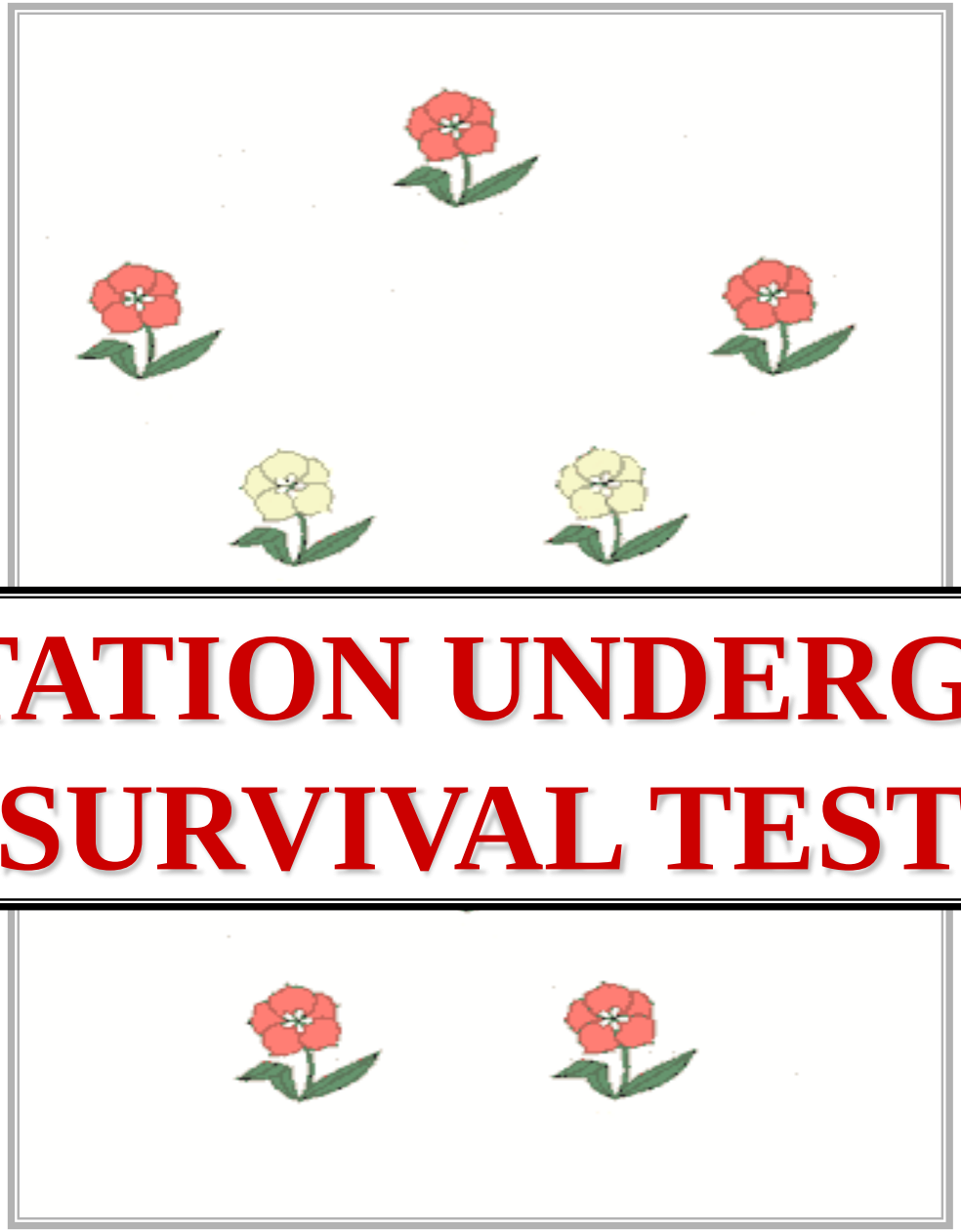
CHANGE PROTEIN → CHANGE ORGANISM

ST



CHANGE ORGANISM

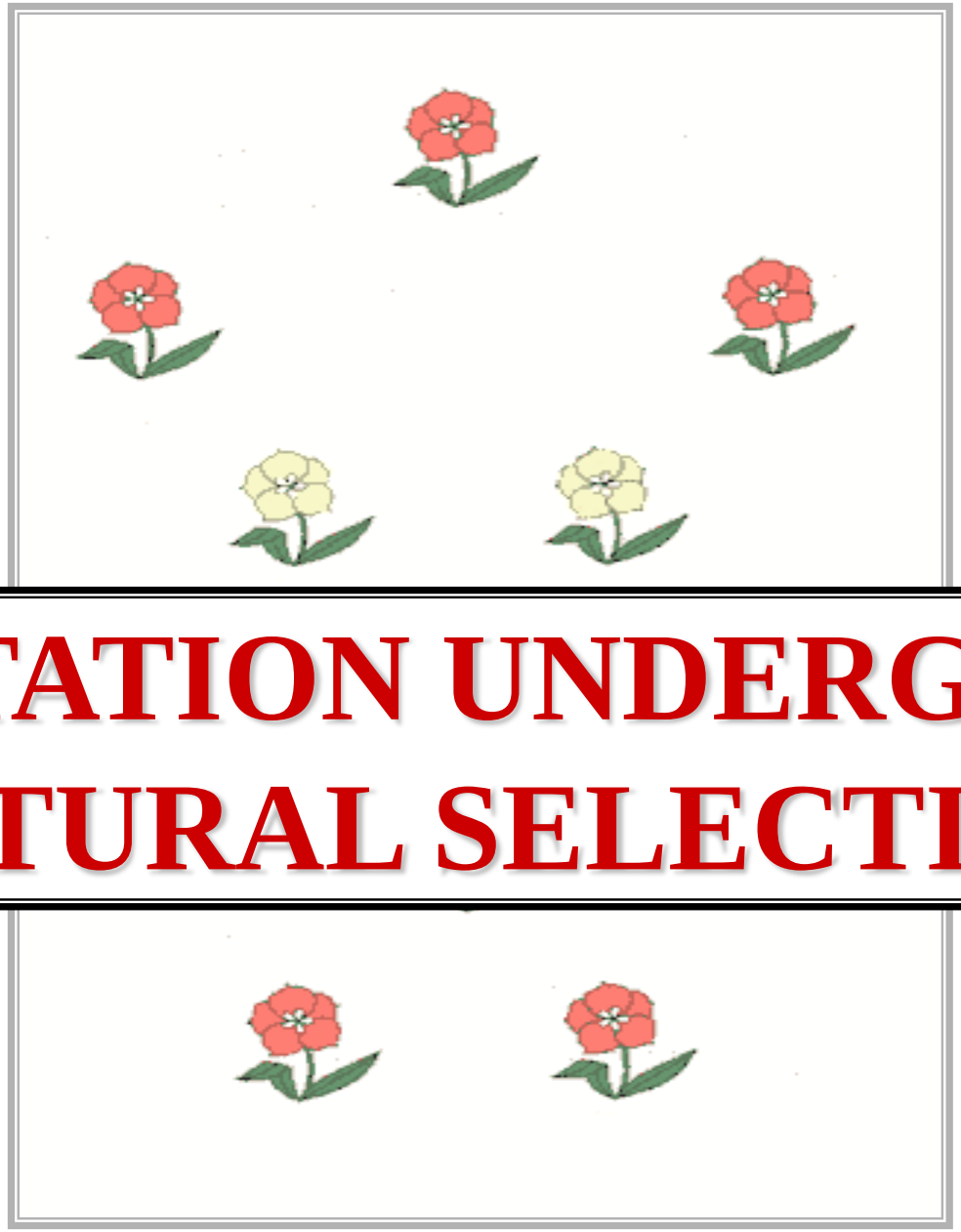
MUTATION: WHITE FLOWERED PLANTS



MUTATION UNDERGOES SURVIVAL TEST

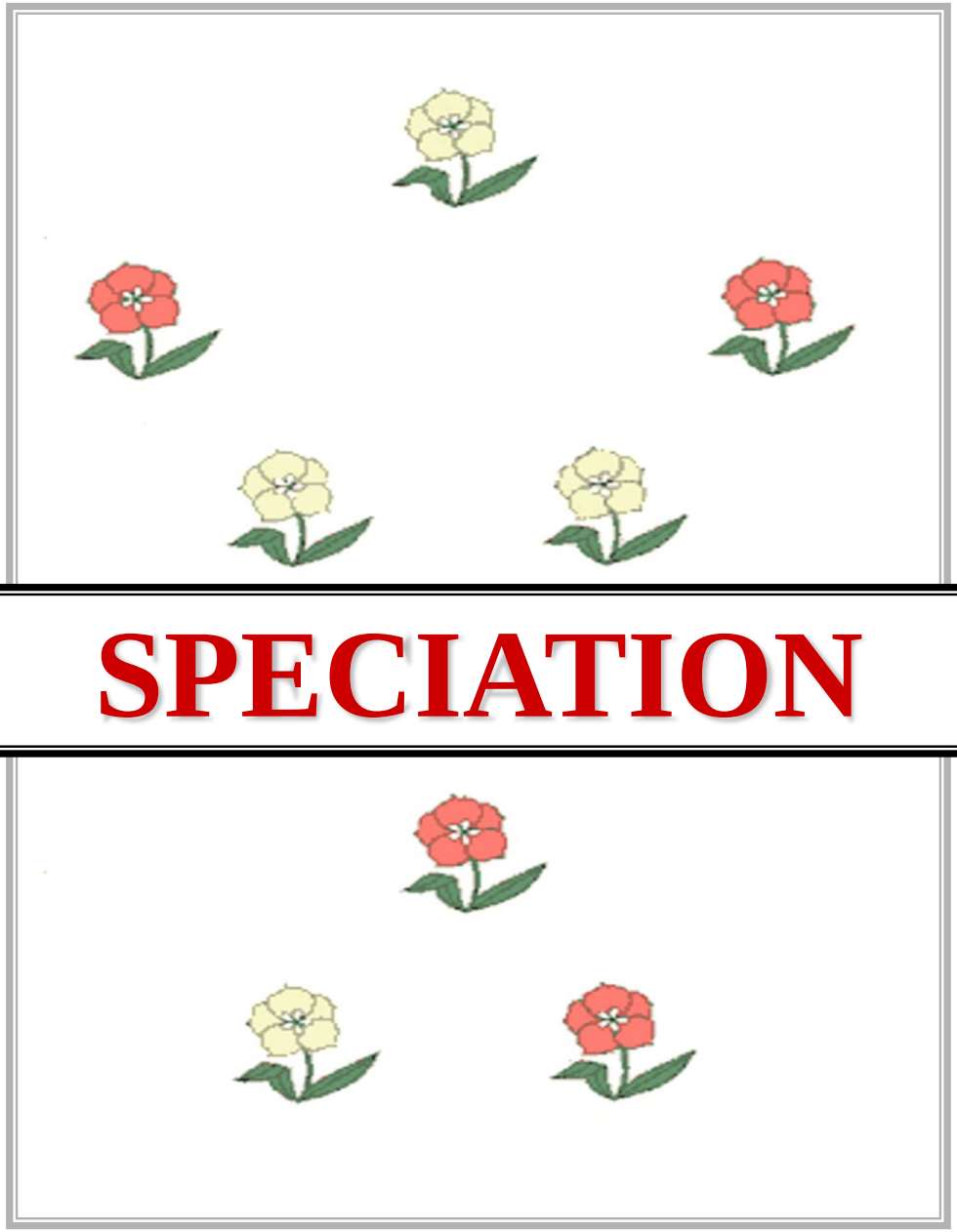
MUTATION: WHITE FLOWERED PLANTS

S



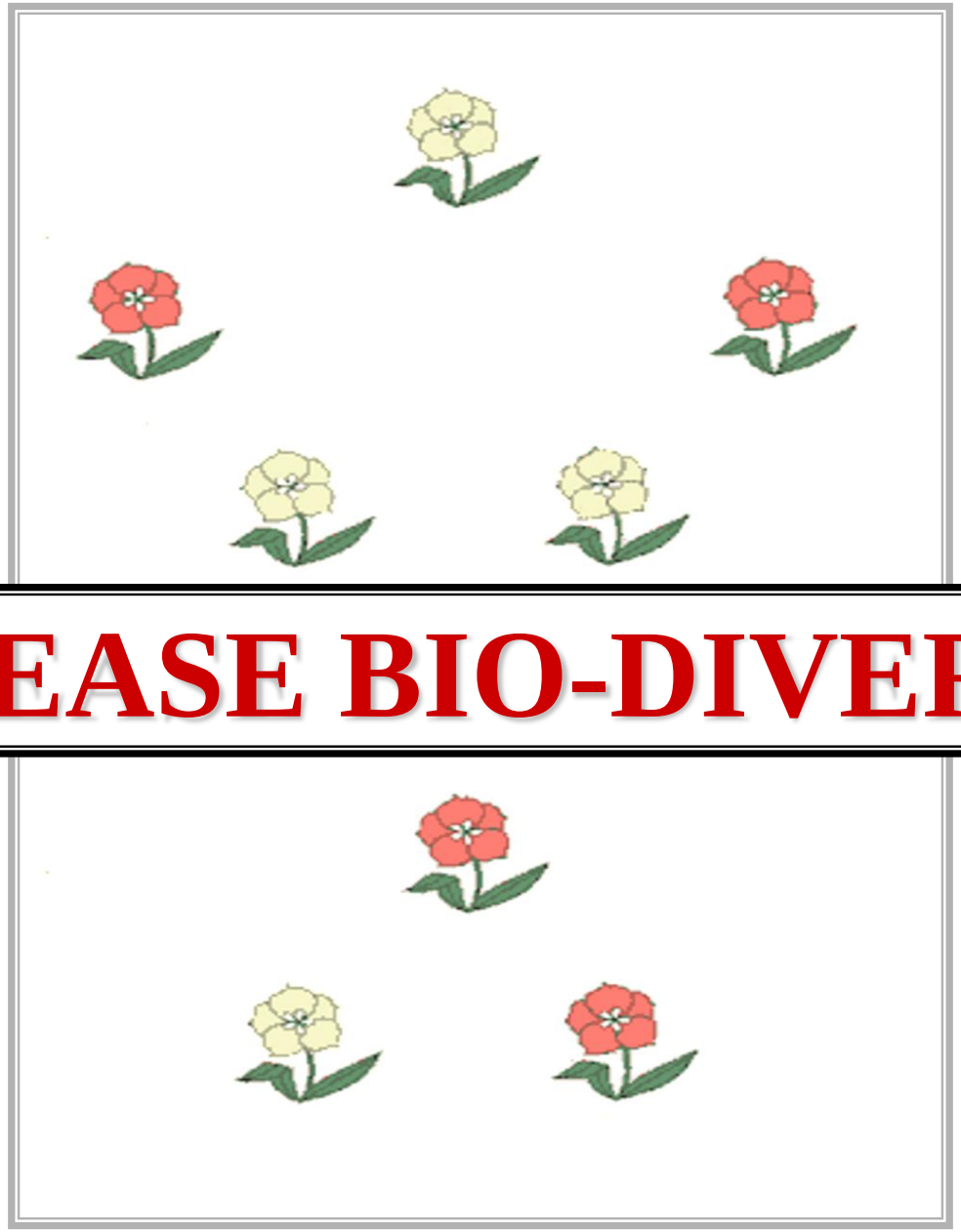
MUTATION UNDERGOES NATURAL SELECTION

MUTATION: WHITE FLOWERED PLANTS



SPECIATION

DAUGHTER SPECIES

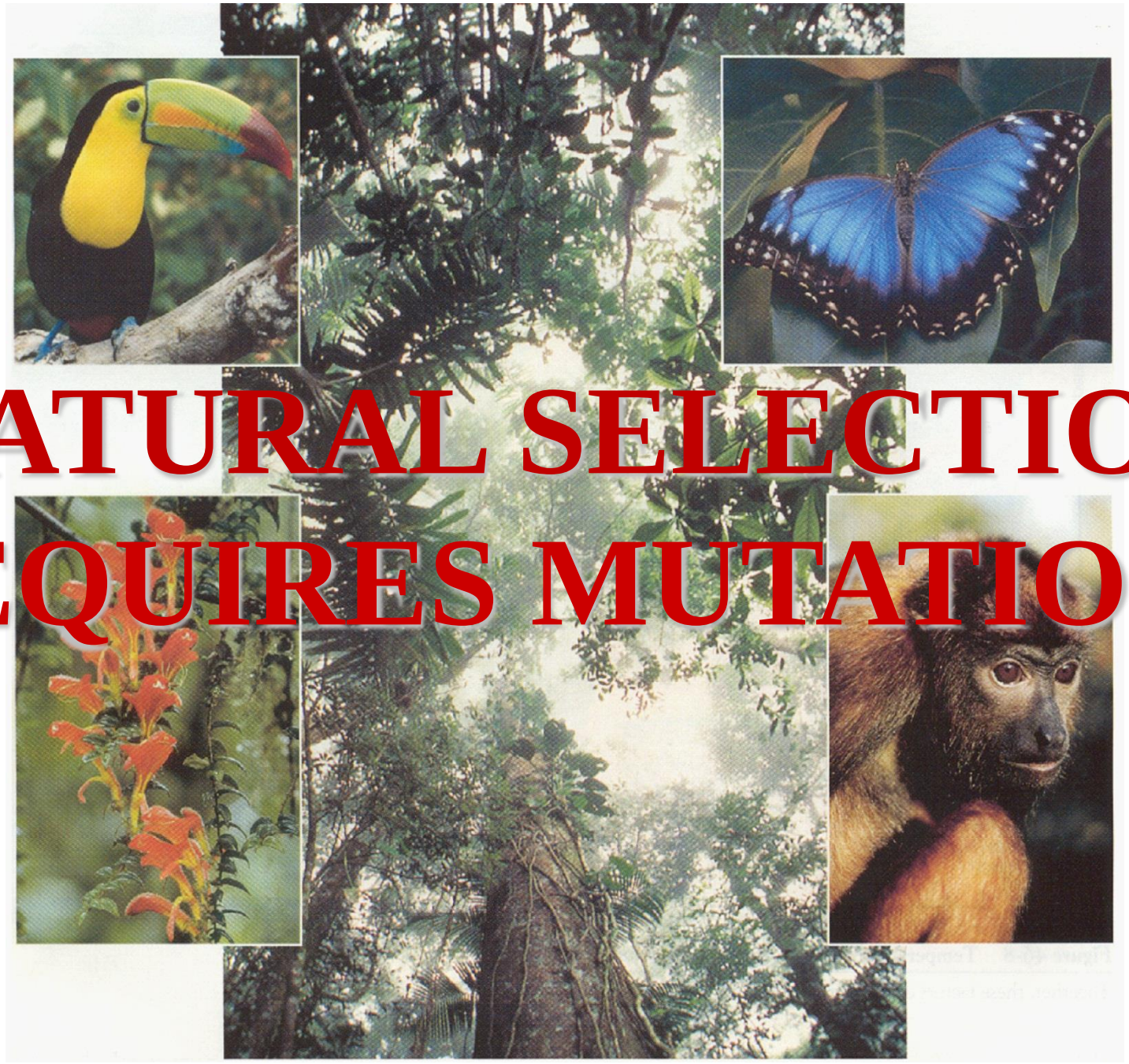


INCREASE BIO-DIVERSITY

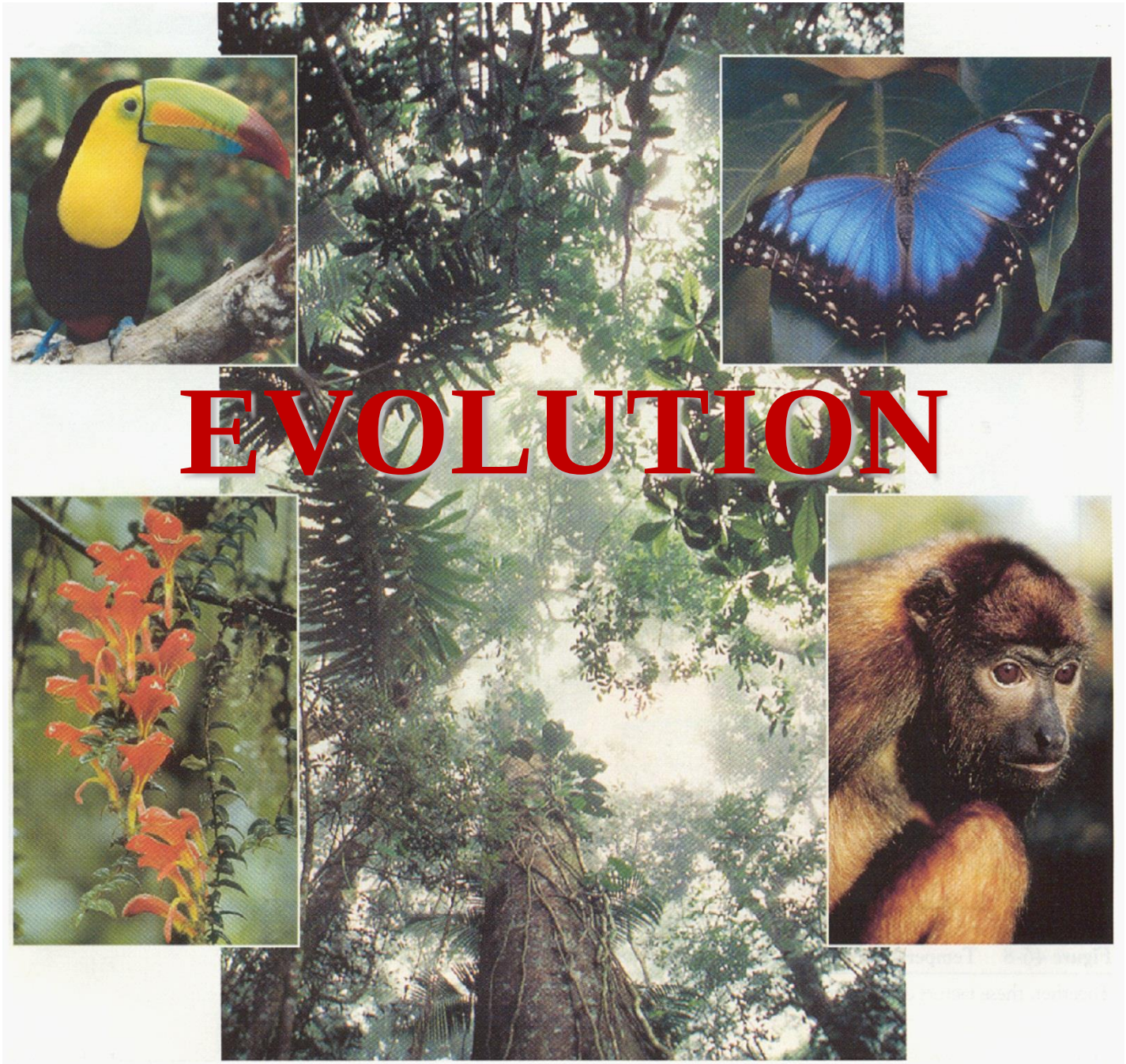
DAUGHTER SPECIES

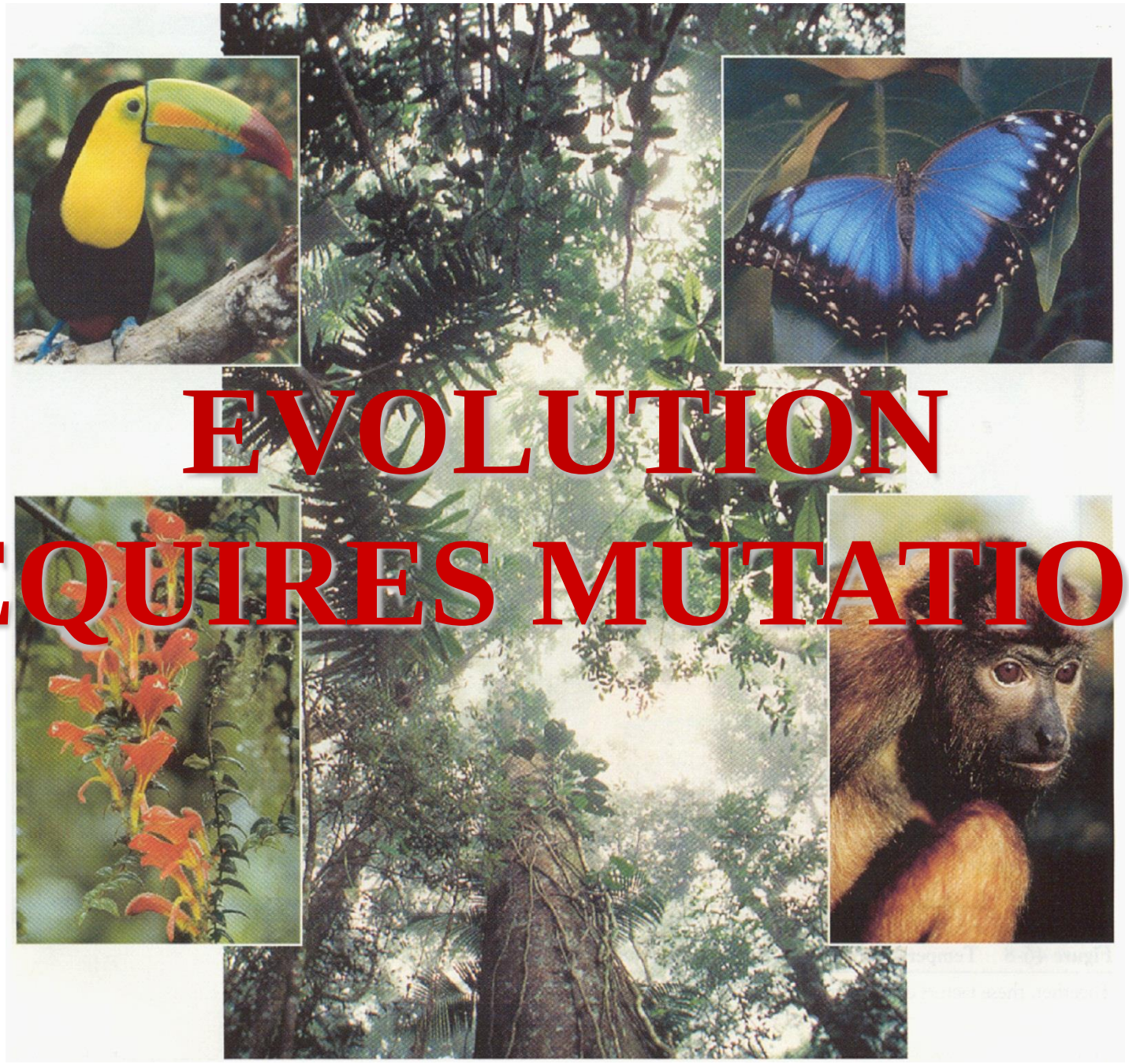
NATURAL SELECTION

E

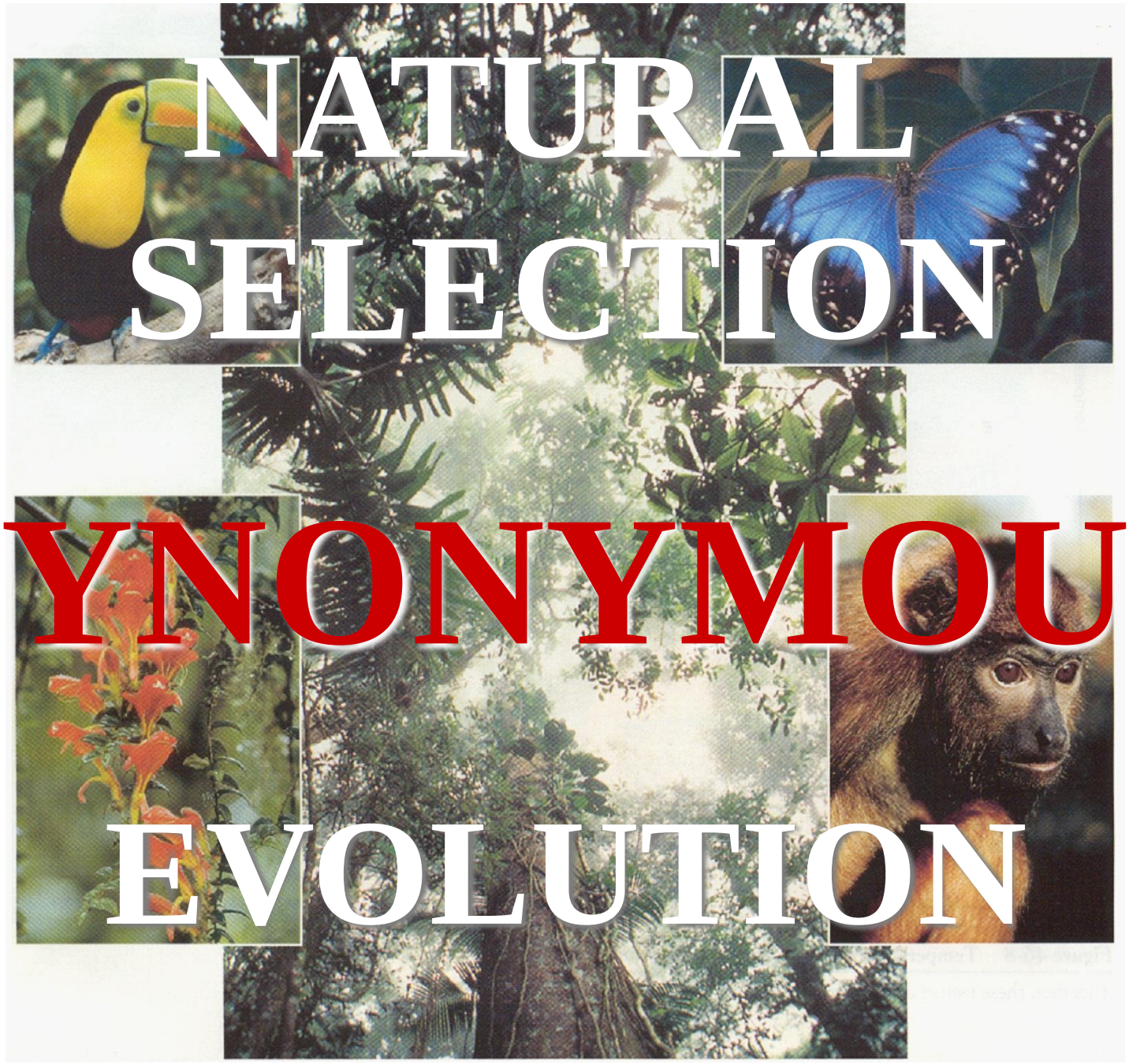


NATURAL SELECTION REQUIRES MUTATIONS


EVOLUTION



EVOLUTION REQUIRES MUTATIONS


NATURAL
SELECTION
SYNONYMOUS
EVOLUTION

SUMMARY

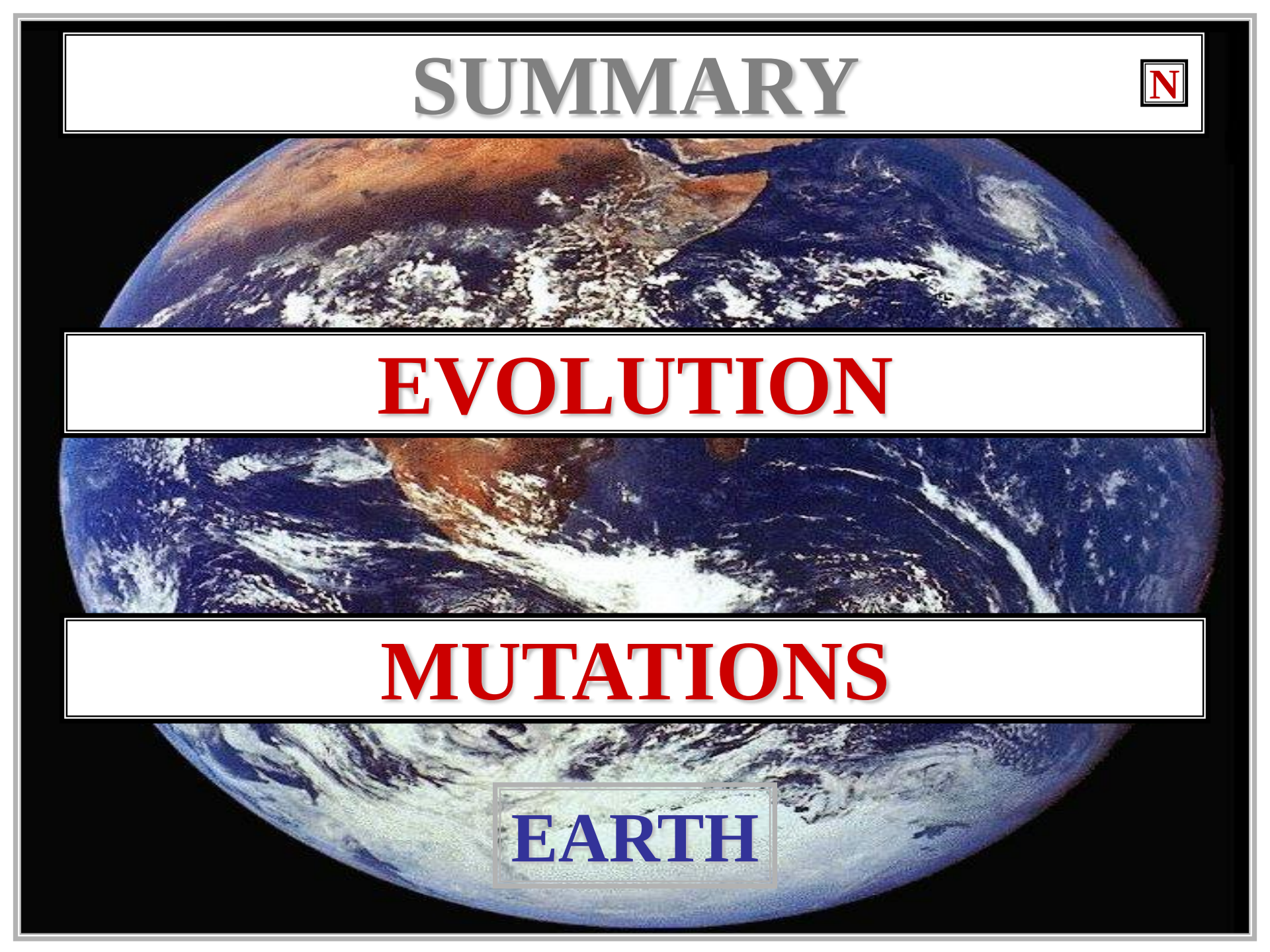
E

SUMMARY

EVOLUTION

SUMMARY

N



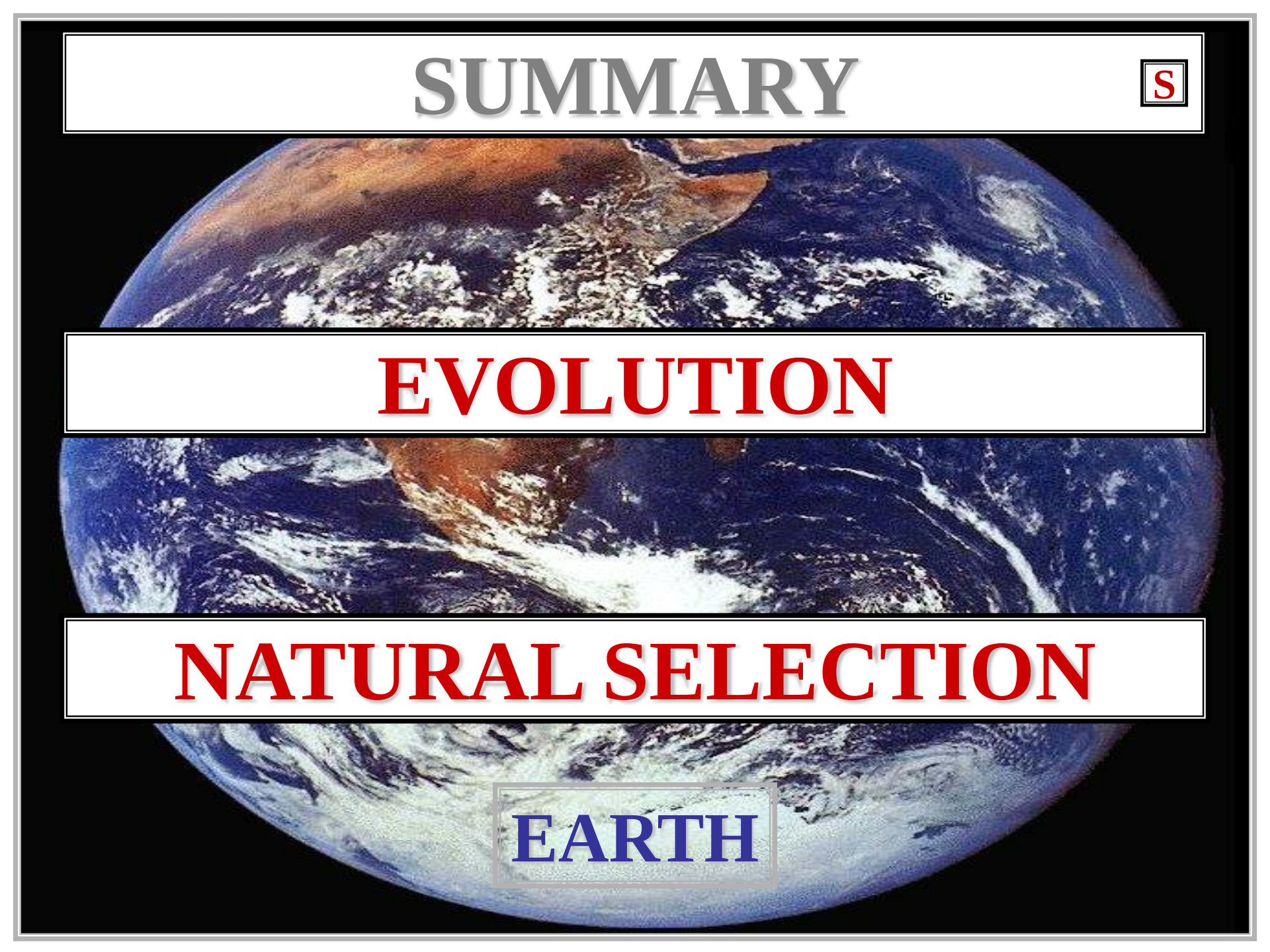
EVOLUTION

MUTATIONS

EARTH

SUMMARY

S



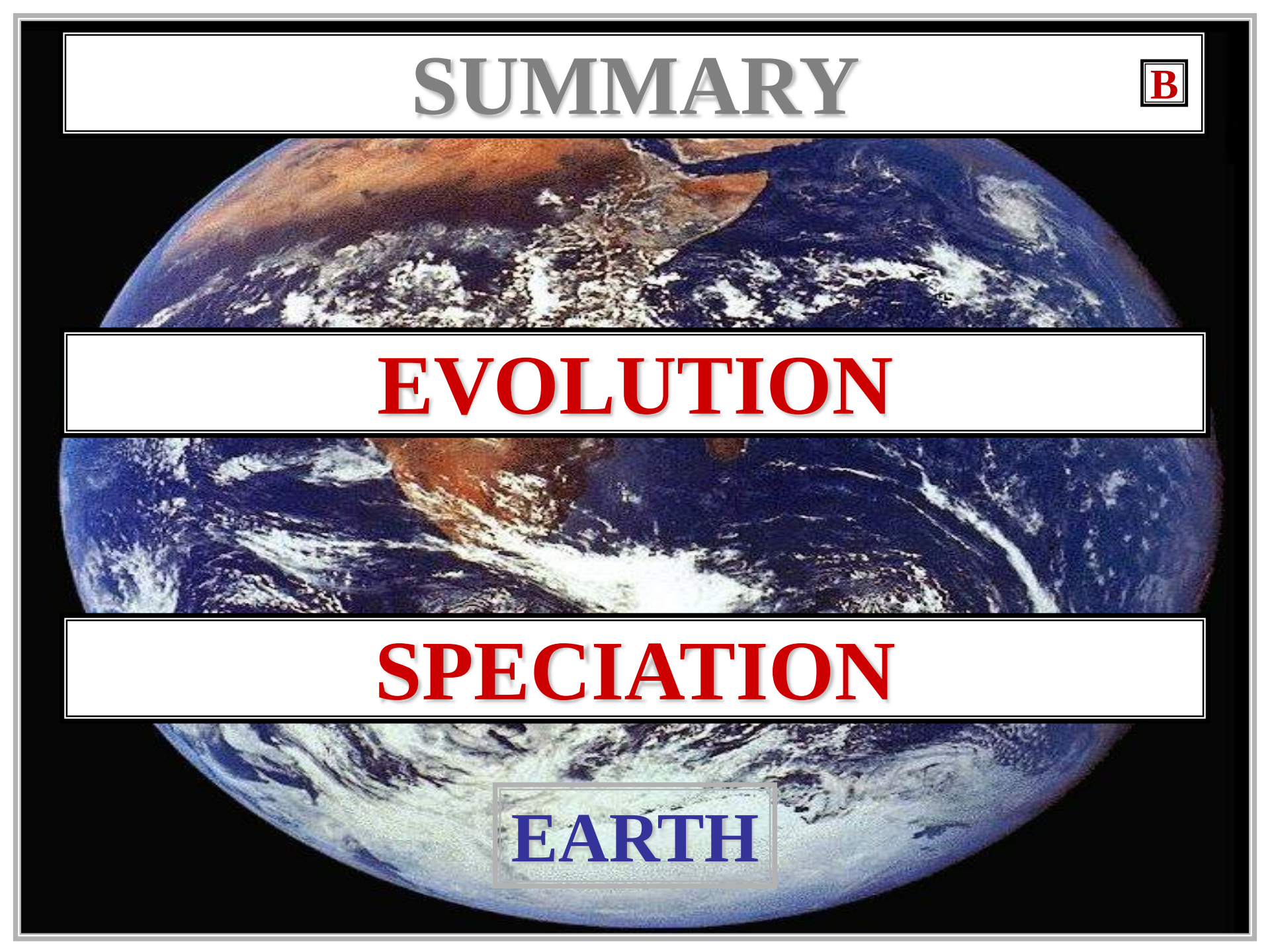
EVOLUTION

NATURAL SELECTION

EARTH

SUMMARY

B

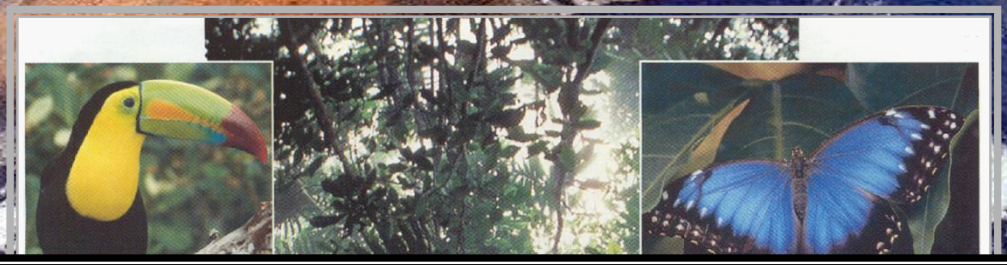


EVOLUTION

SPECIATION

EARTH

SUMMARY



EVOLUTION

BIO-DIVERSITY

EARTH

#

BIO-DIVERSITY


~10 MILLION SPECIES
EARTH

BIOLOGY DISCIPLINES

BIOLOGY DISCIPLINES

MICROBIOLOGY

BIOLOGY DISCIPLINES

BIOLOGY DISCIPLINES

MICROBIOLOGY
MYCOLOGY

BIOLOGY DISCIPLINES

BIOLOGY DISCIPLINES

MICROBIOLOGY
MYCOLOGY
ZOOLOGY

BIOLOGY DISCIPLINES

M

BIOLOGY DISCIPLINES

MICROBIOLOGY

MYCOLOGY

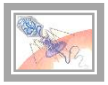
ZOOLOGY

BOTANY

BIOLOGY DISCIPLINES

MICROBIOLOGY

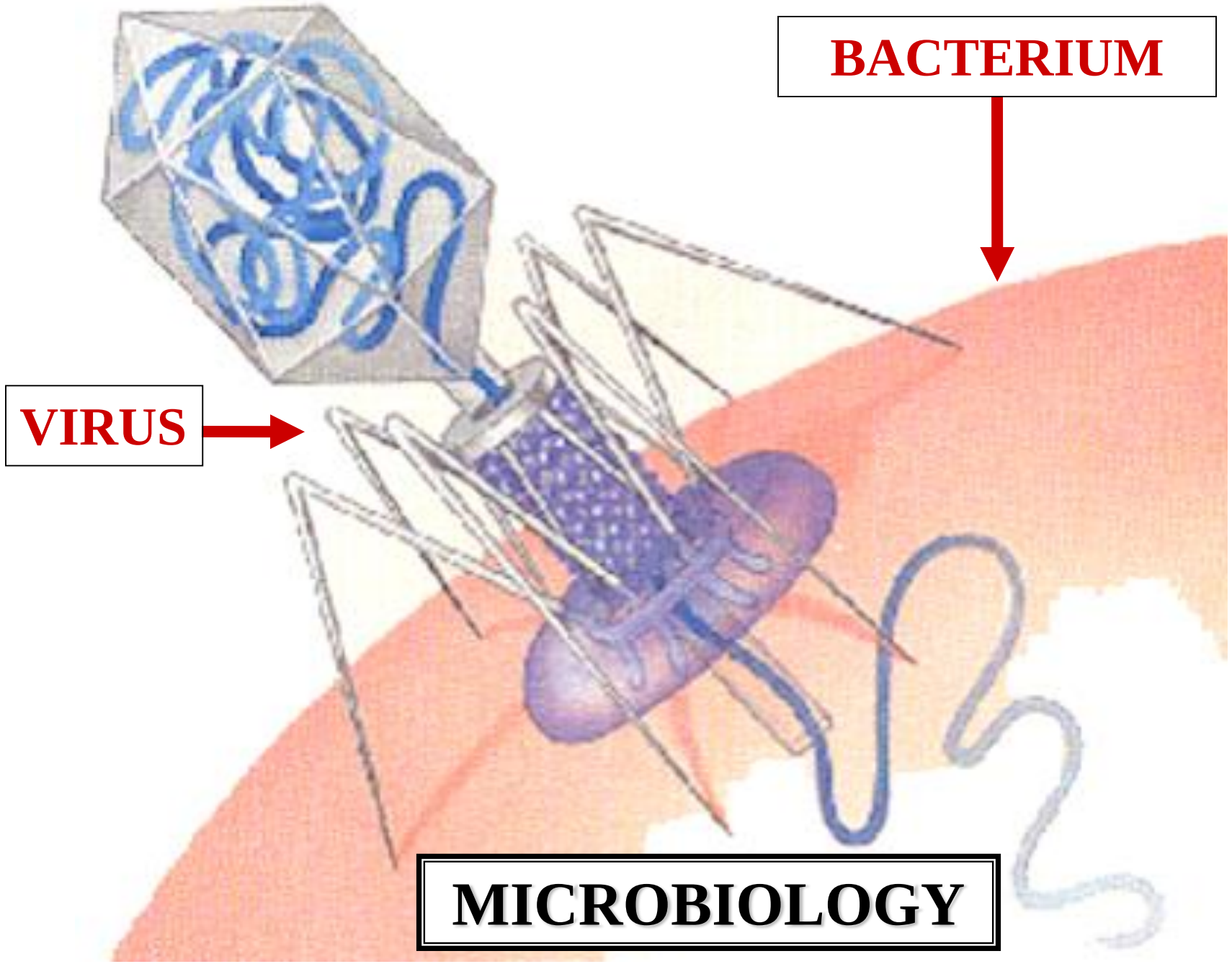
MICROBIOLOGY



STUDY
BACTERIA & VIRUSES

MICROBIOLOGY

M



MICROBIOLOGY