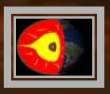
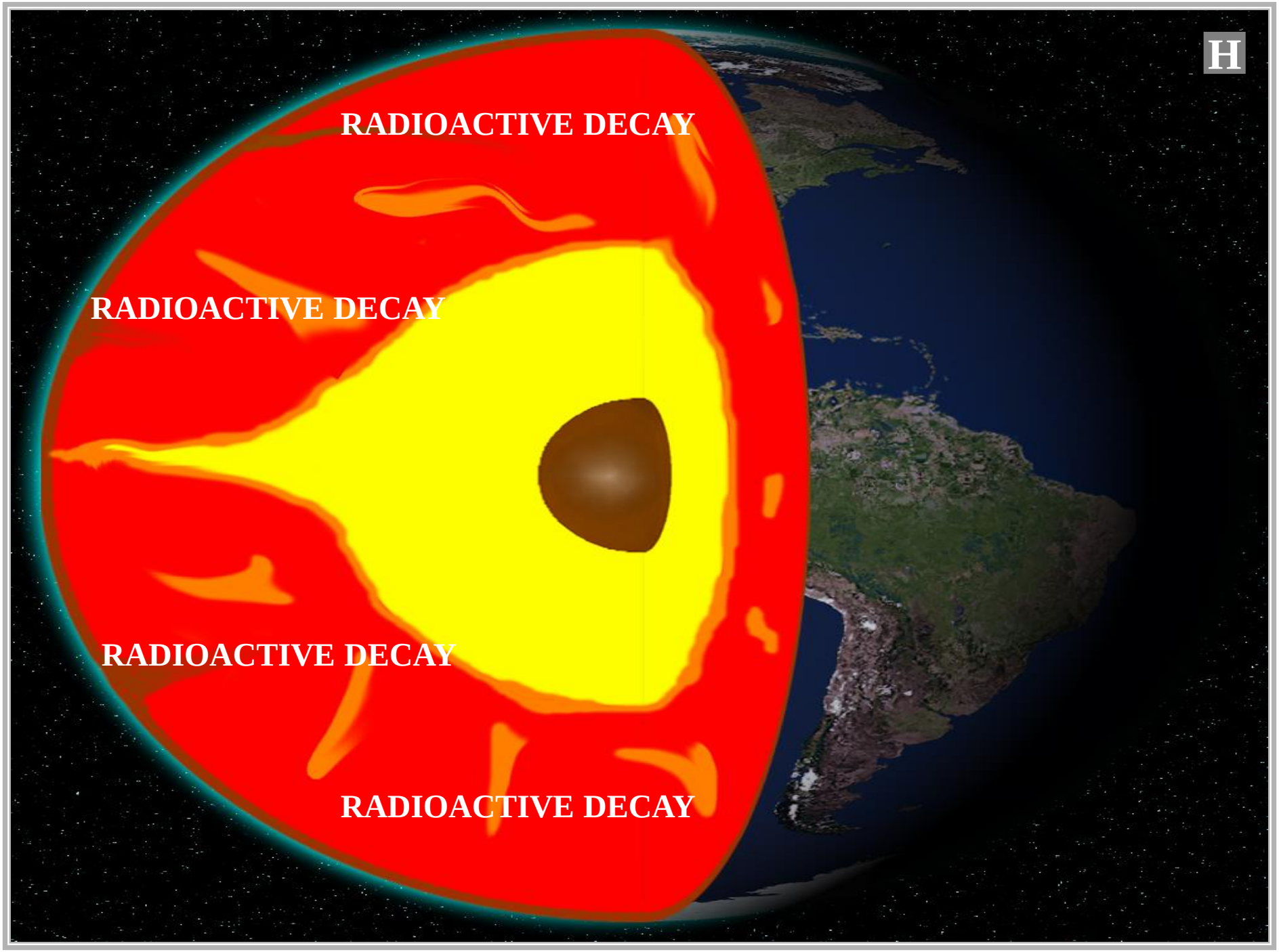
EARTH ORIGIN



ATMOSPHERE: ABSENT

PRIMORDIAL EARTH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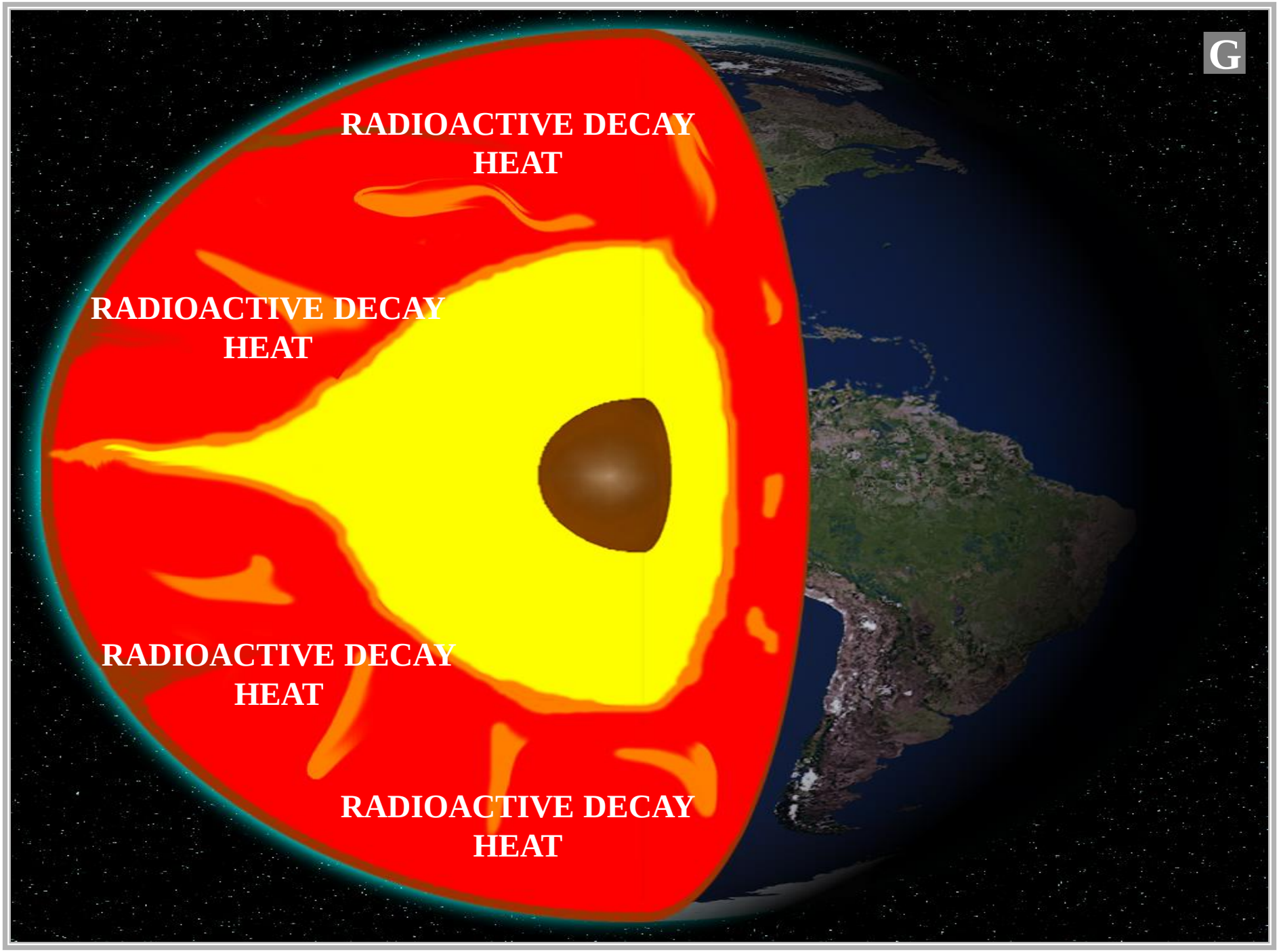
RADIOACTIVE DECAY
RADIOACTIVE DECAY
RADIOACTIVE DECAY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RADIOACTIVE DECAY
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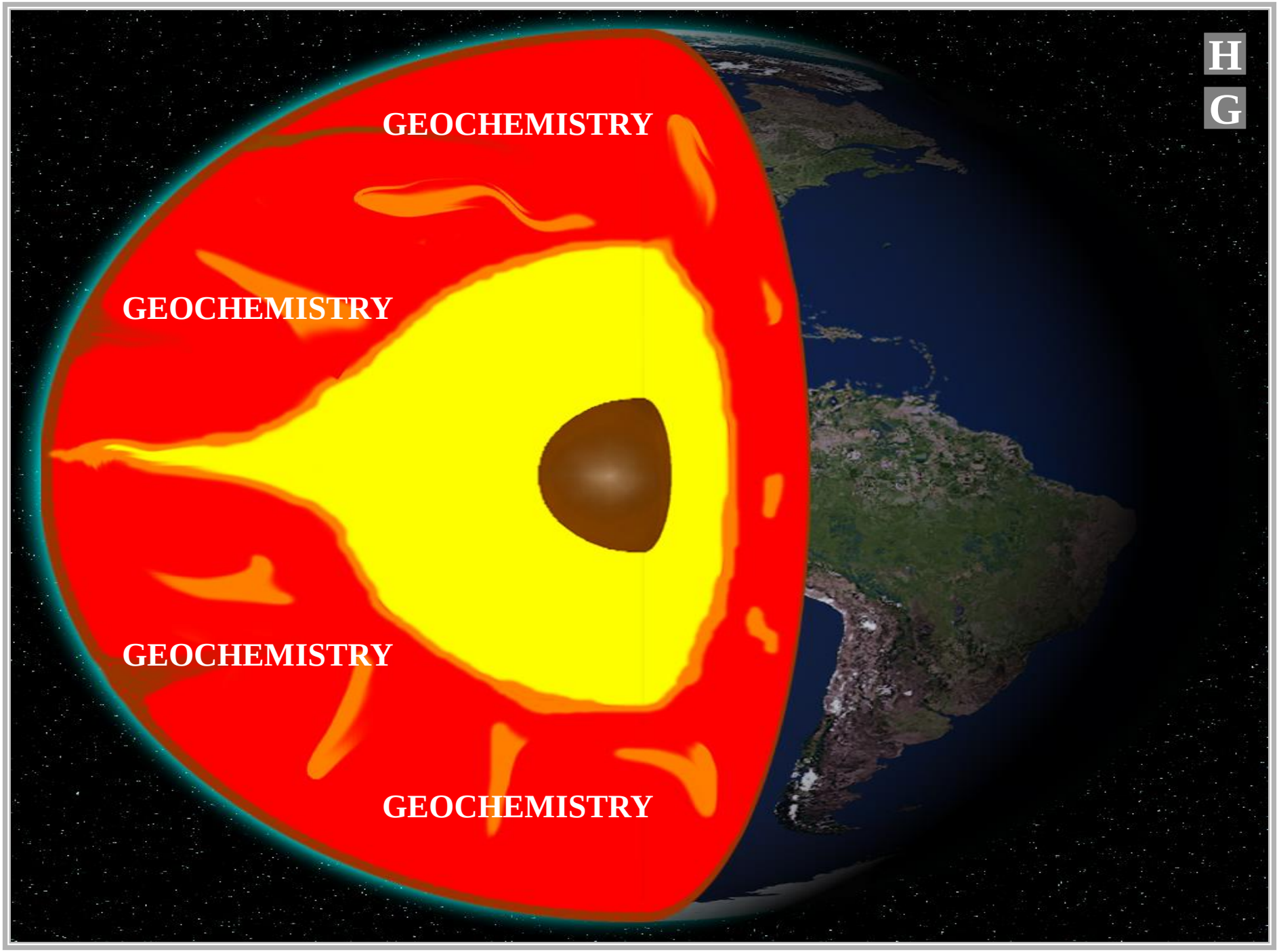
RADIOACTIVE DECAY
HEAT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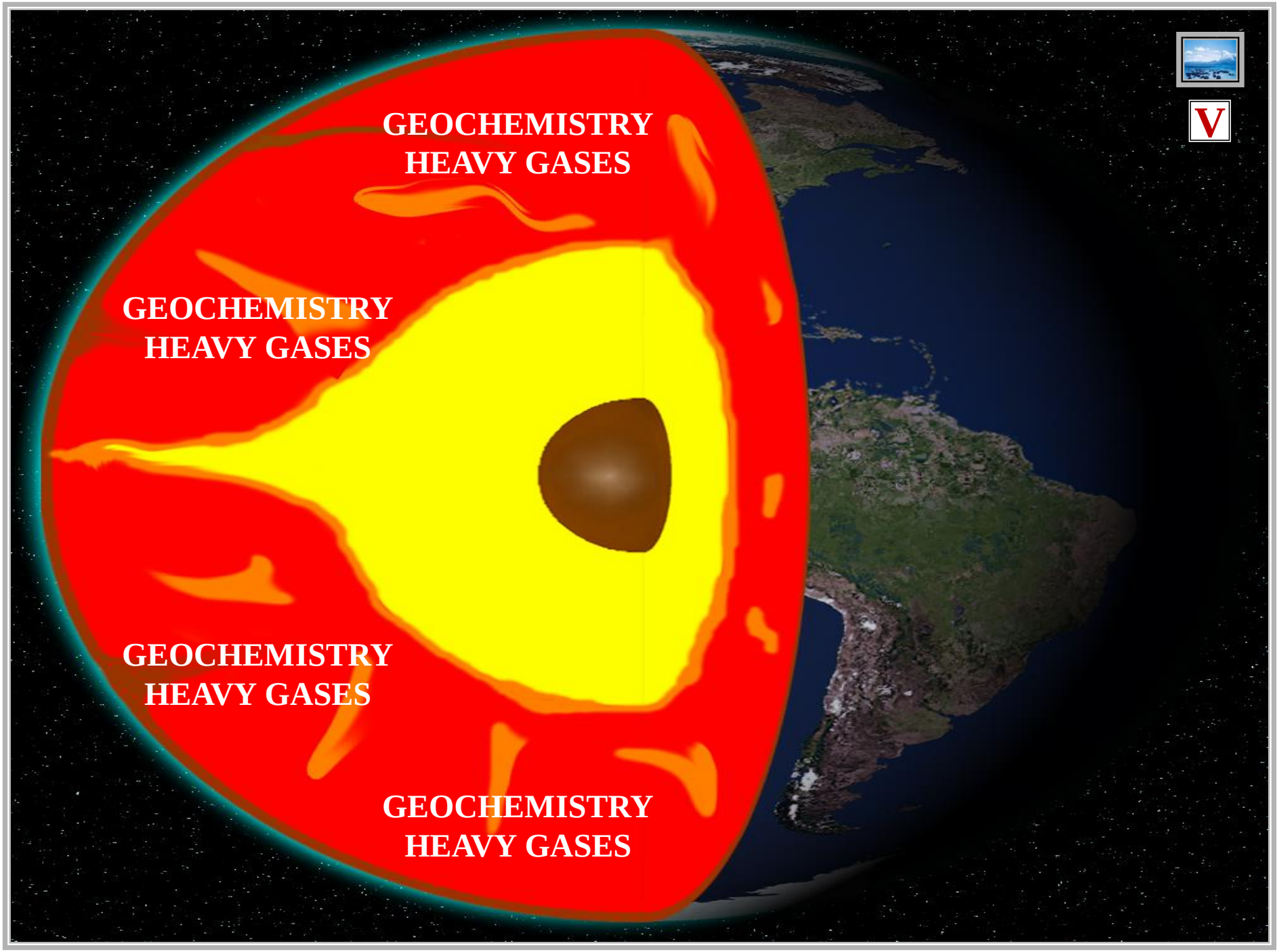
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HEAVY GASES
GEOCHEMISTRY
HEAVY GASES
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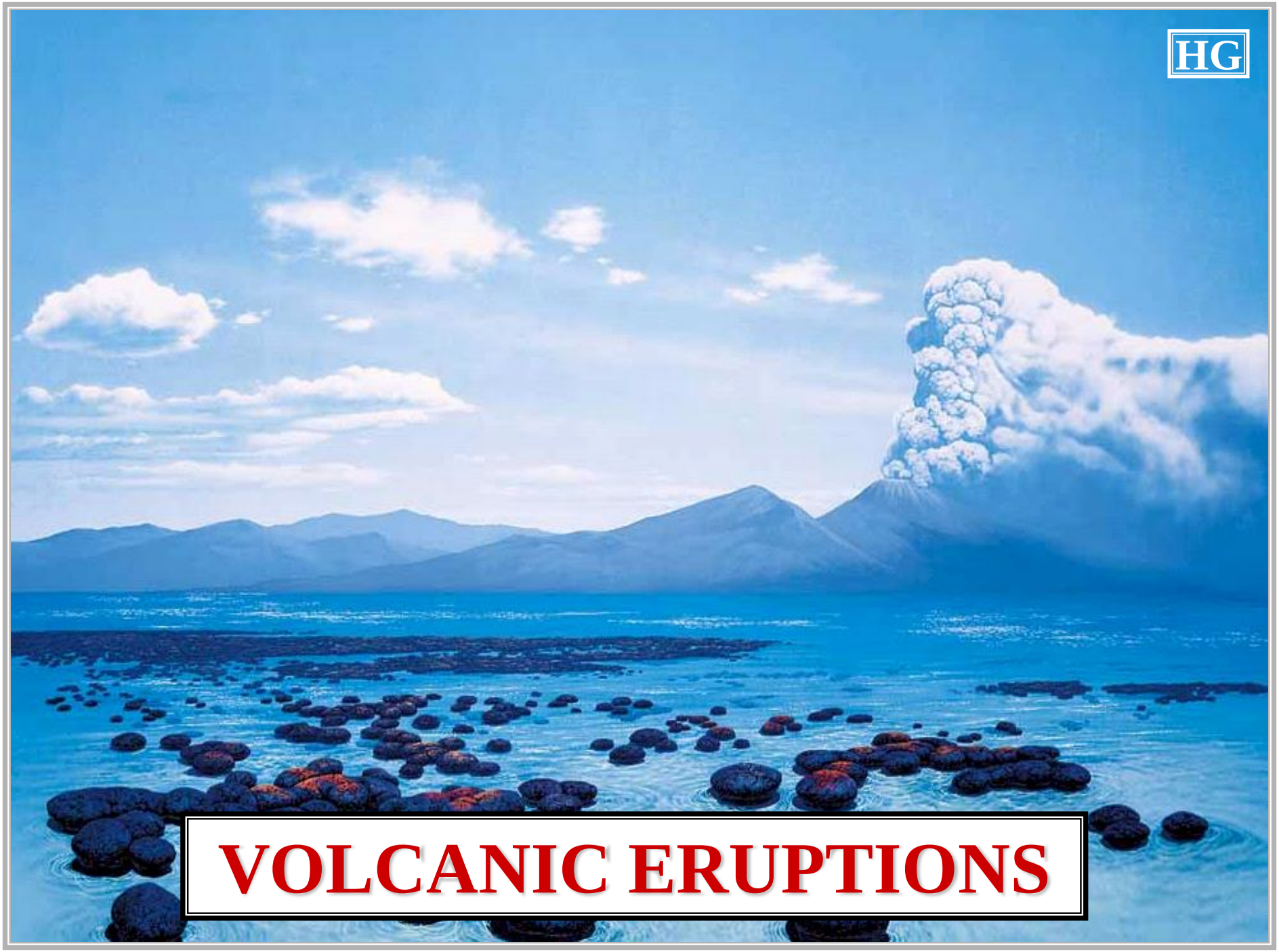
GEOCHEMISTRY
HEAVY GASES
V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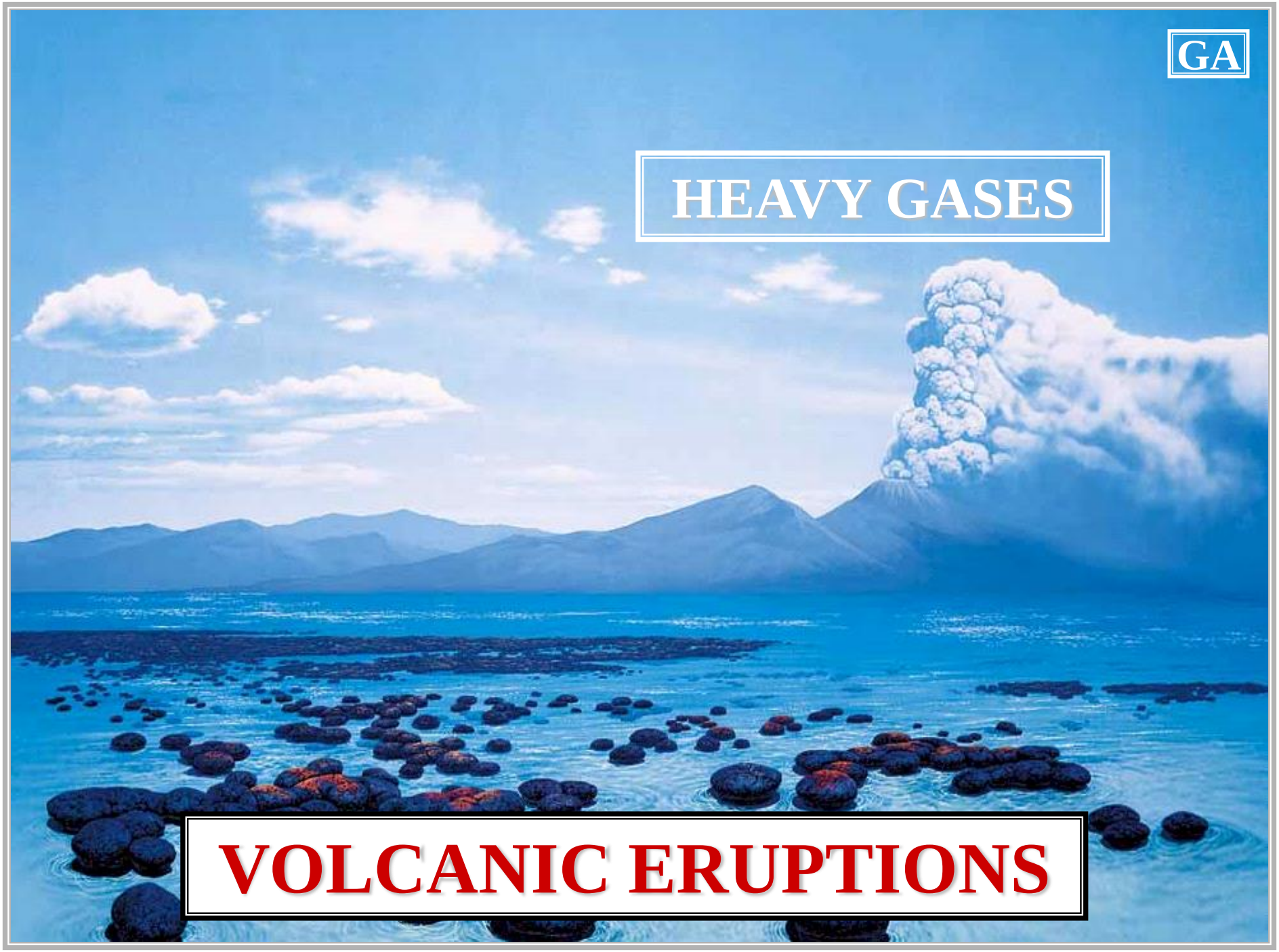
VOLCANIC ERUPTIONS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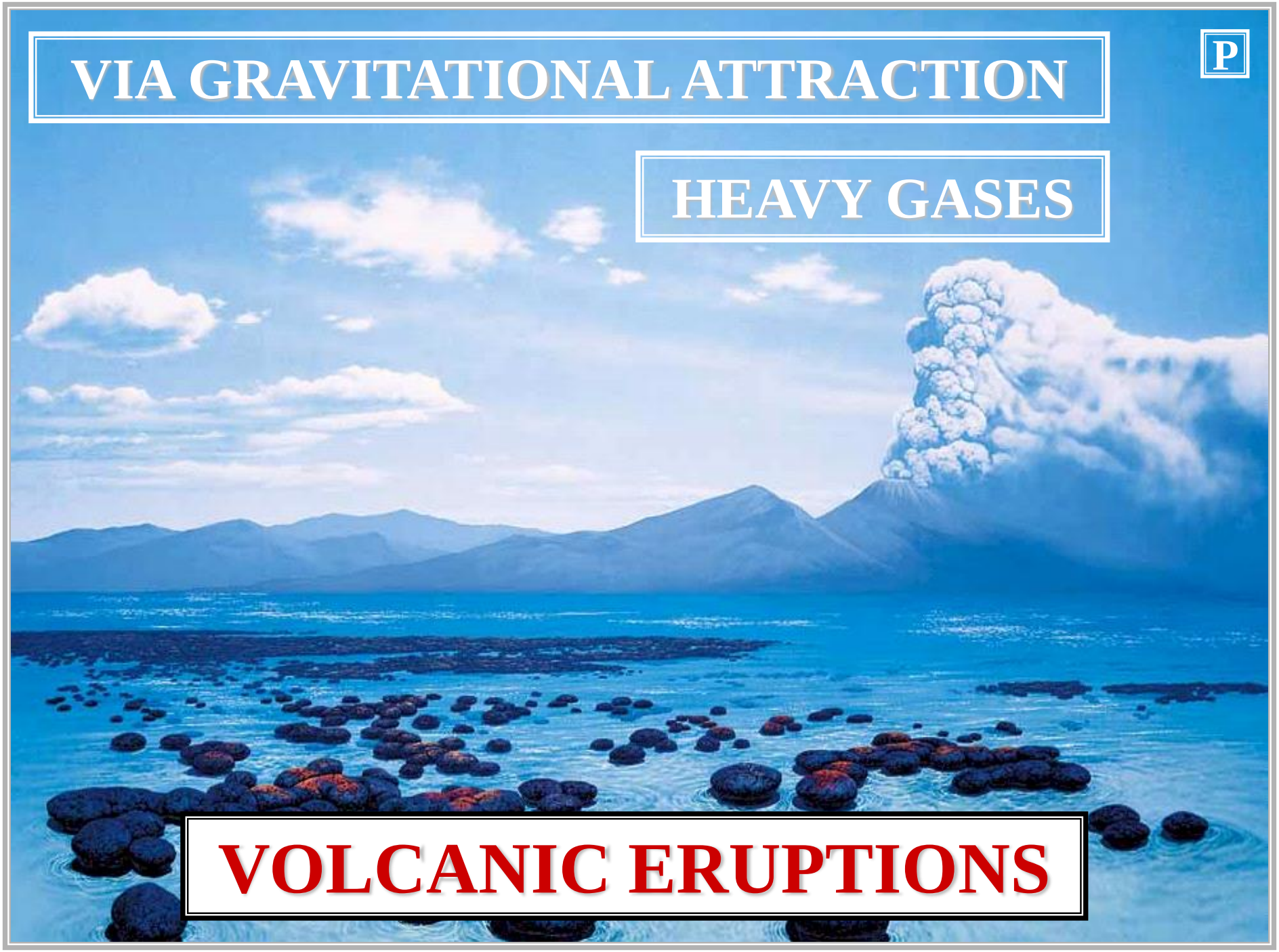
HEAVY GASES
VOLCANIC ERUPTIONS


VIA GRAVITATIONAL ATTRACTION
P
HEAVY GASES
VOLCANIC ERUPTIONS

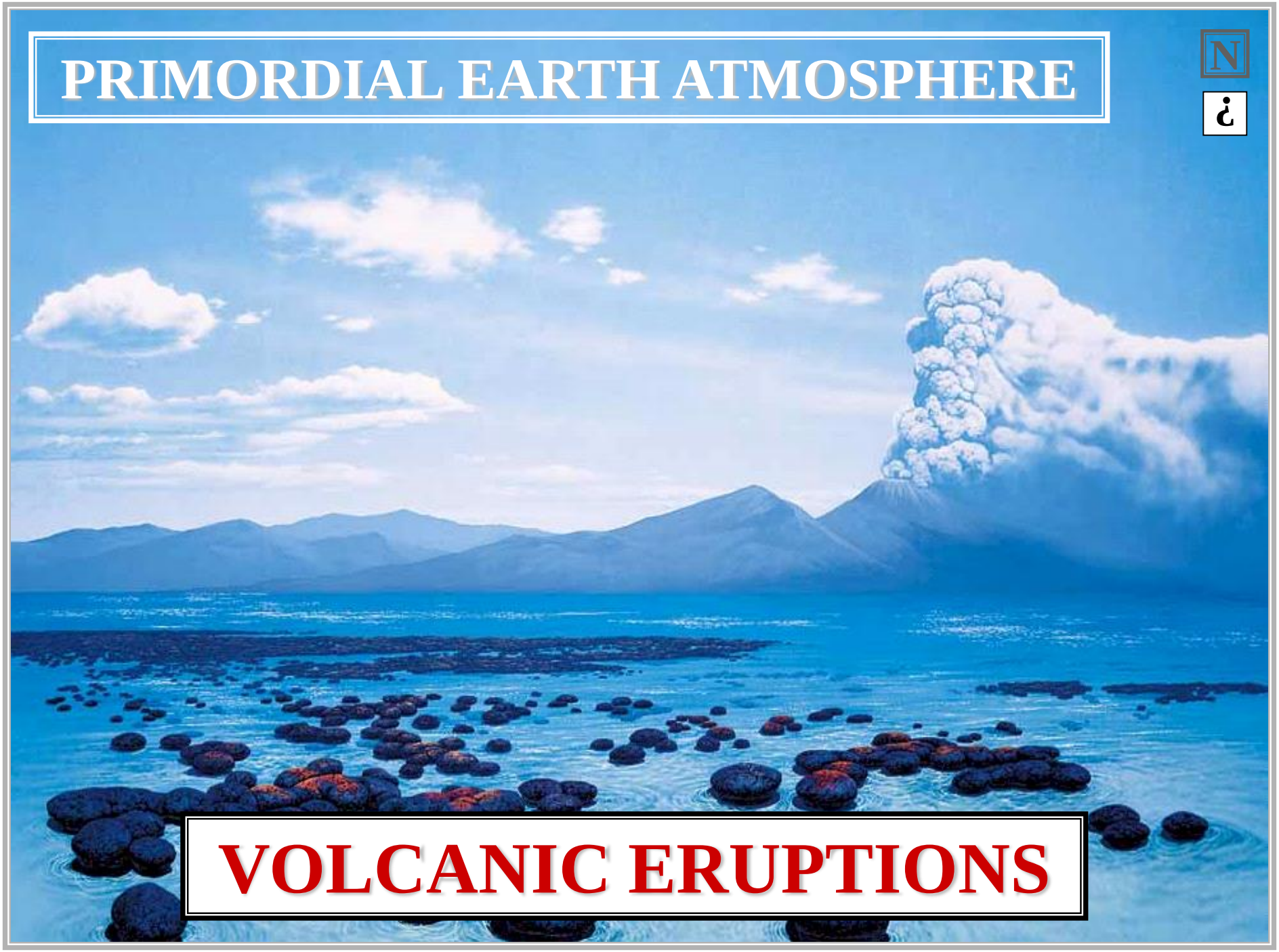
PRIMORDIAL EARTH ATMOSPHERE

HEAVY GASES

VOLCANIC ERUPTIONS

EARTH PRIMORDIAL ATMOSPHERE

PRIMORDIAL EARTH ATMOSPHERE

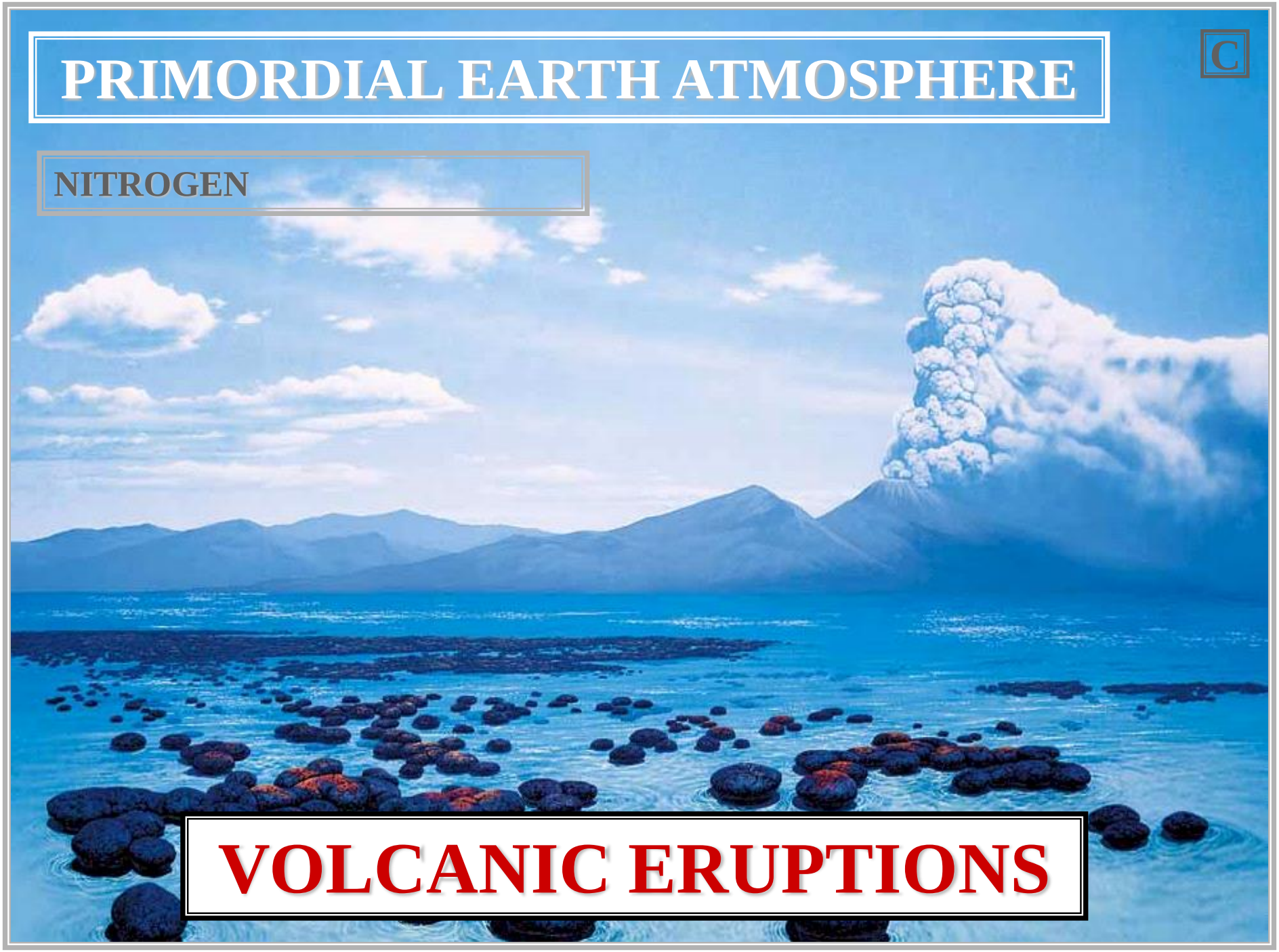


VOLCANIC ERUPTIONS

PRIMORDIAL EARTH ATMOSPHERE

C

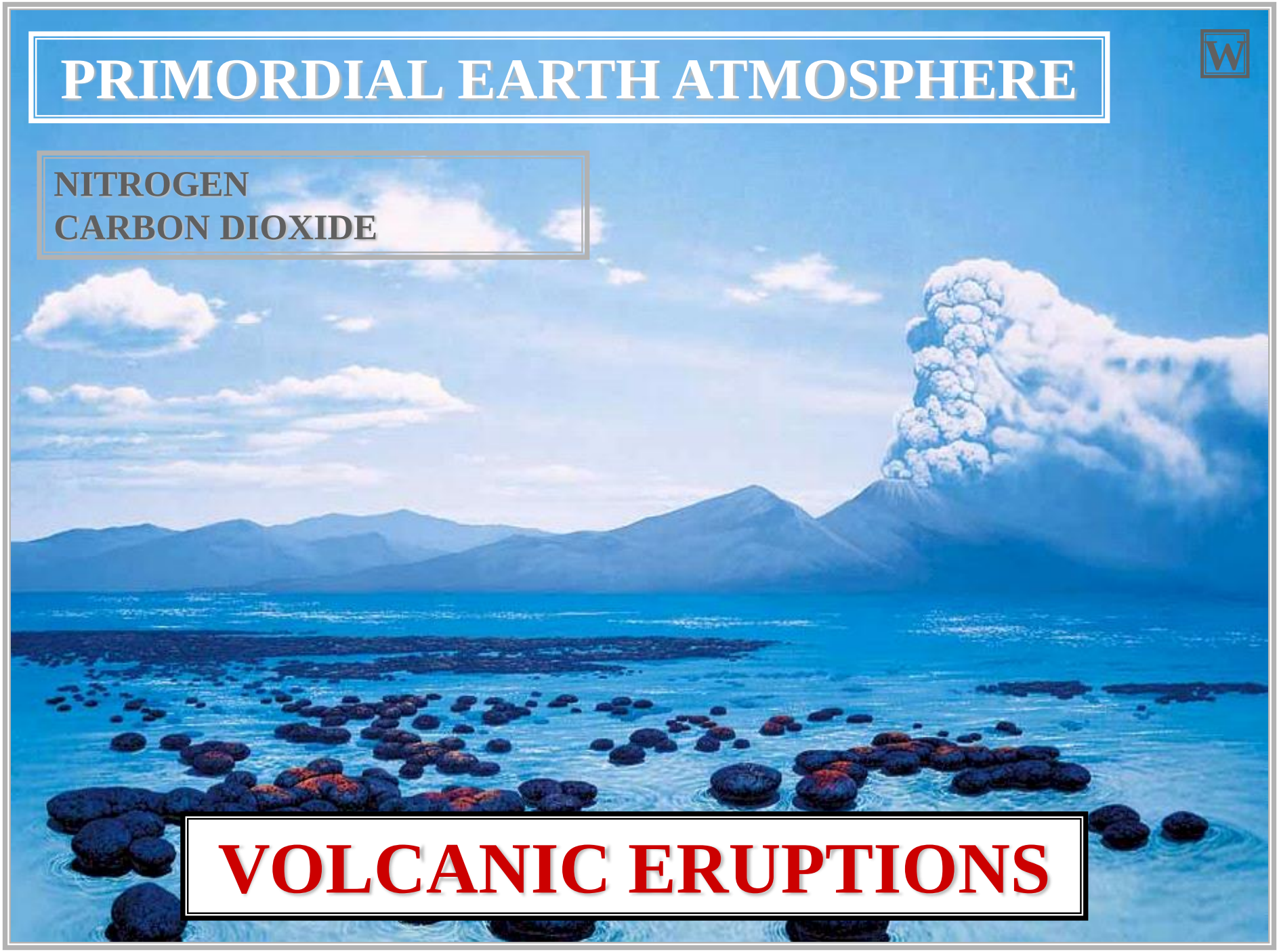
NITROGEN



VOLCANIC ERUPTIONS

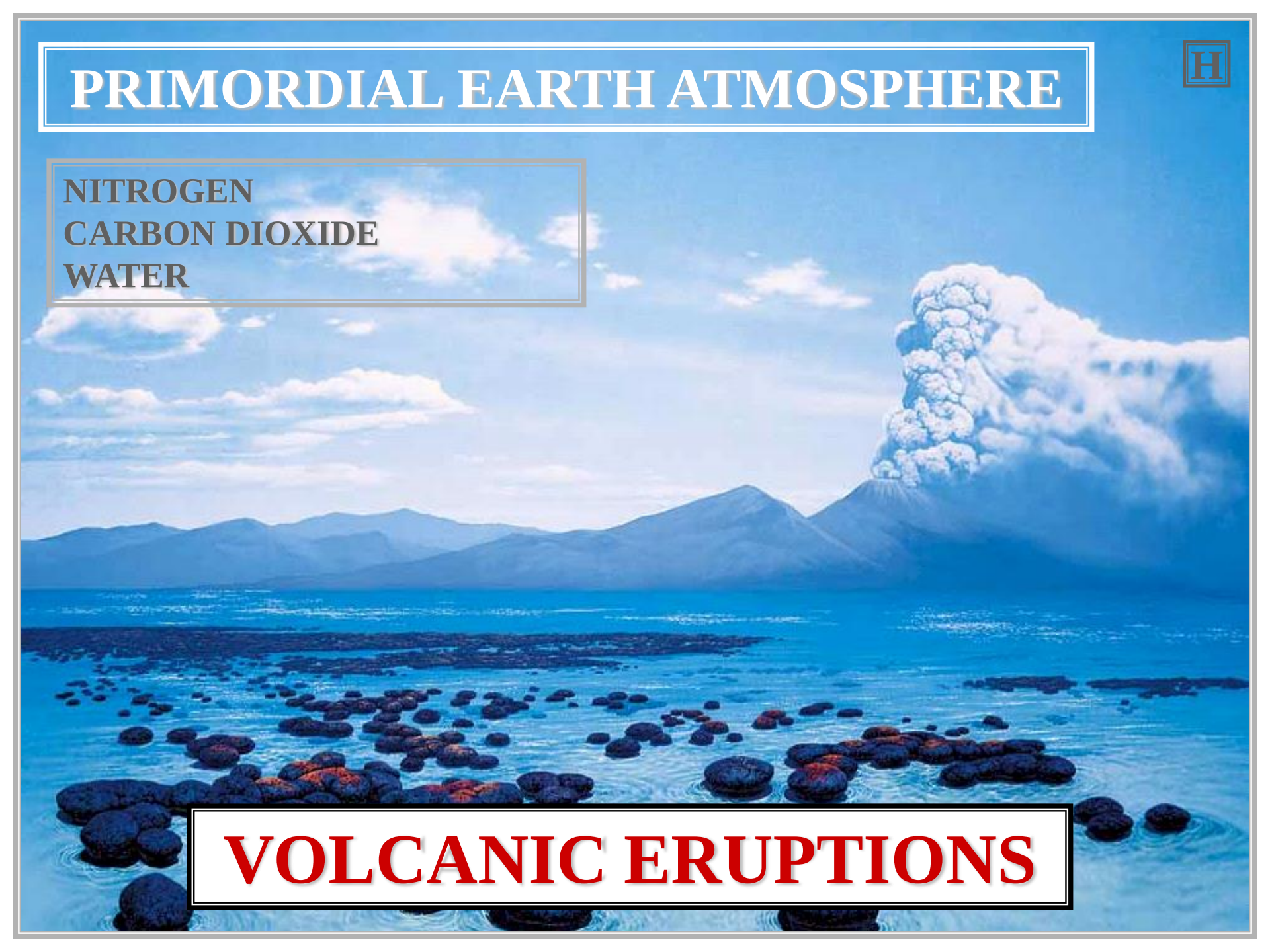
PRIMORDIAL EARTH ATMOSPHERE

NITROGEN
CARBON DIOXIDE



VOLCANIC ERUPTIONS

PRIMORDIAL EARTH ATMOSPHERE

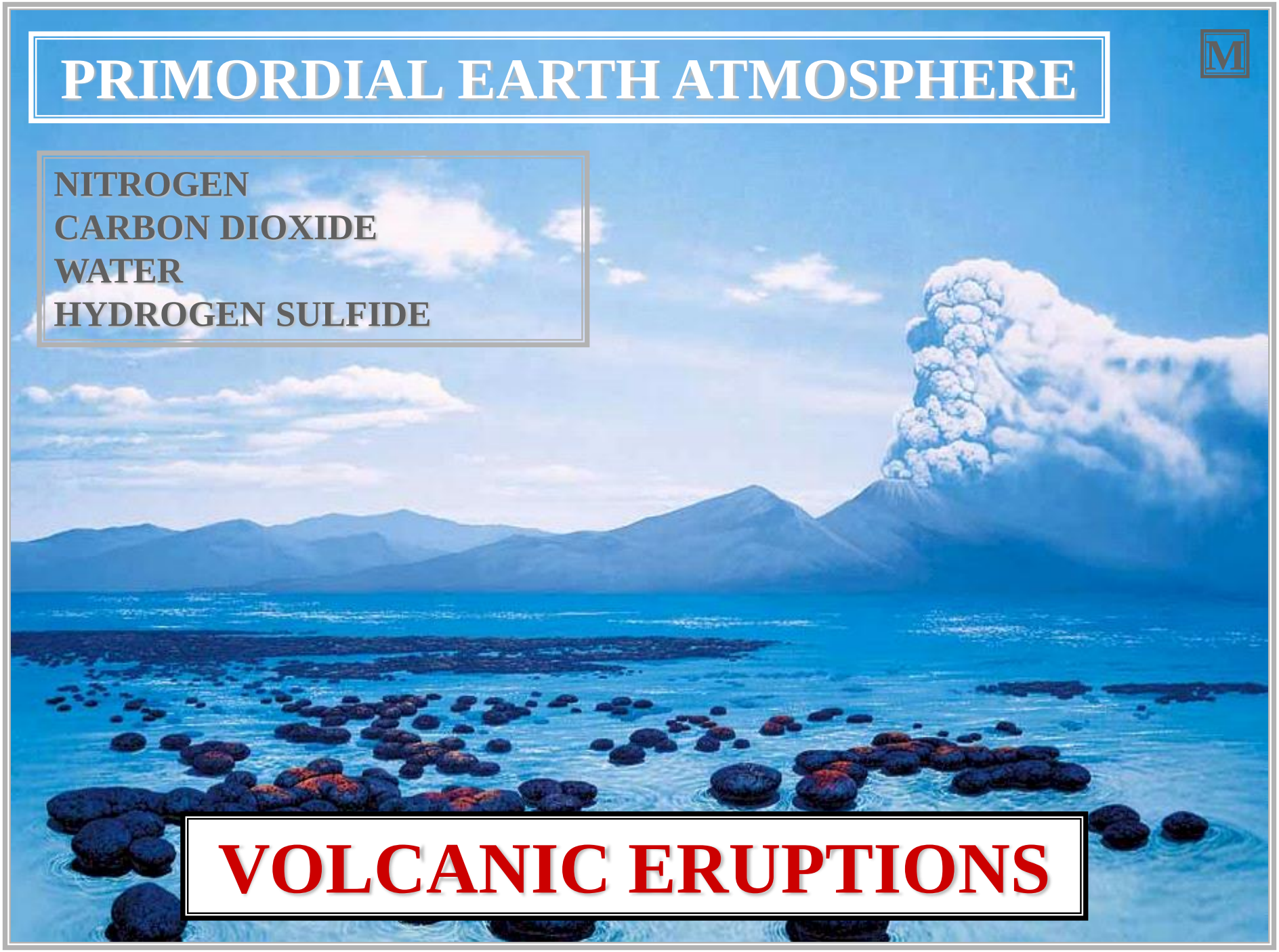


NITROGEN
CARBON DIOXIDE
WATER

VOLCANIC ERUPTIONS

PRIMORDIAL EARTH ATMOSPHERE

NITROGEN
CARBON DIOXIDE
WATER
HYDROGEN SULFIDE

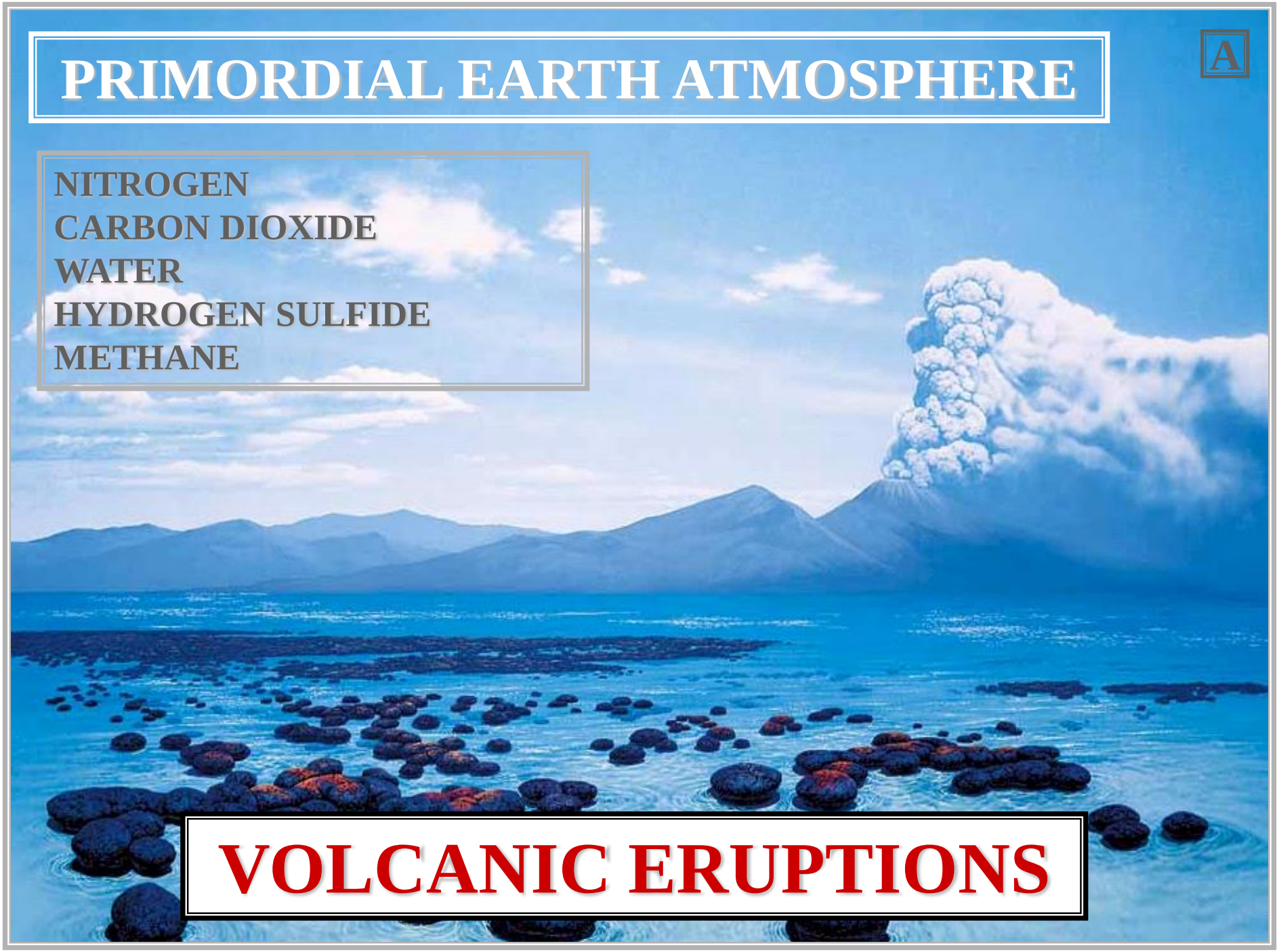


VOLCANIC ERUPTIONS

PRIMORDIAL EARTH ATMOSPHERE

A

NITROGEN
CARBON DIOXIDE
WATER
HYDROGEN SULFIDE
METHANE



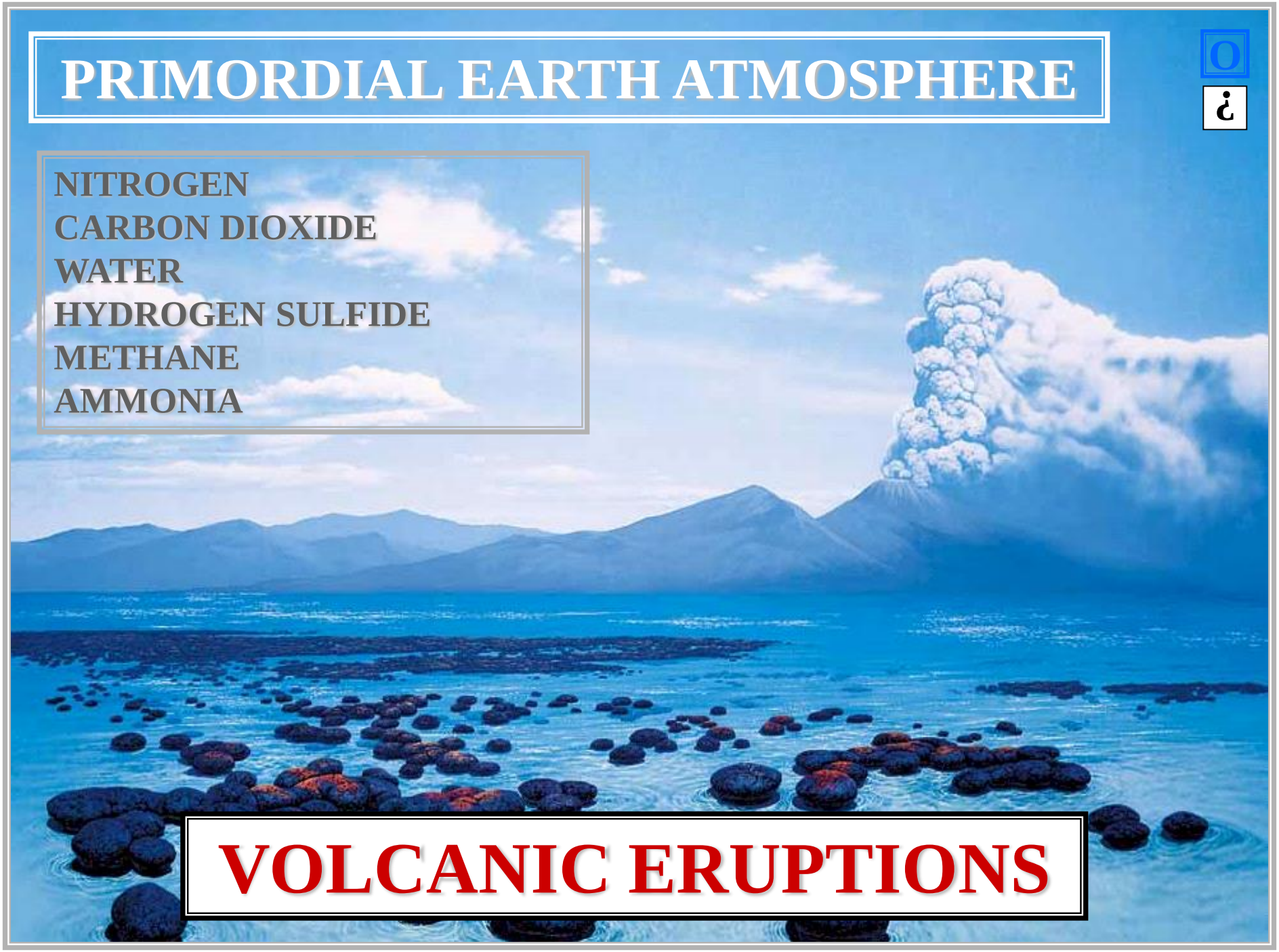
VOLCANIC ERUPTIONS

PRIMORDIAL EARTH ATMOSPHERE

O

¿

NITROGEN
CARBON DIOXIDE
WATER
HYDROGEN SULFIDE
METHANE
AMMONIA



VOLCANIC ERUPTIONS

PRIMORDIAL EARTH ATMOSPHERE

A

NITROGEN
CARBON DIOXIDE
WATER
HYDROGEN SULFIDE
METHANE
AMMONIA

OXYGEN ABSENT

VOLCANIC ERUPTIONS

PRIMORDIAL EARTH ATMOSPHERE

NITROGEN
CARBON DIOXIDE
WATER
HYDROGEN SULFIDE
METHANE
AMMONIA

ANAEROBIC ATMOSPHERE

VOLCANIC ERUPTIONS

C

CHEMICAL EVOLUTION

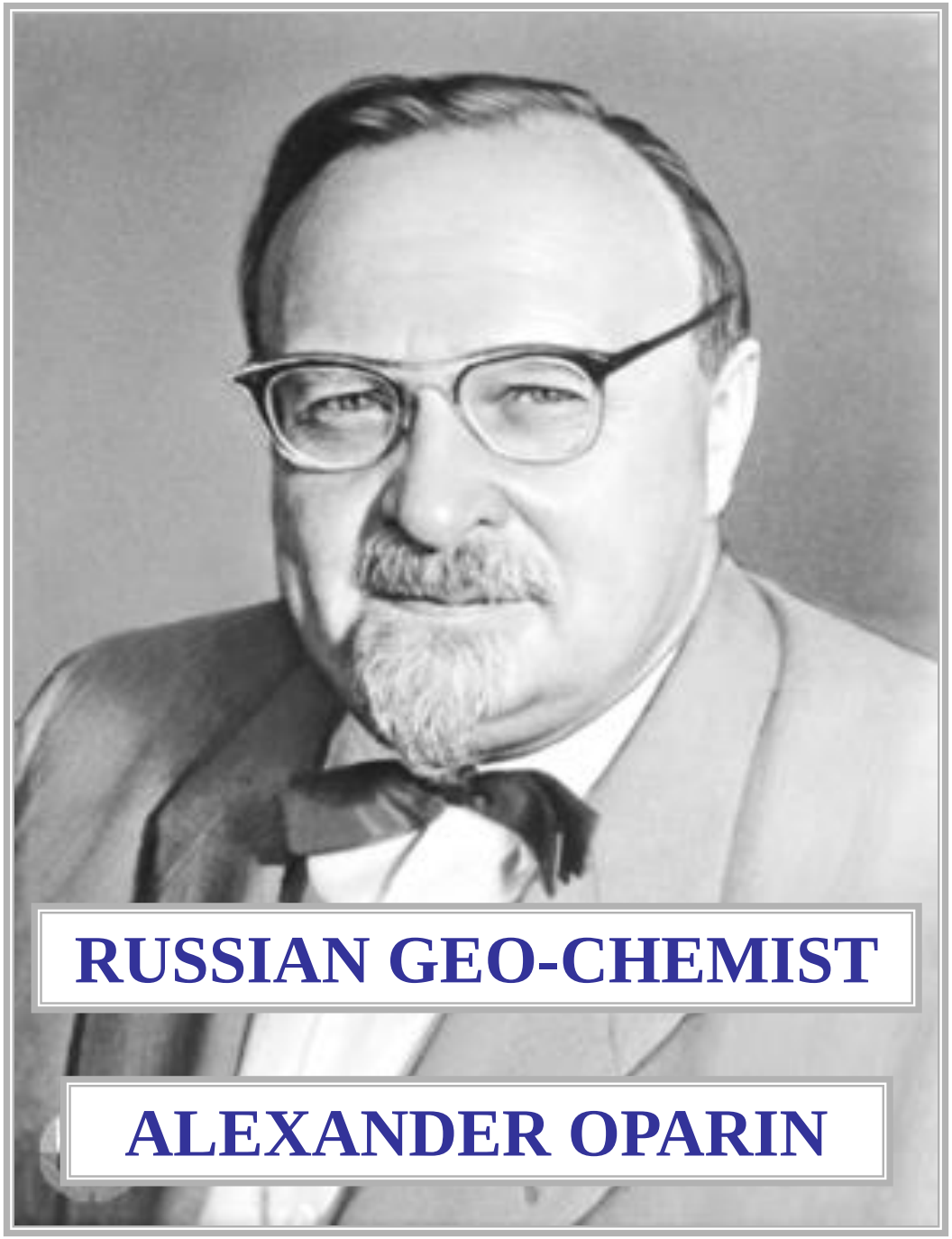
CHEMICAL EVOLUTION

CHEMICAL EVOLUTION

CONVERSION ATMOSPHERIC GASES TO COMPLEX ORGANIC COMPOUNDS

CHEMICAL EVOLUTION

OPARIN THEORY


RUSSIAN GEO-CHEMIST
ALEXANDER OPARIN

C

N_2 CO_2 H_2O
H_2S CH_4 NH_3

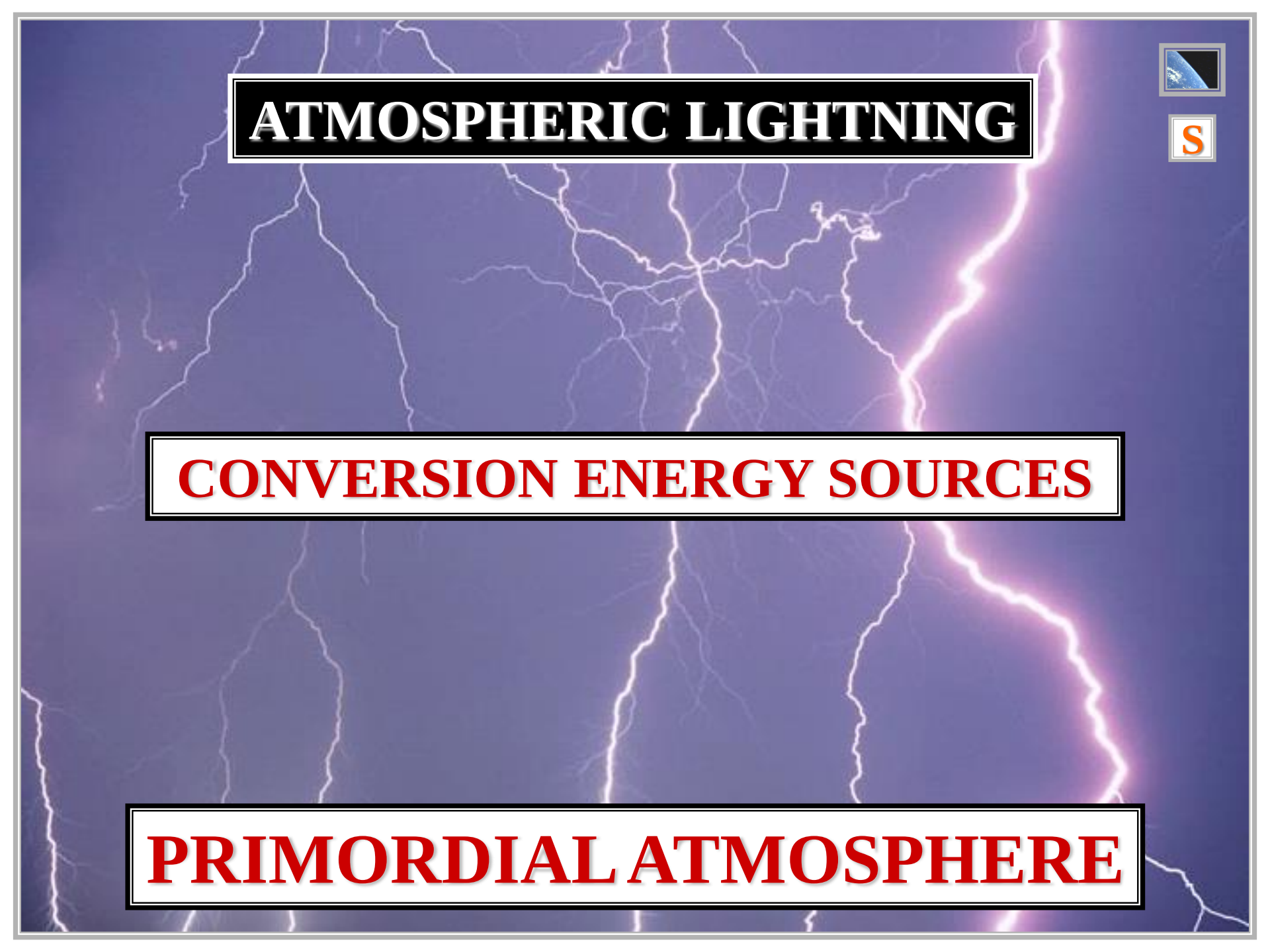
OPARIN THEORY EXPLAINS CONVERSION ATMOSPHERIC GASES TO COMPLEX ORGANIC COMPOUNDS

PRIMORDIAL ATMOSPHERE

N2 CO2 H2O
H2S CH4 NH3

CONVERSION ENERGY SOURCES

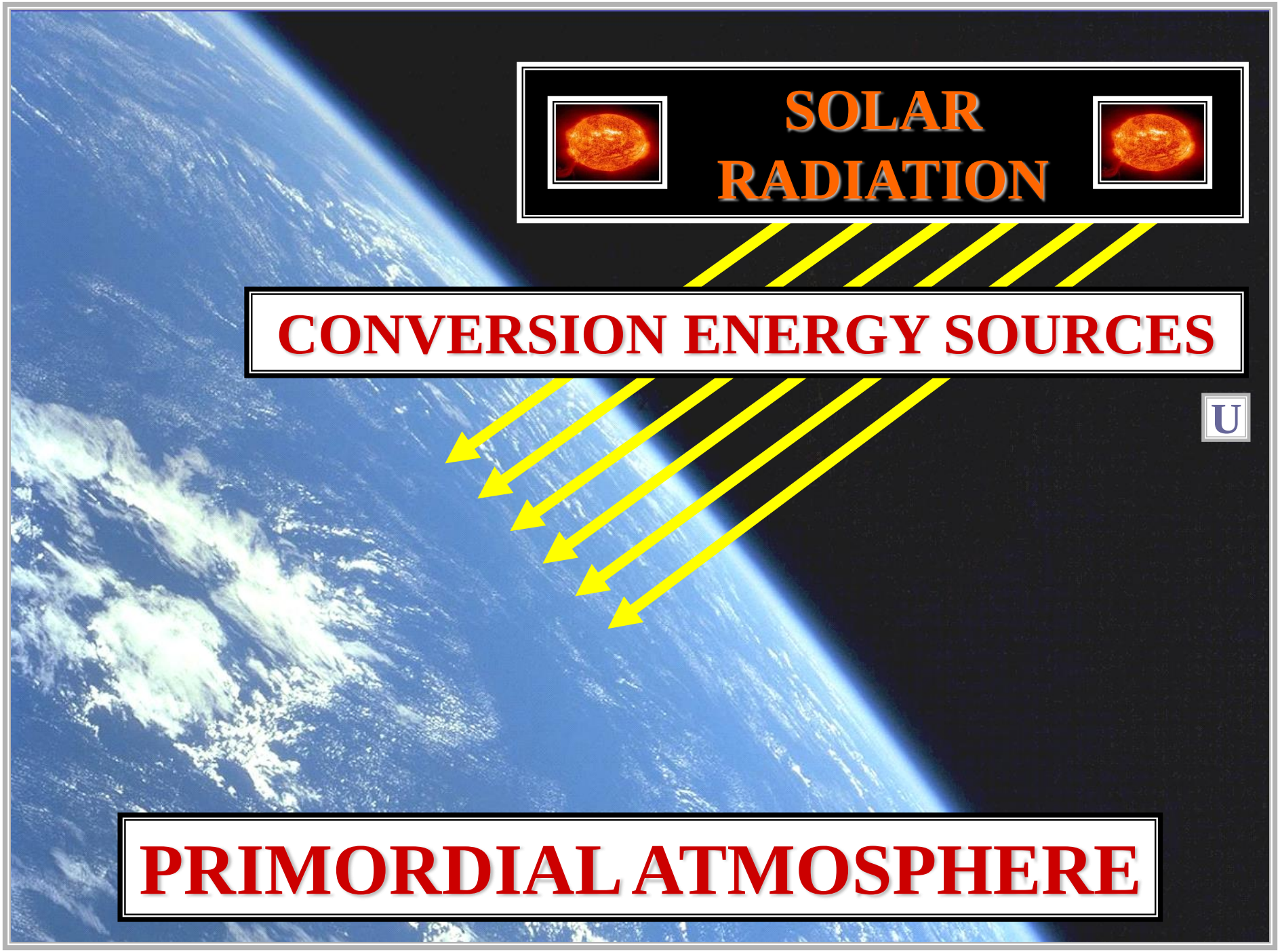
PRIMORDIAL ATMOSPHERE

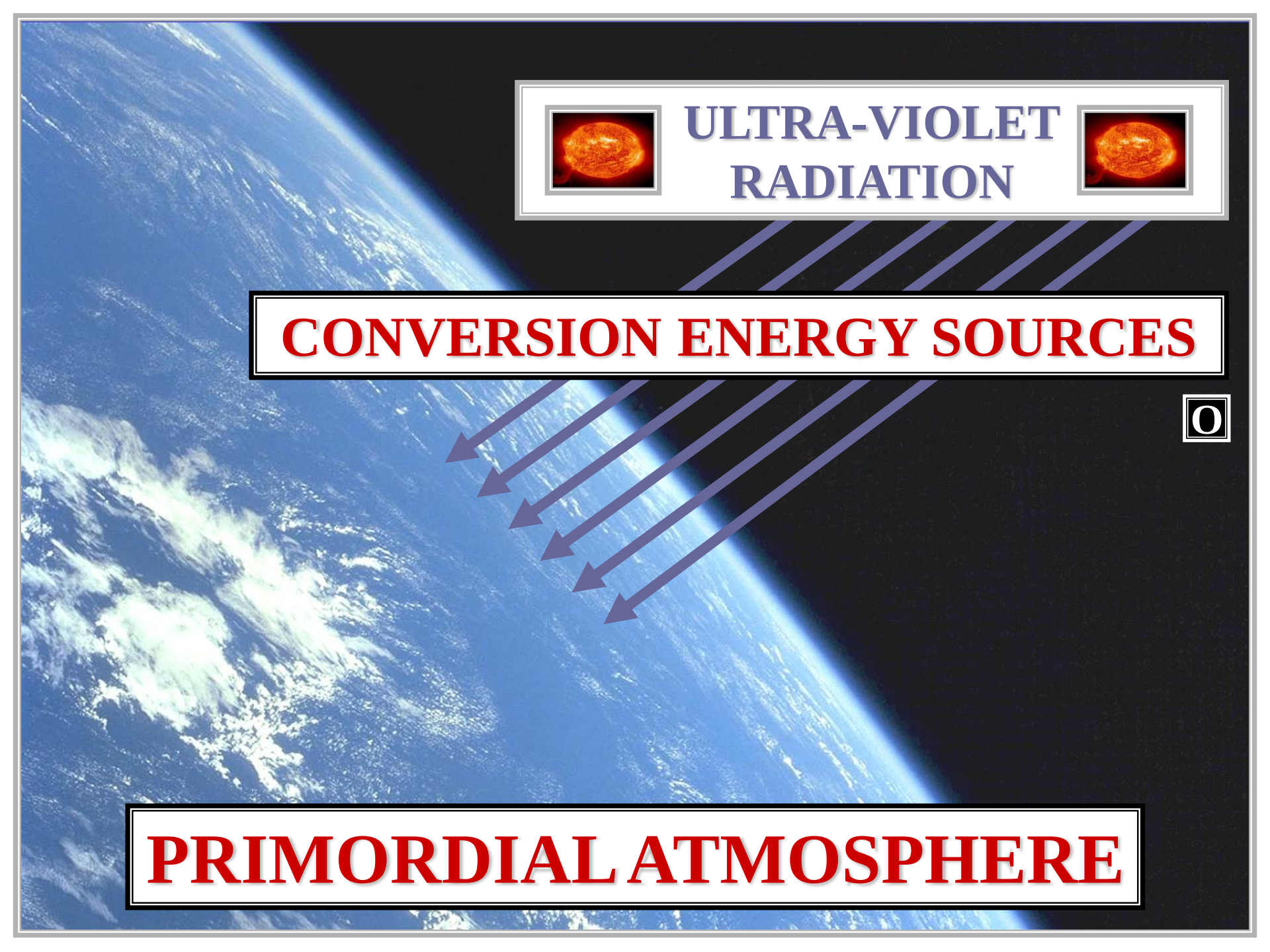


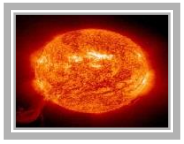
ATMOSPHERIC LIGHTNING

CONVERSION ENERGY SOURCES

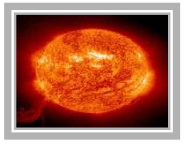
PRIMORDIAL ATMOSPHERE


SOLAR
RADIATION
CONVERSION ENERGY SOURCES
U
PRIMORDIAL ATMOSPHERE


ULTRA-VIOLET
RADIATION
CONVERSION ENERGY SOURCES
O
PRIMORDIAL ATMOSPHERE



ULTRA-VIOLET RADIATION



CONVERSION ENERGY SOURCES

N

OZONE LAYER: ABSENT

PRIMORDIAL ATMOSPHERE

C

NITROGEN

CARBON DIOXIDE

WATER

HYDROGEN

SULFIDE

METHANE

AMMONIA

PRIMORDIAL ATMOSPHERE

R

C-CMP C-CMP C-CMP C-CMP

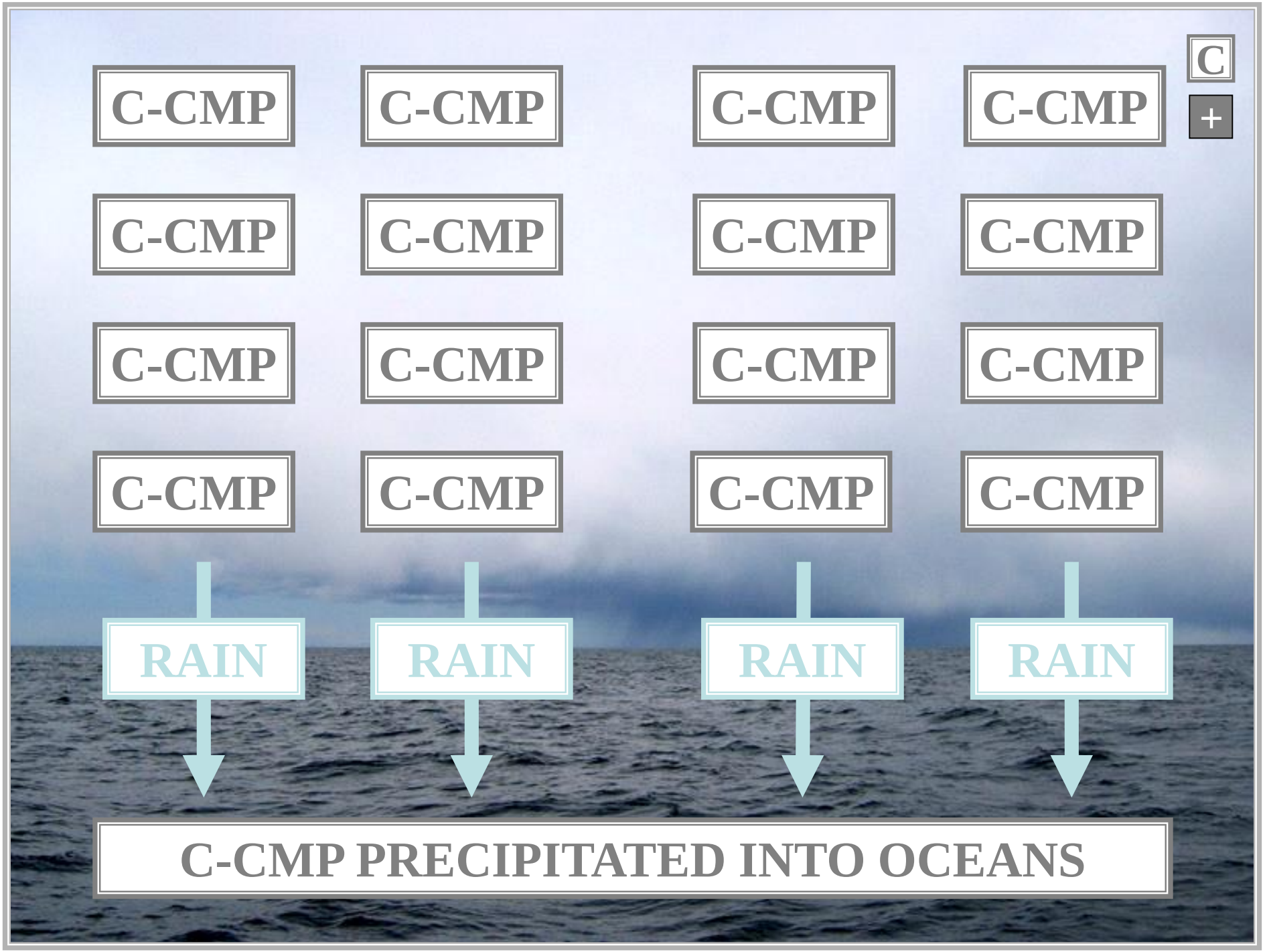
C-CMP C-CMP C-CMP C-CMP

C-CMP C-CMP C-CMP C-CMP

C-CMP C-CMP C-CMP C-CMP

C-CMP = COMPLEX ORGANIC COMPOUNDS

AMINO ACIDS & NUCLEOTIDES


C-CMP
C-CMP
C-CMP
C-CMP
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RAIN
RAIN
RAIN
RAIN
C-CMP PRECIPITATED INTO OCEANS
C
+

C-CMP C-CMP C-CMP C-CMP

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C-CMP C-CMP C-CMP C-CMP

C-CMP C-CMP C-CMP C-CMP

RAIN RAIN RAIN RAIN

C-CMP C-CMP C-CMP C-CMP

OCEANS HIGH ORGANIC CONTENT

"P"

SHALLOW COAST

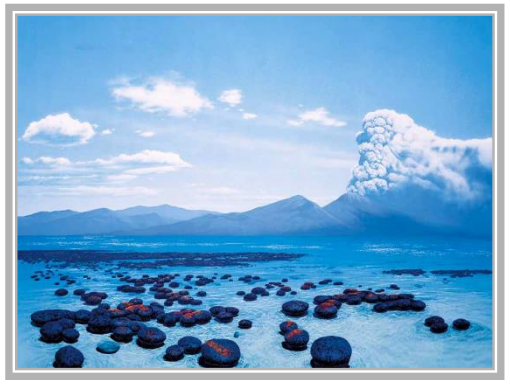
OCEANS HIGH ORGANIC CONTENT

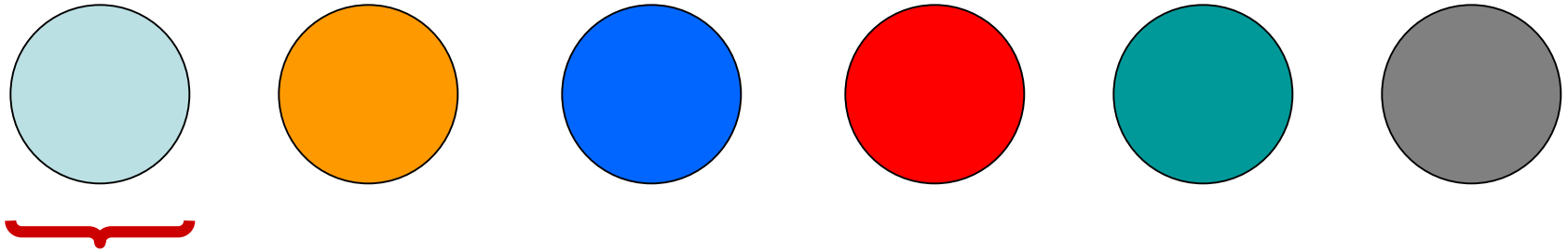
A&O

“PRIMORDIAL SOUP”


OCEANS HIGH ORGANIC CONTENT
"PRIMORDIAL SOUP"
ORGANIC CMPS
ASSOCIATE & ORGANIZE
SHALLOW COAST

ORGANIC COMPOUNDS





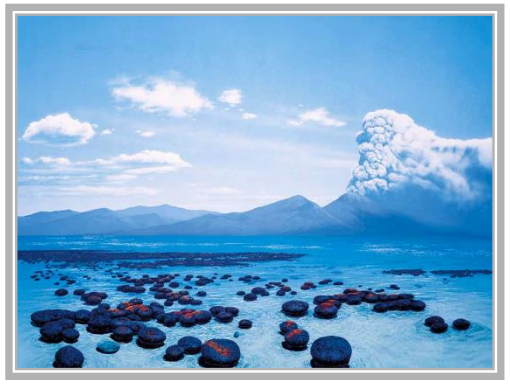
MONOMER

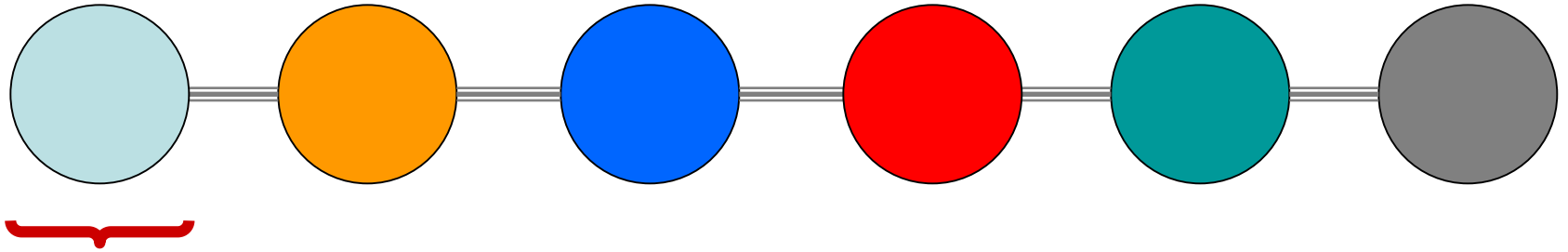
ORGANIC CMPS ASSOCIATE & ORGANIZE

“PRIMORDIAL SOUP”

?

ORGANIC COMPOUNDS



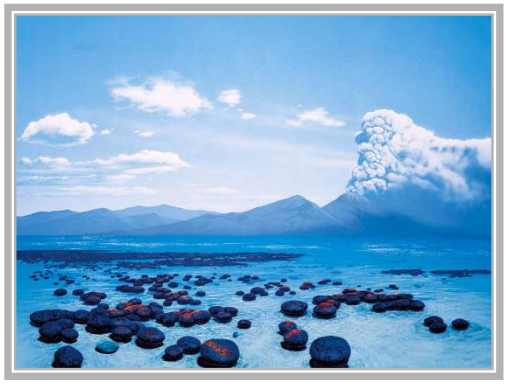


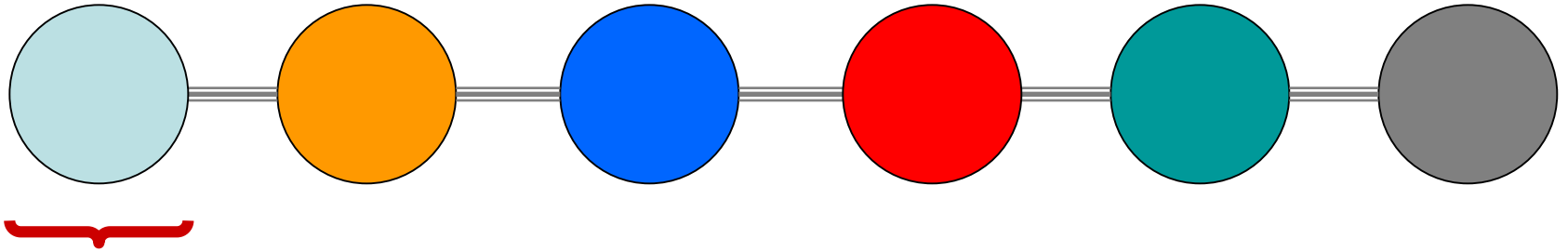
MONOMER **= BOND**

“PRIMORDIAL SOUP”

P

ORGANIC COMPOUNDS





MONOMER **= BOND**

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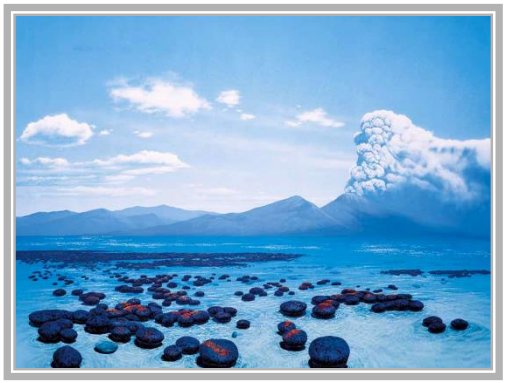
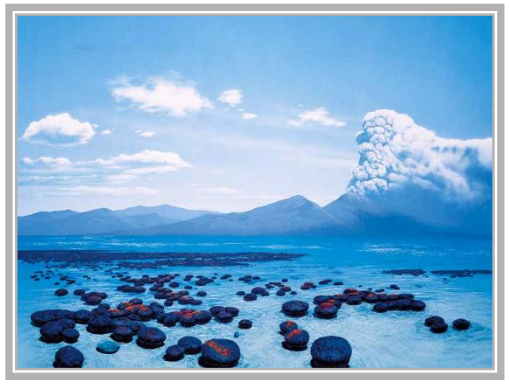
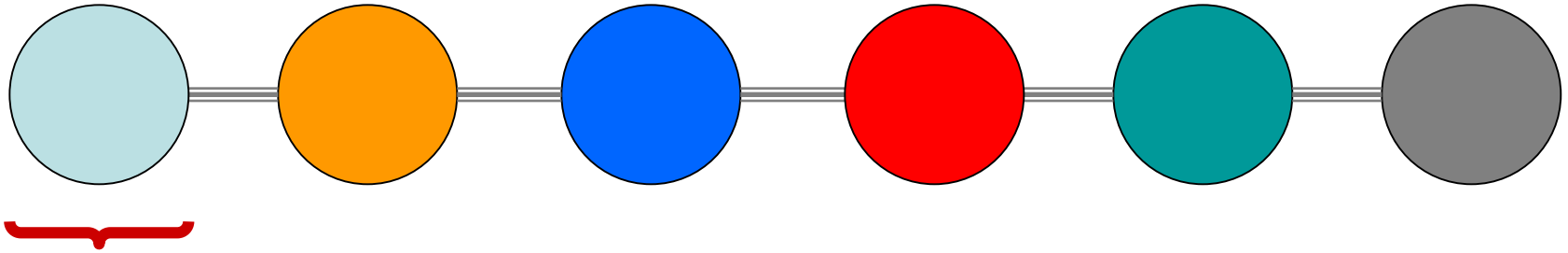


ORGANIC COMPOUNDS



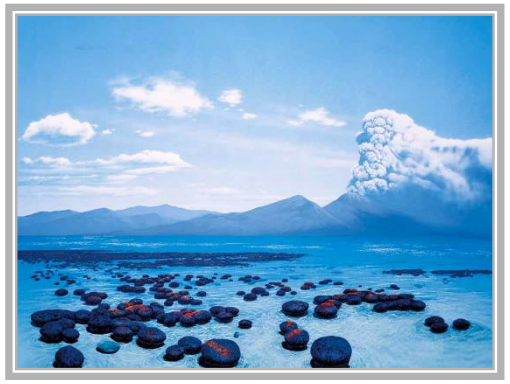


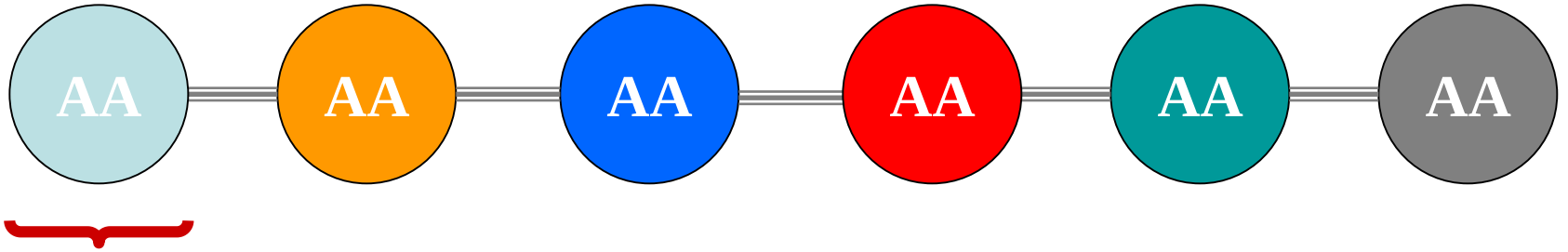
MONOMER

= BOND

POLYMER

ORGANIC COMPOUNDS



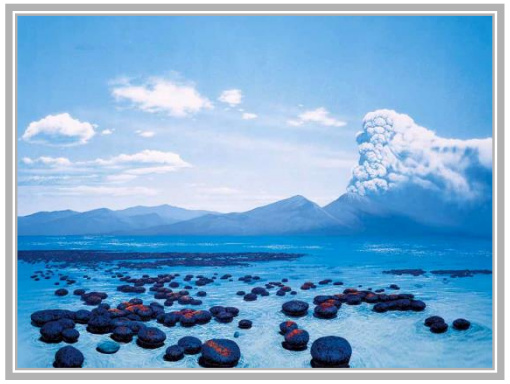


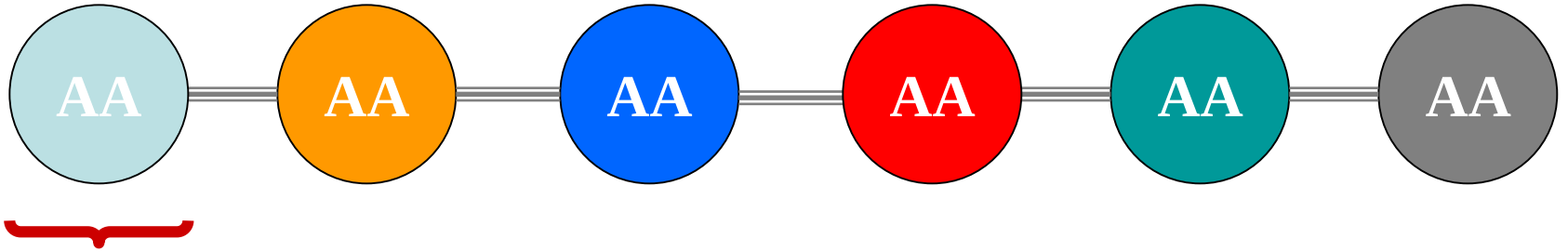
AMINO ACID MONOMERS

= PEPTIDE BOND

POLYMER

ORGANIC COMPOUNDS





AMINO ACID MONOMERS

= PEPTIDE BOND

PROTEINS

ORGANIC COMPOUNDS

B

NT NT NT NT NT NT

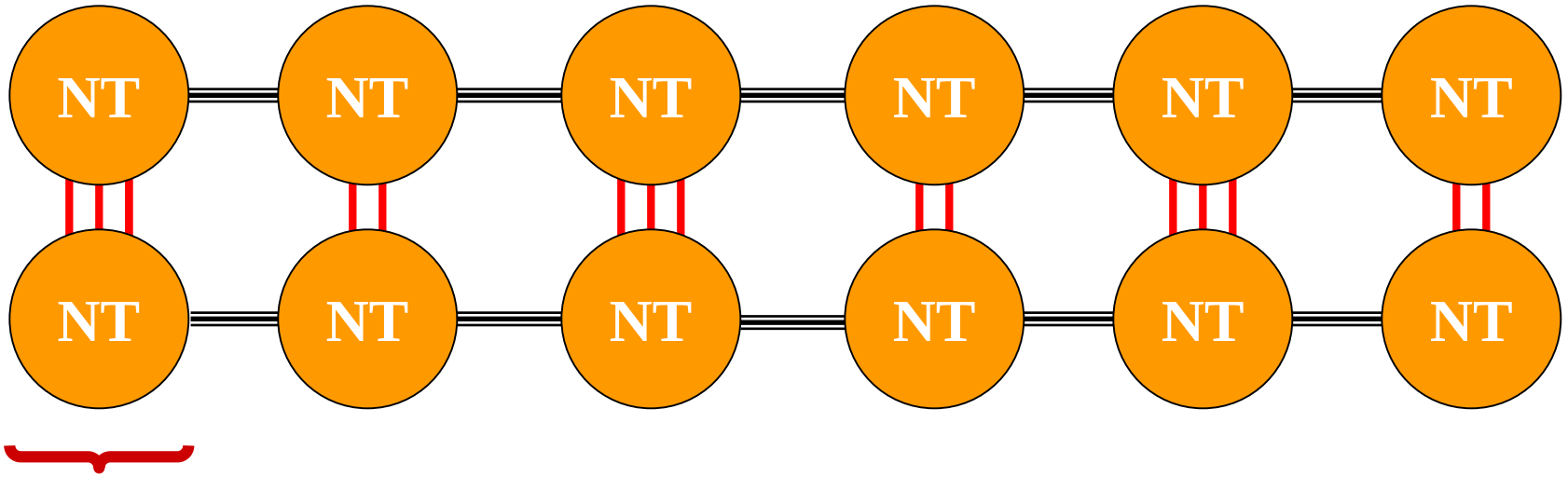
NT NT NT NT NT NT

NUCLEOTIDE MONOMERS

POLYMER

ORGANIC COMPOUNDS

¿
N



NUCLEOTIDE MONOMERS

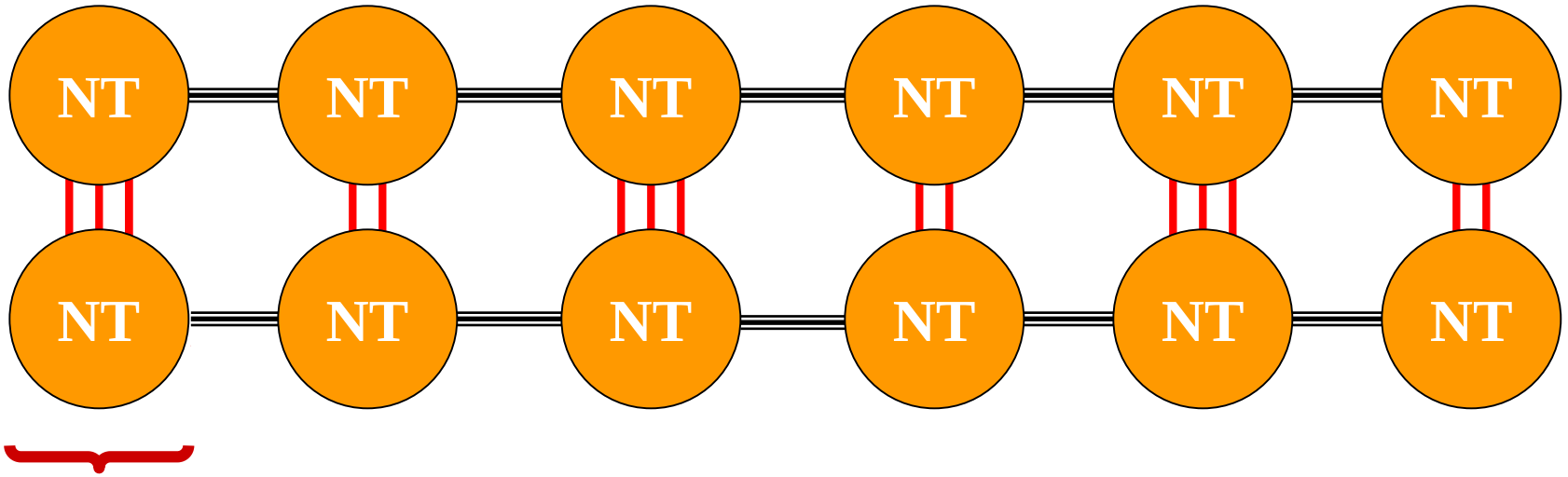
= PHOSPHODIESTER BOND

= HYDROGEN BOND

POLYMER

ORGANIC COMPOUNDS

¿
2



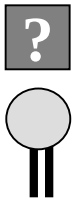
NUCLEOTIDE MONOMERS

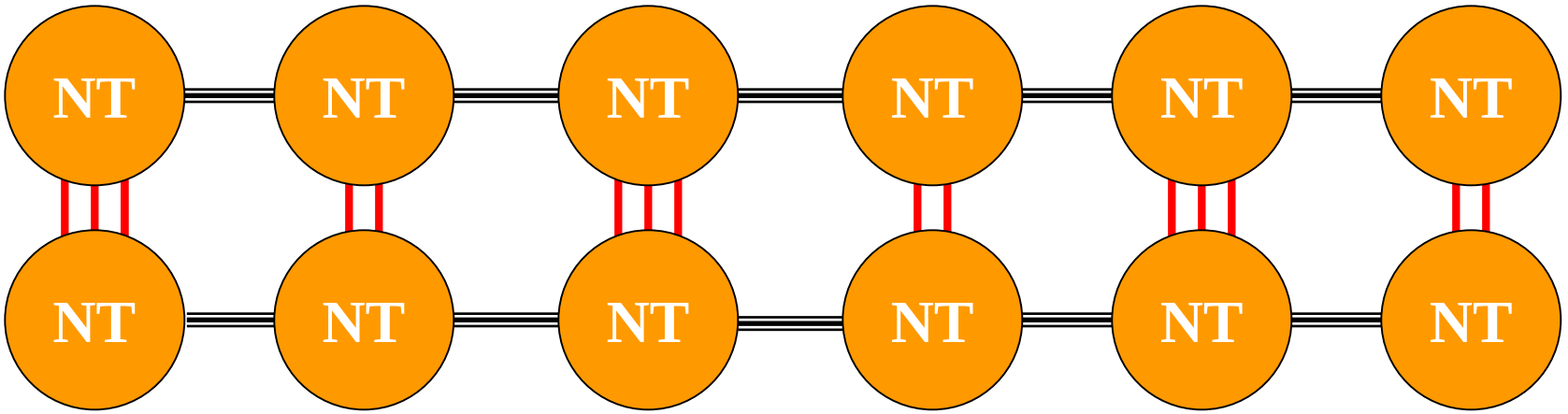
= PHOSPHODIESTER BOND

= HYDROGEN BOND

NUCLEIC ACIDS

ORGANIC COMPOUNDS



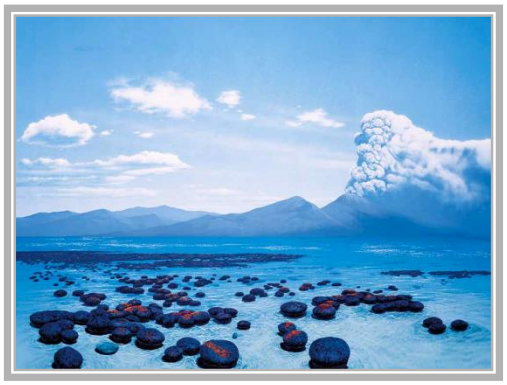


NUCLEOTIDE MONOMERS

= **PHOSPHODIESTER BOND**

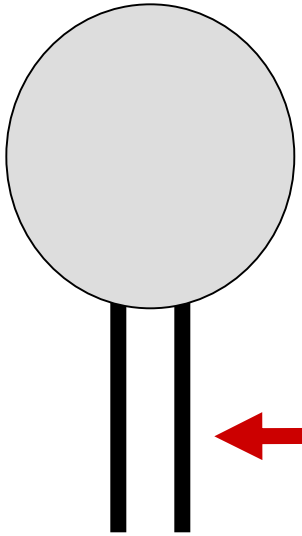
= **HYDROGEN BOND**

NUCLEIC ACIDS
DNA & RNA



ORGANIC COMPOUNDS

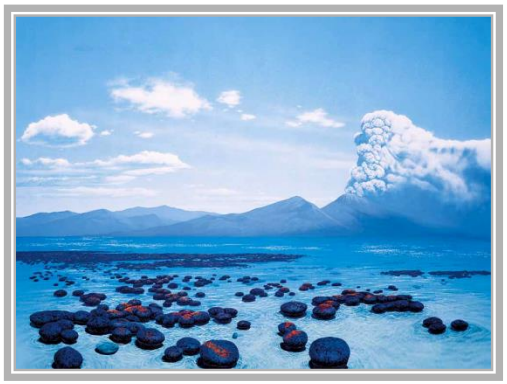
P



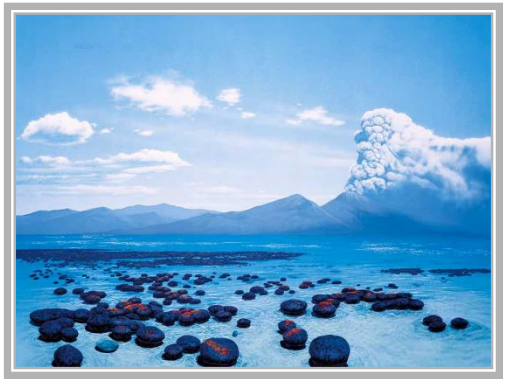
PHOSPHATE GROUP

FATTY ACIDS

?



ORGANIC COMPOUNDS



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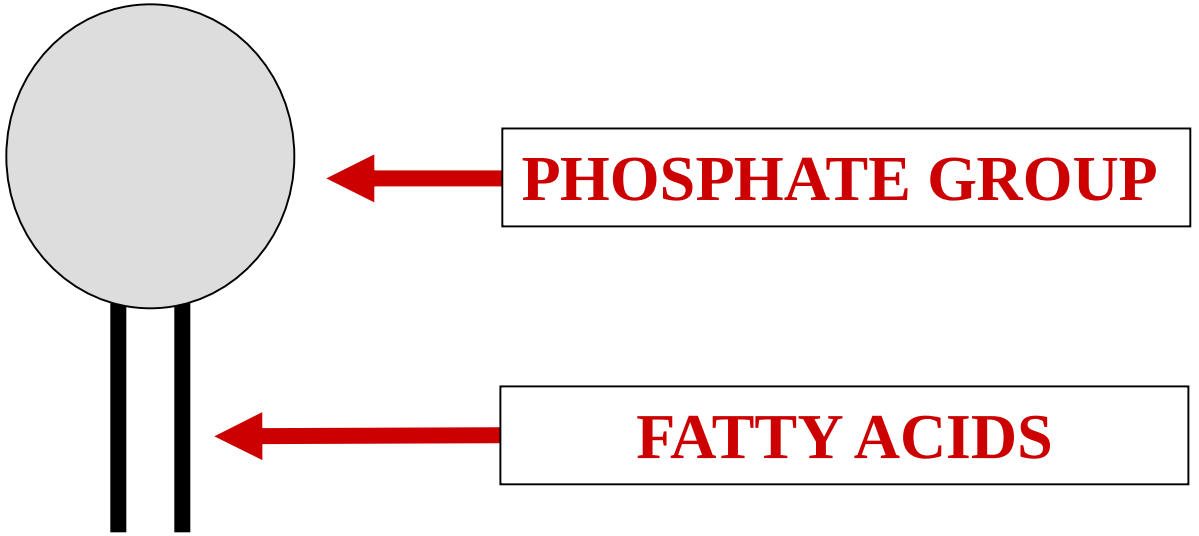


PHOSPHOLIPID

ORGANIC COMPOUNDS

?

WATER WATER WATER

PHOSPHOLIPIDS
ASSOCIATE & ORGANIZE

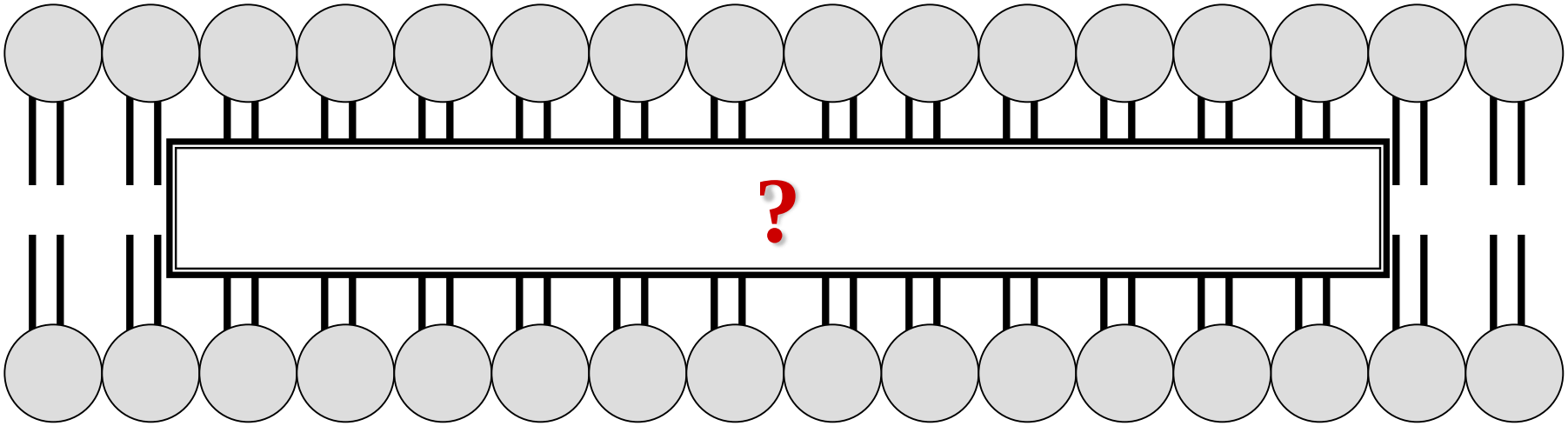
WATER WATER WATER

PHOSPHOLIPIDS

ORGANIC COMPOUNDS

B

WATER WATER WATER

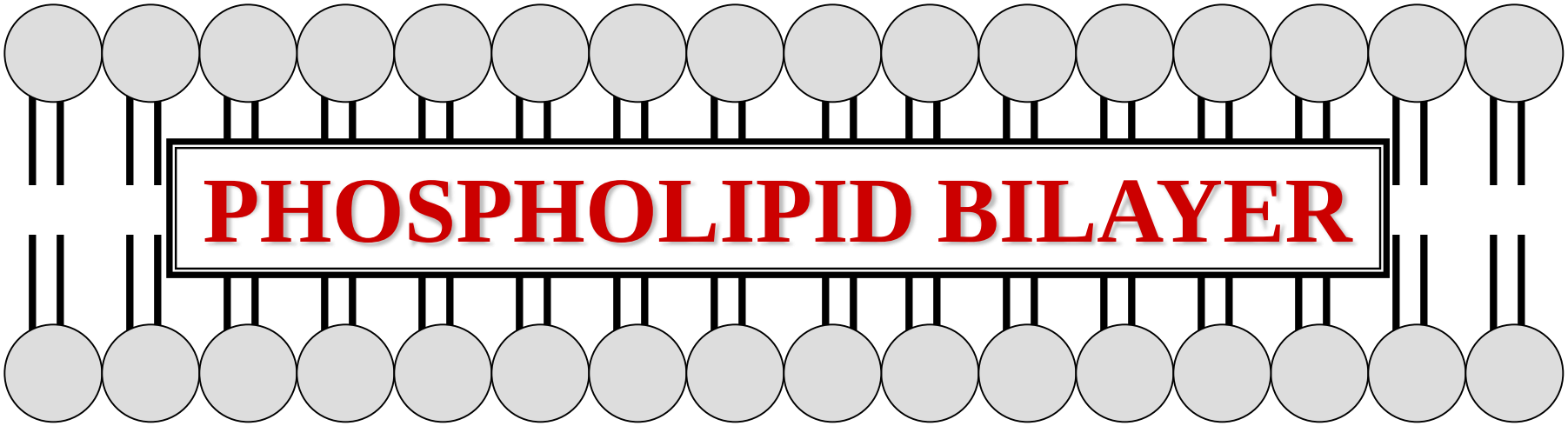


WATER WATER WATER

PHOSPHOLIPIDS

ORGANIC COMPOUNDS

WATER WATER WATER

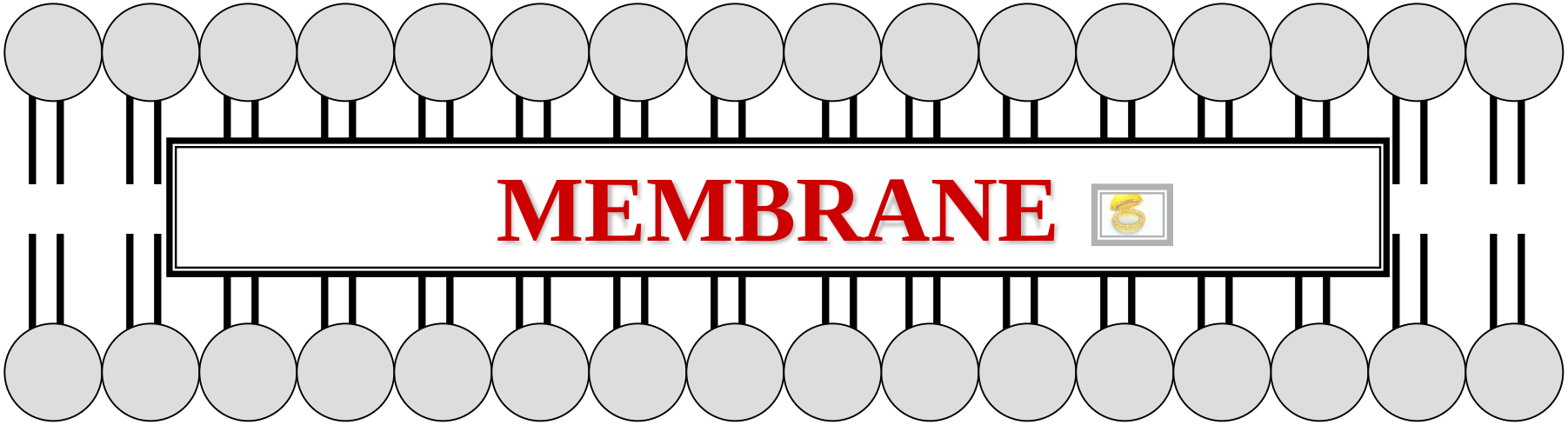


WATER WATER WATER

PHOSPHOLIPIDS

ORGANIC COMPOUNDS

WATER WATER WATER

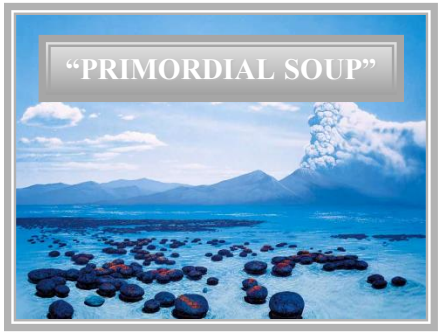


WATER WATER WATER

PHOSPHOLIPIDS

P

PRIMITIVE MEMBRANE



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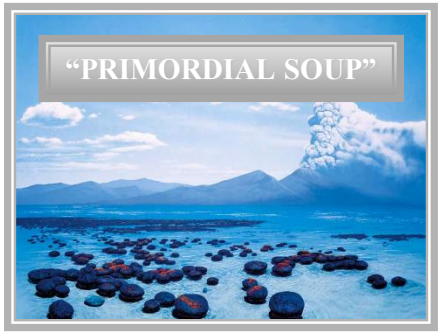


PROTOBIONT

PROTOBIONTS

PROTOBIONTS

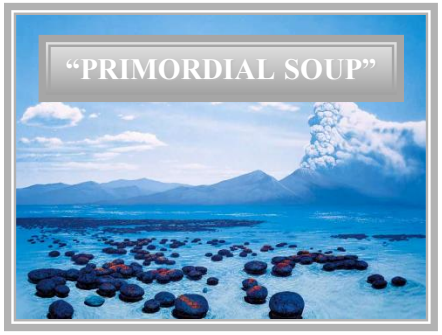
PROTOBIONTS

ABIOTIC ORGANIC AGGREGATES

PROTOBIONTS

R

PRIMITIVE MEMBRANE

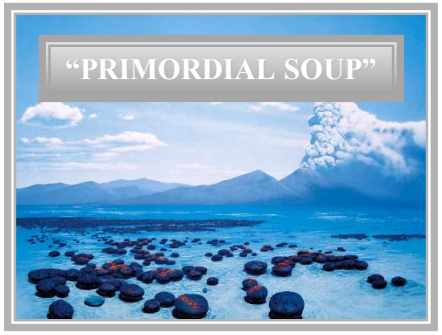


PROTOBIONT

H

PRIMITIVE MEMBRANE REGULATES PASSAGE

PROTOBIONT INTERIOR

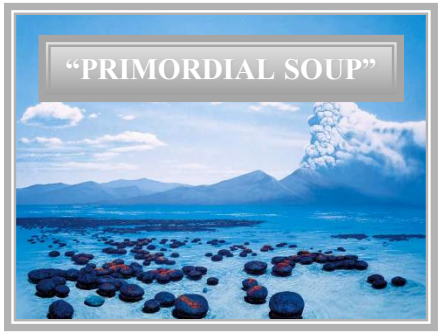


PROTOBIONT

LE

PRIMITIVE MEMBRANE REGULATES PASSAGE

HIGHER ORGANIZATION

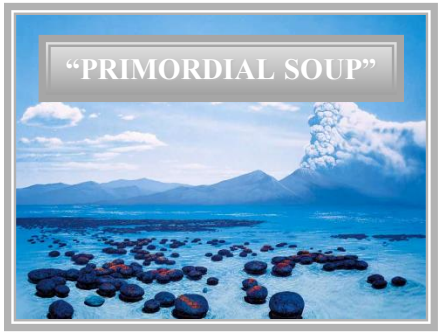


PROTOBIONT

ME

PRIMITIVE MEMBRANE REGULATES PASSAGE

LOWER ENTROPY

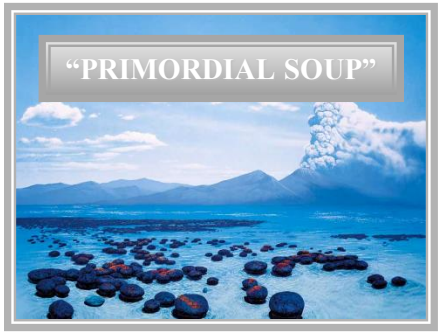


PROTOBIONT

PR

PRIMITIVE MEMBRANE REGULATES PASSAGE

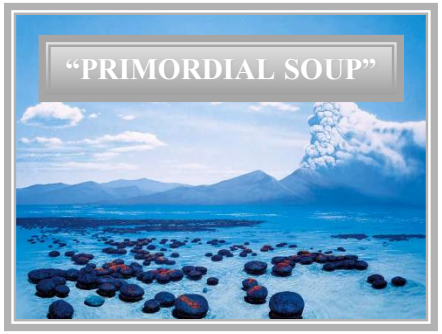
METABOLISM EVOLVES



PROTOBIONT

PRIMITIVE MEMBRANE REGULATES PASSAGE

PRIMITIVE RESPIRATION



PROTOBIONT

RESPIRATION

GLUCOSE

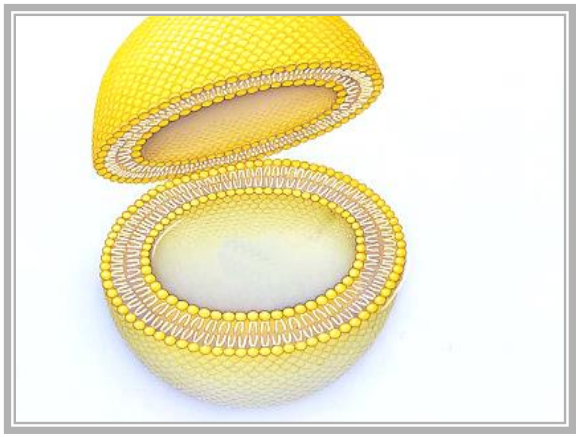
RESPIRATION

F

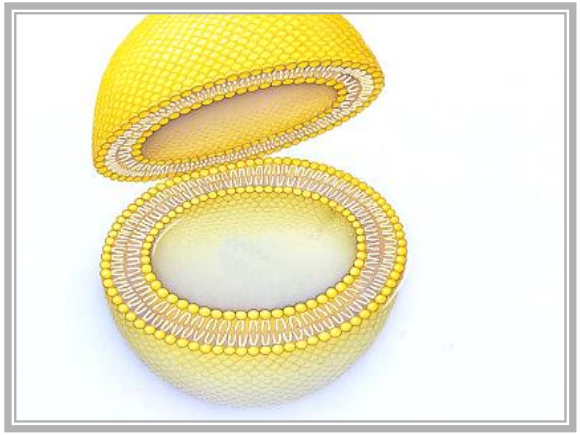
HEXOKINASE

ATP — EGY — ADP

GLUCOSE-6-PHOSPHATE



PHOSPHOGLUCOISOMERASE

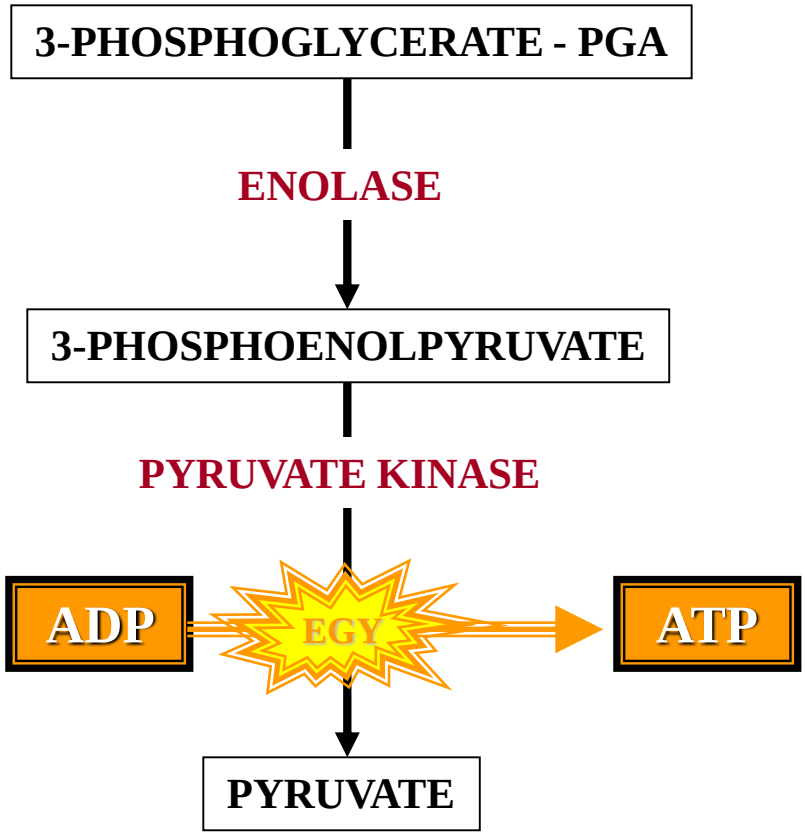


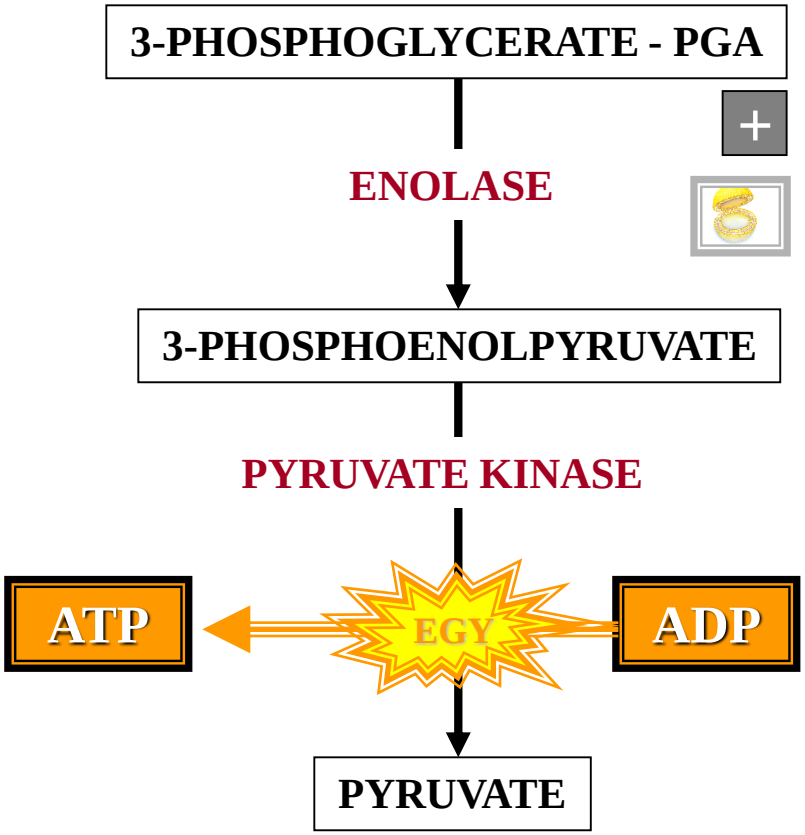
FRUCTOSE-6-PHOSPHATE

PHOSPHOFRUCTOKINASE

ATP — EGY — ADP

FRUCTOSE-1-6-PHOSPHATE





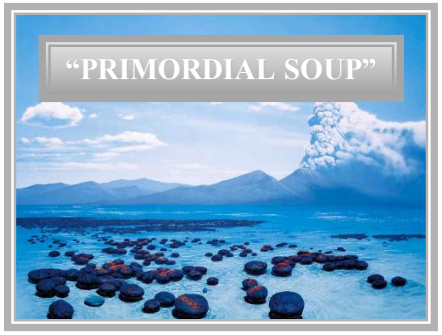
ATP = BIOLOGICAL ENERGY MOLECULE

FUNCTIONAL ENZYMES

P

PRIMITIVE MEMBRANE

FUNCTIONAL ENZYMES

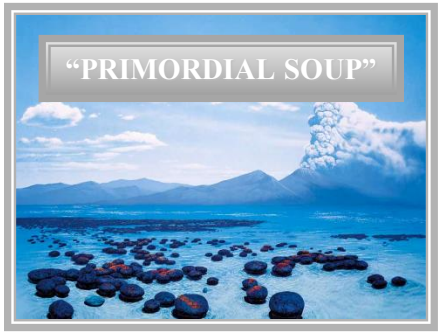


PROTOBIONT

PS

PRIMITIVE MEMBRANE

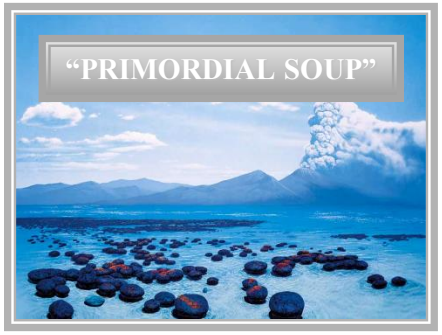
FUNCTIONAL PROTEINS



PROTOBIONT

PRIMITIVE MEMBRANE

PROTEIN SYNTHESIS



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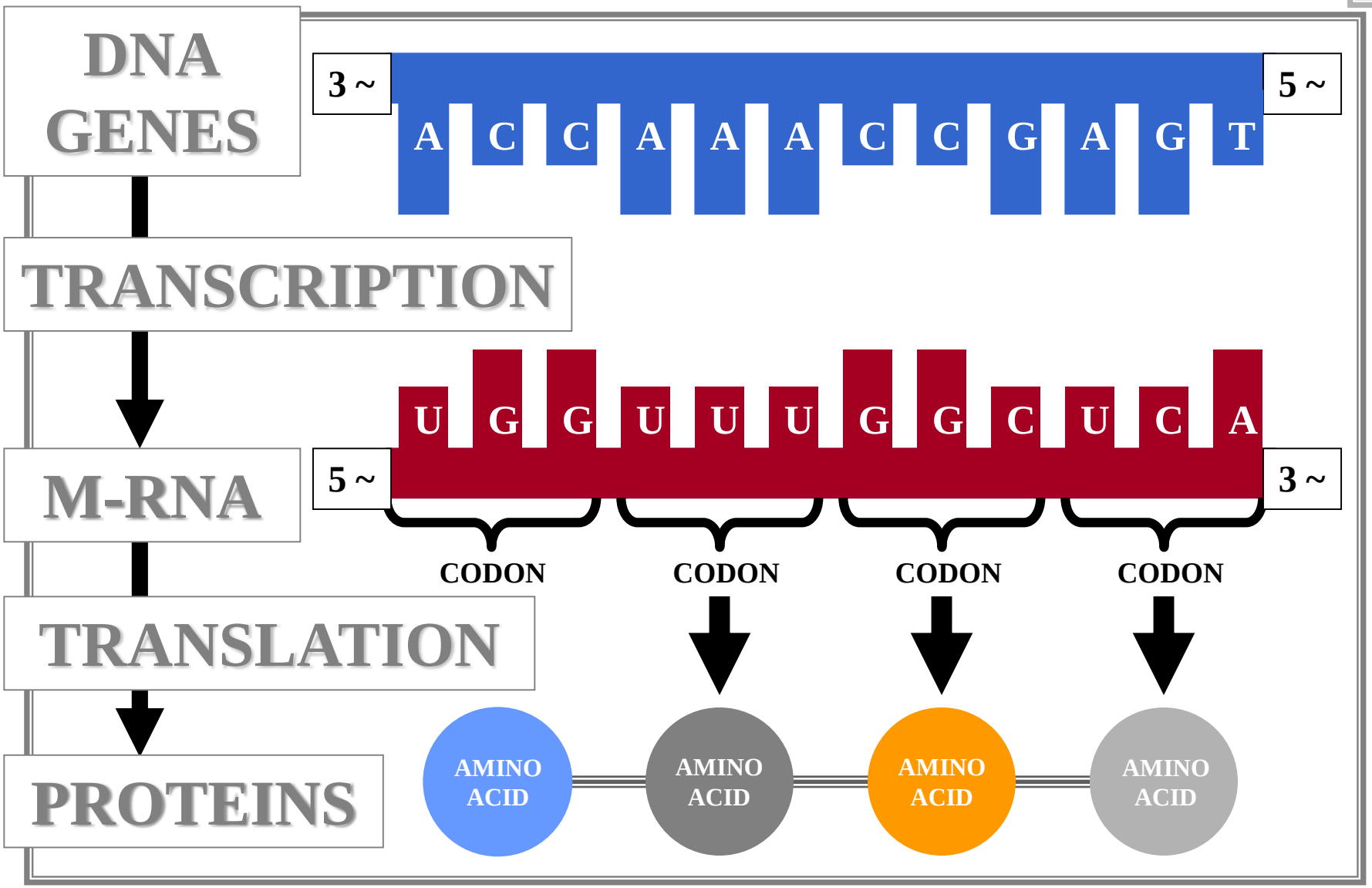
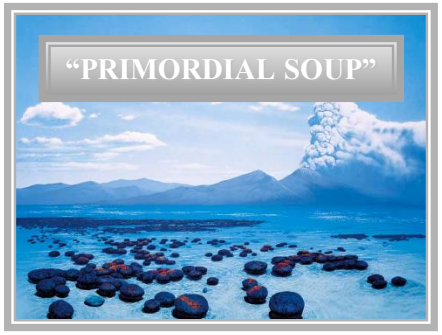
PROTEIN SYNTHESIS



FN

PRIMITIVE MEMBRANE

FUNCTIONAL DNA & RNA

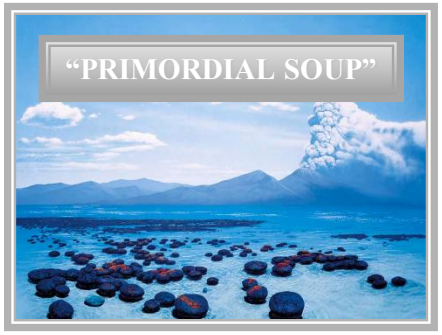


PROTOBIONT

LO

PRIMITIVE MEMBRANE

FUNCTIONAL NUCLEIC ACIDS

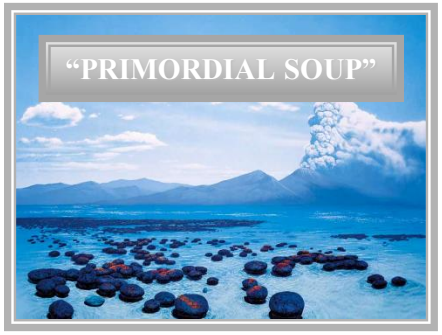


PROTOBIONT

B

PRIMITIVE MEMBRANE

LIVING ORGANISM



PROTOBIONT

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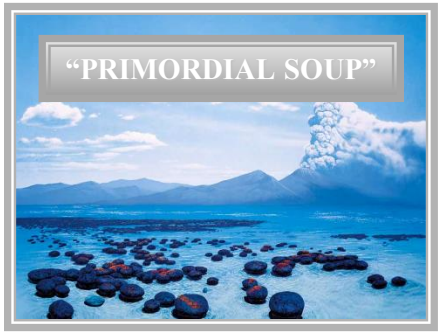
PRIMITIVE MEMBRANE

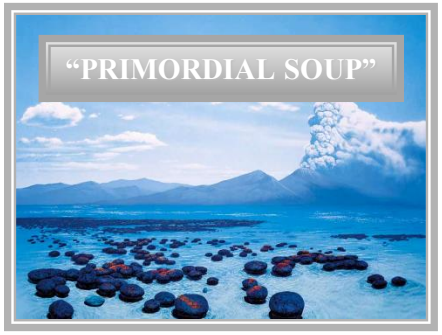
BIOGENESIS



PROTOBIONT

PRIMITIVE MEMBRANE

ORIGIN OF LIFE



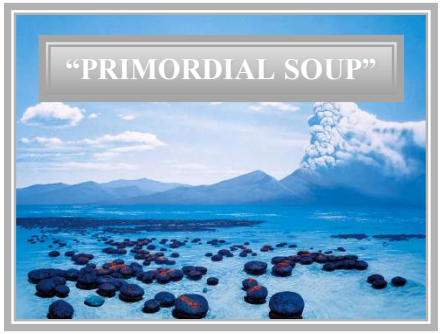
PROTOBIONT

1

+

PRIMITIVE MEMBRANE

FIRST CELLS



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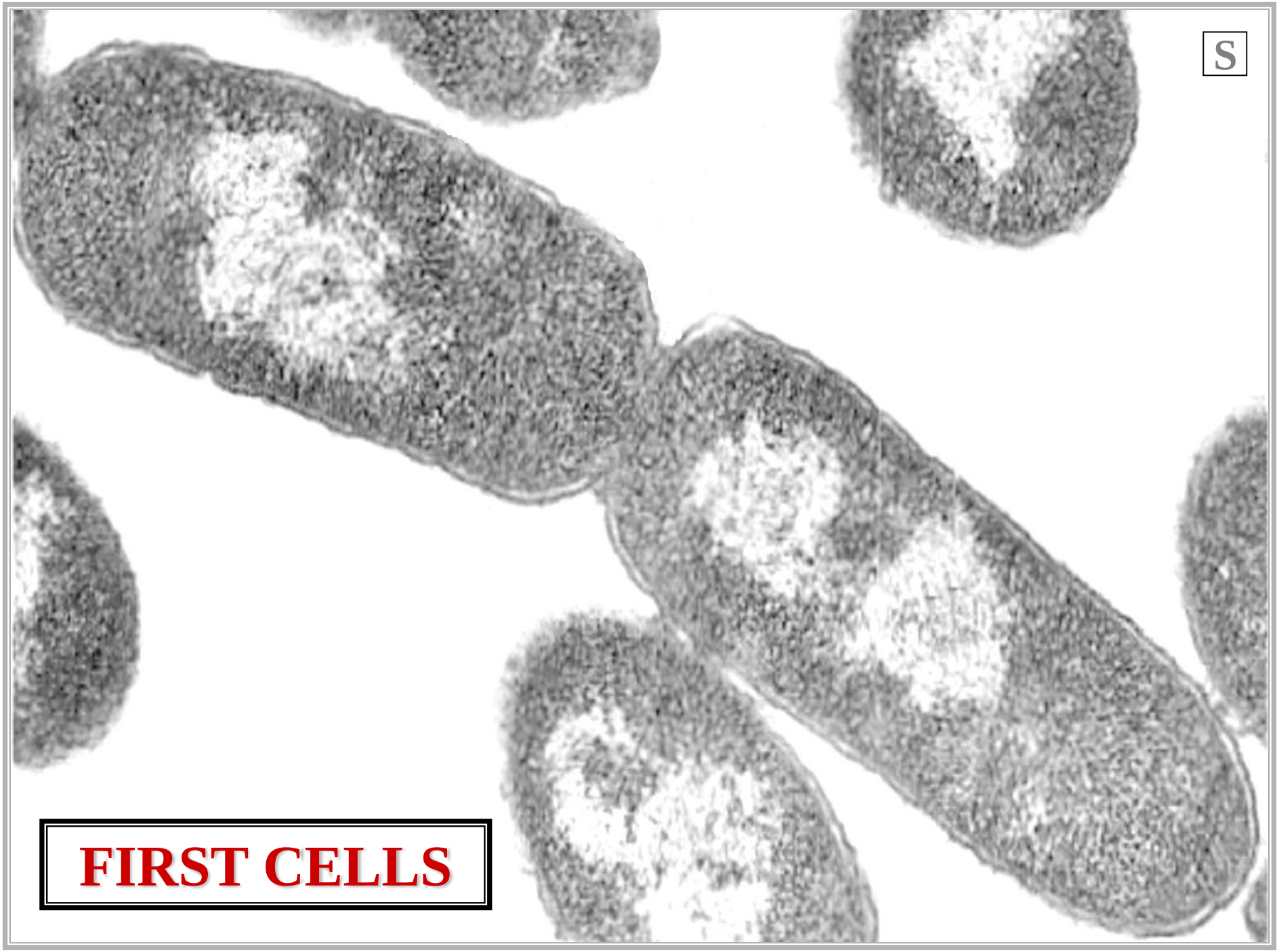
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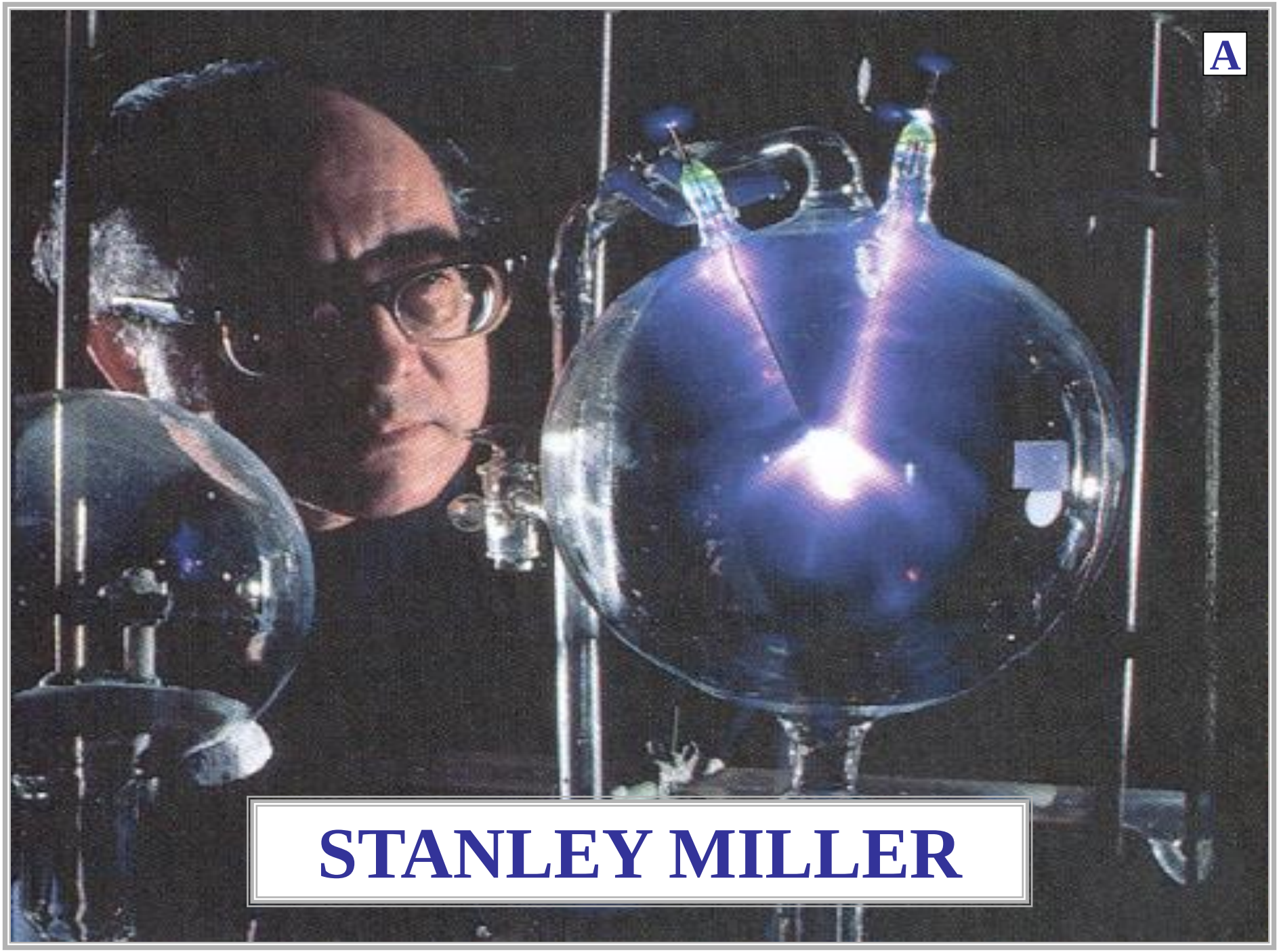
FIRST CELLS

SUPPORTING EVIDENCE

STANLEY MILLER EXPERIMENTS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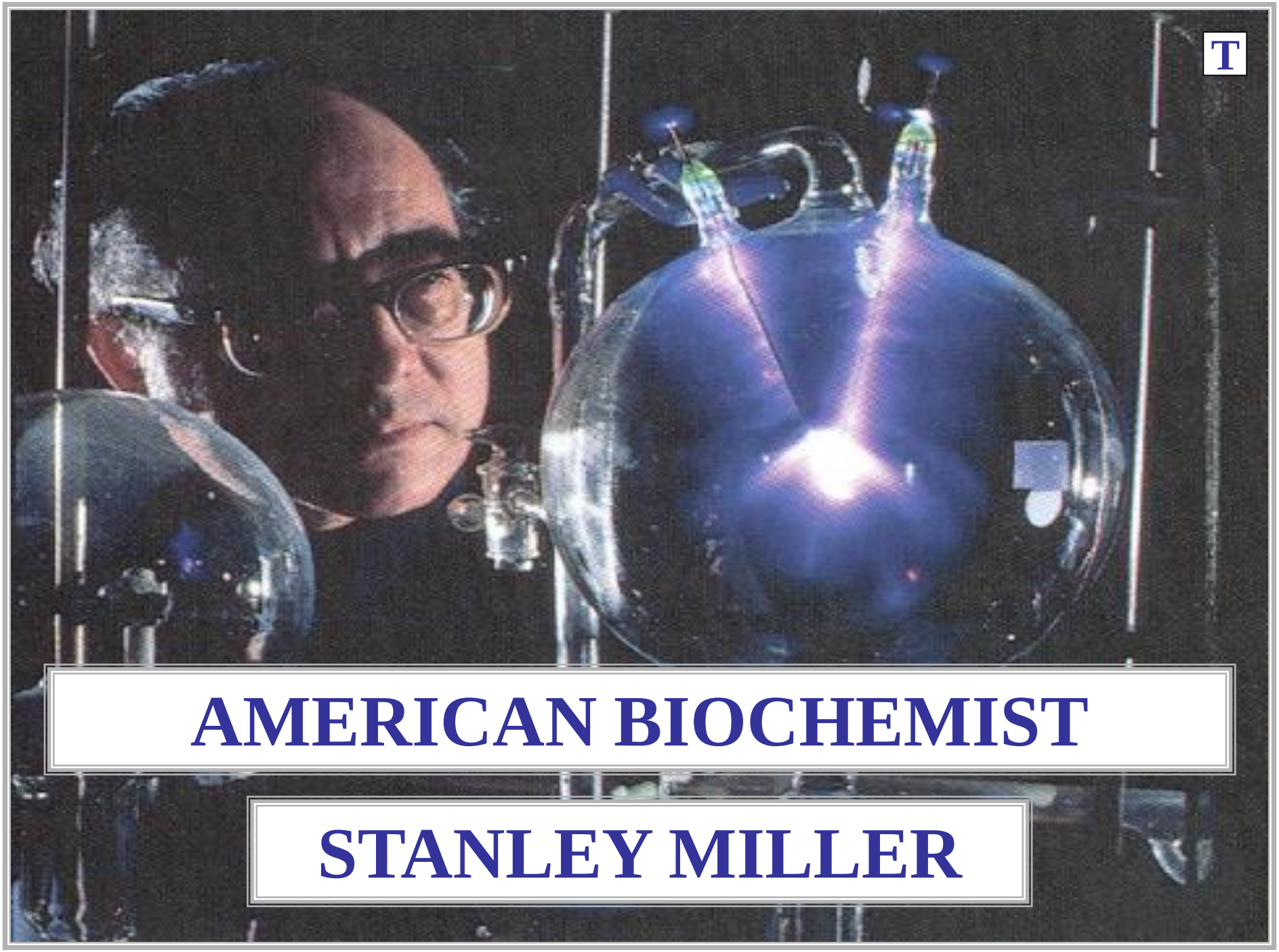
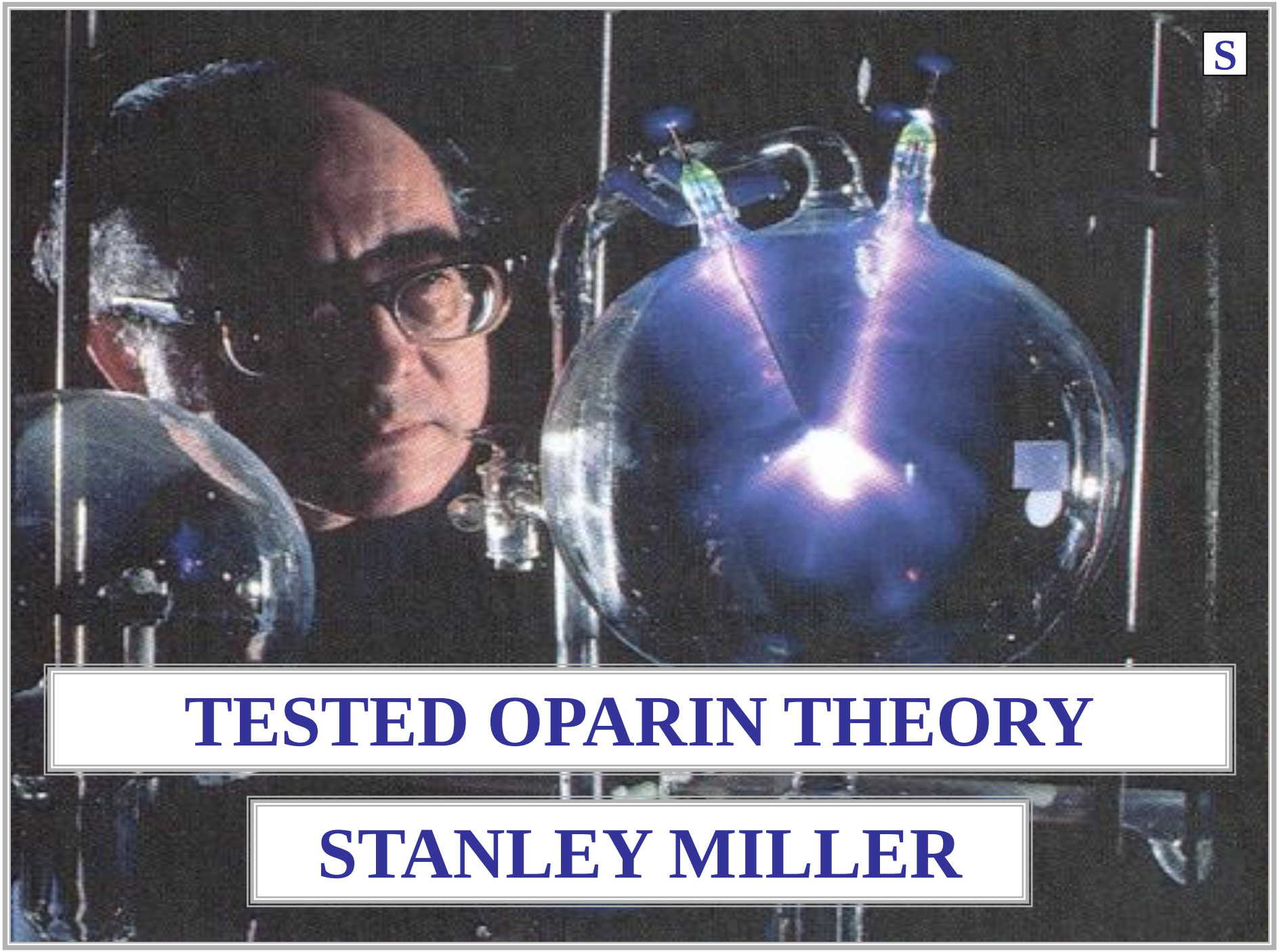
STANLEY MILLER



AMERICAN BIOCHEMIST

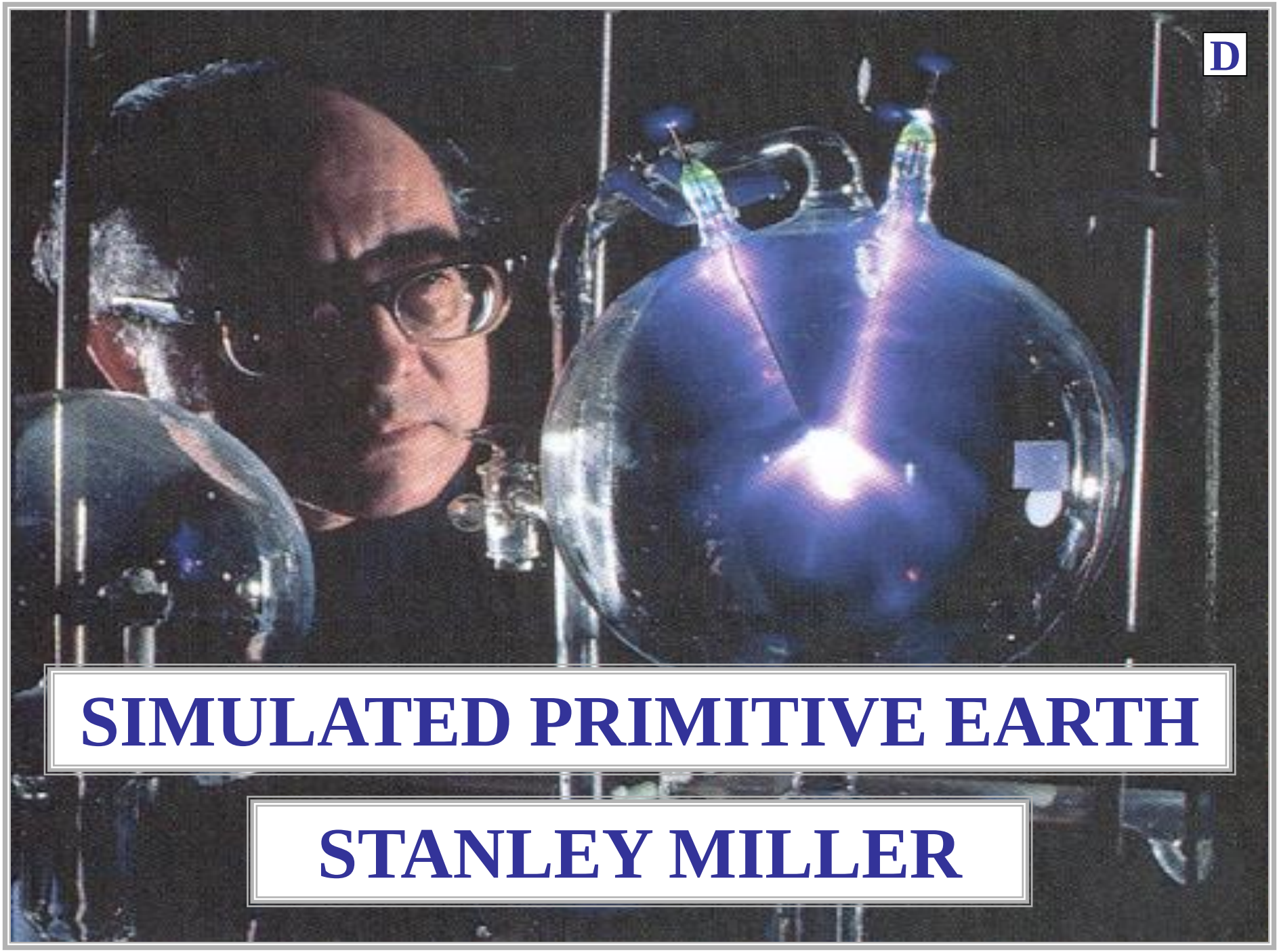
STANLEY MILLER



S

TESTED OPARIN THEORY

STANLEY MILLER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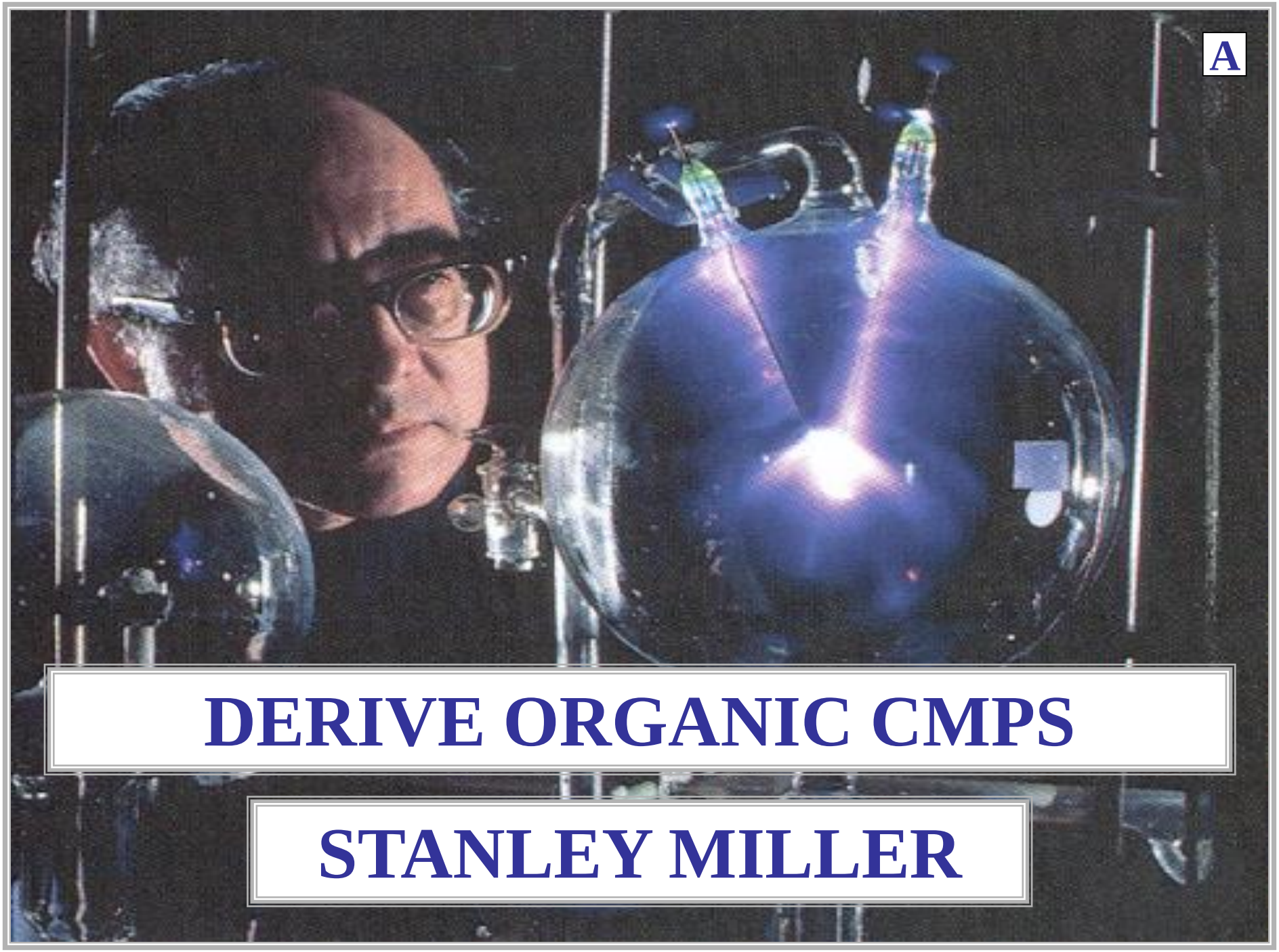
SIMULATED PRIMITIVE EARTH
STANLEY MILLER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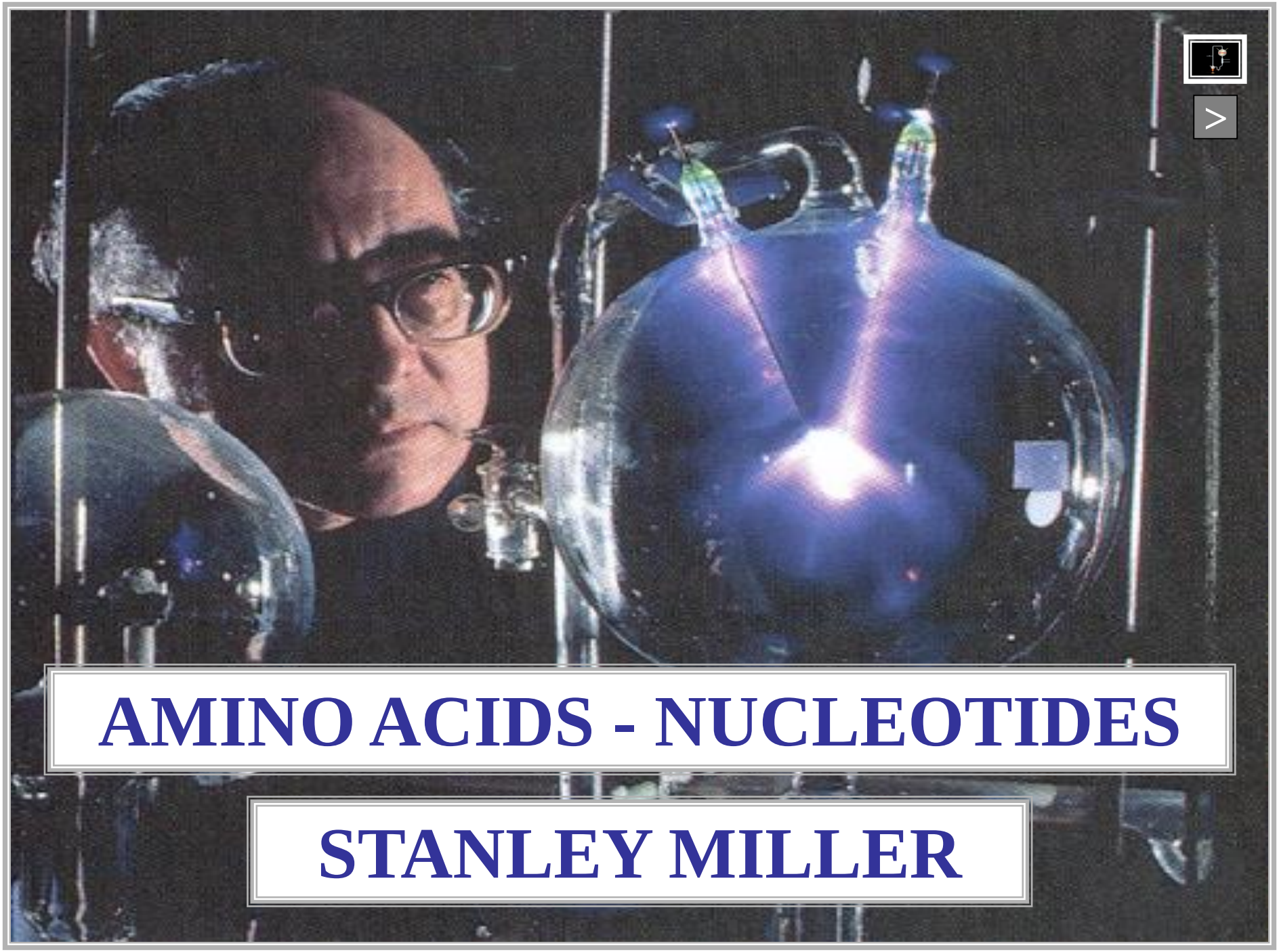
DERIVE ORGANIC CMPS
STANLEY MILLER



AMINO ACIDS - NUCLEOTIDES

STANLEY MILLER

MILLER APPARATUS

A

BULB

STANLEY MILLER

MILLER APPARATUS

STANLEY MILLER

BULB

ATMOSPHERE

MILLER APPARATUS

E

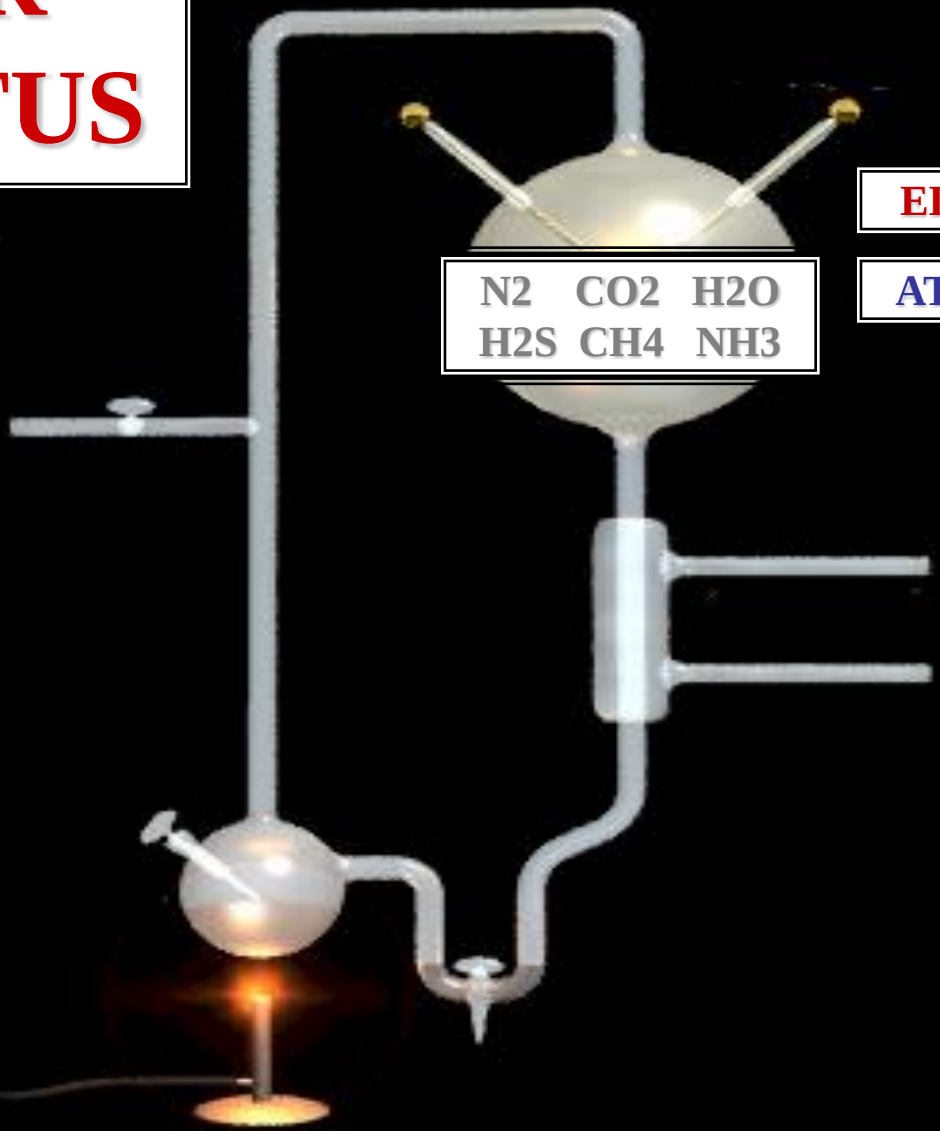
STANLEY MILLER

N2 CO2 H2O
H2S CH4 NH3

ATMOSPHERE

MILLER APPARATUS

STANLEY MILLER



ELECTRODES

ATMOSPHERE

N_2 CO_2 H_2O
H_2S CH_4 NH_3

MILLER APPARATUS

STANLEY MILLER

MILLER APPARATUS

STANLEY MILLER

MILLER APPARATUS

C

N2 CO2 H2O
H2S CH4 NH3

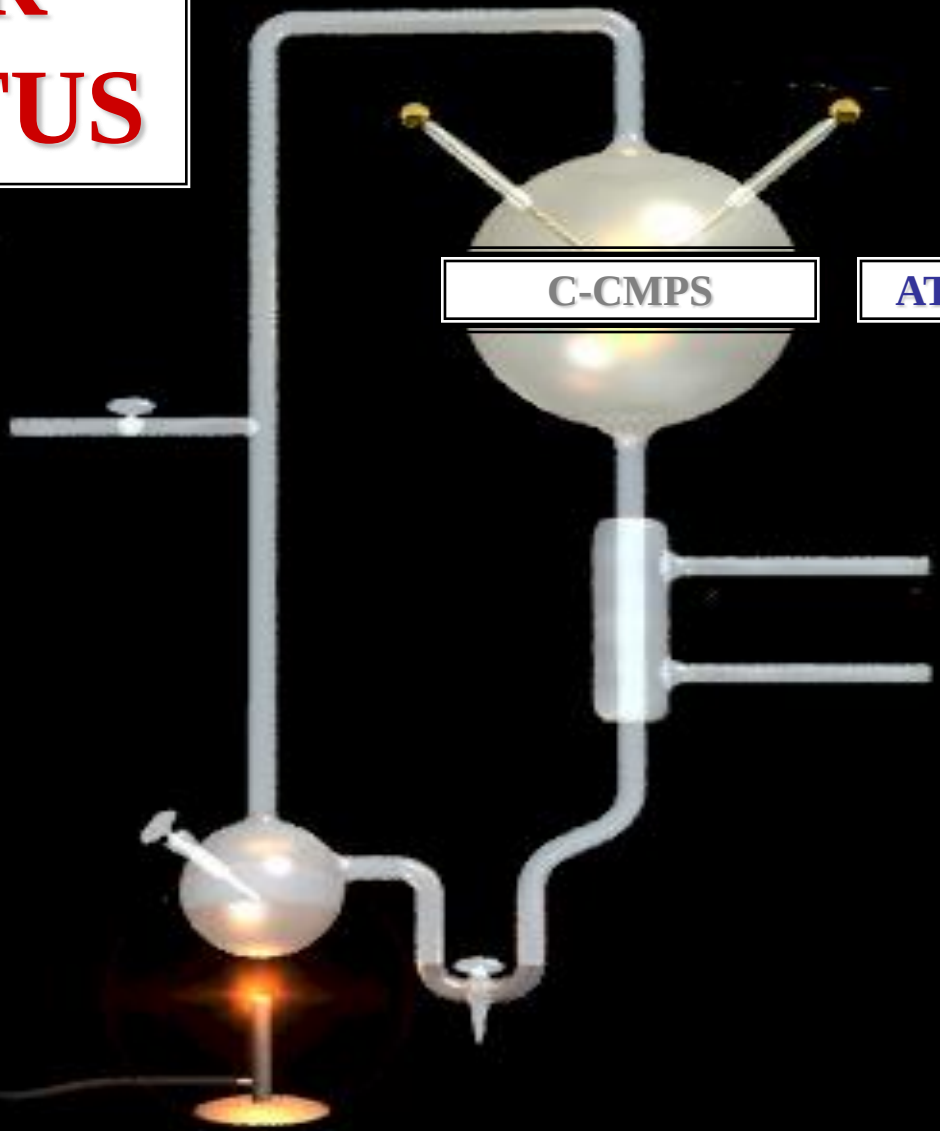
ATMOSPHERE

STANLEY MILLER

MILLER APPARATUS

C

STANLEY MILLER



C-CMPS

ATMOSPHERE

MILLER APPARATUS

C

STANLEY MILLER

C-CMPS

ATMOSPHERE

C-CMPS

MILLER APPARATUS

C

STANLEY MILLER

C-CMPS

ATMOSPHERE

C-CMPS

CONDENSER

MILLER APPARATUS

STANLEY MILLER

C-CMPS

ATMOSPHERE

C-CMPS

COLD WATER

MILLER APPARATUS

O

STANLEY MILLER

C-CMPS

ATMOSPHERE

C-CMPS

RAIN

C-CMPS PRECIPITATED

C-CMPS

STOP COCK

MILLER APPARATUS

STANLEY MILLER

C-CMPS

ATMOSPHERE

C-CMPS

RAIN

C-CMPS PRECIPITATED

C-CMPS

OCEAN

MILLER APPARATUS

STANLEY MILLER

C-CMPS

ATMOSPHERE

C-CMPS

RAIN

C-CMPS PRECIPITATED

"PRIMORDIAL SOUP"

MILLER APPARATUS

A

N

STANLEY MILLER

C-CMPS

ATMOSPHERE

C-CMPS

RAIN

C-CMPS PRECIPITATED

TESTED FOR C-CMPS