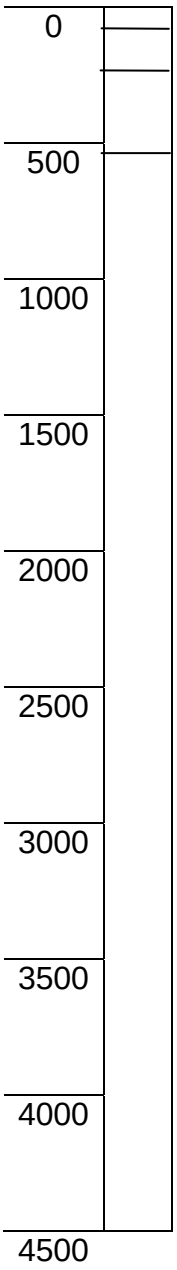
AP BIOLOGY
DIVERSITY OF LIFE
ACTIVITY #1

NAME_____

DATE_____HOUR____

ORIGIN OF LIFE

HISTORY OF LIFE



ORIGIN OF LIFE – AN OVERVIEW

PROBLEM	HOW?

ORIGIN OF LIFE: FOUR STAGE HYPOTHESIS

1. ABIOTIC SYNTHESIS OF SMALL ORGANIC MOLECULES

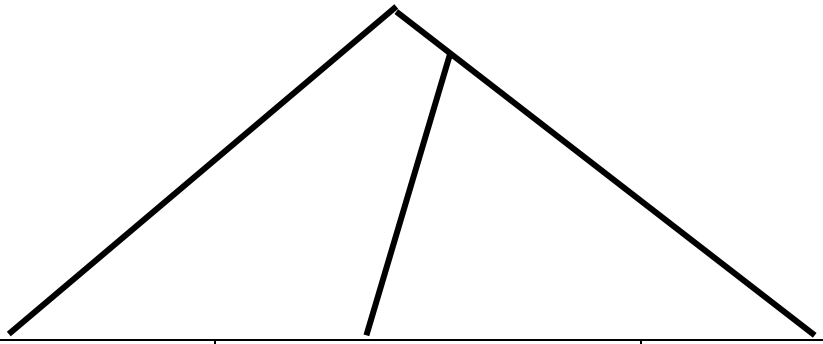
OPARIN & HALDANE	MILLER & UREY

2. Abiotic Synthesis of Polymers

3. Origin of Self-Replicating Molecules

4. ORIGIN OF PROTOBIONTS

MAJOR LINEAGES OF LIFE



BACTERIA	ARCHAEA	EUKARYA

QUESTIONS:

1. How old is the Earth? _____

   How old are the oldest fossils? _____

   Why are these fossils NOT considered to represent the first life forms on Earth?

   _____

   _____

2. Describe the conditions of Earth at the time life began.

   _____

   _____

   _____

3. Listed below are descriptions or supporting evidence of the four proposed steps in the chemical evolution that lead to the first cells. Identify each of the following as true of steps 1, 2, 3, or 4.

   _____ Abiotic production of the 20 amino acids, sugars, lipids, purine and pyrimidine bases under controlled laboratory conditions
   _____ Abiotic synthesis of organic molecules

   _____ Abiotic synthesis of polymers

   _____ Aggregates of abiotically produced molecules that are able to maintain an internal environment different from the external
   _____ Charged sites on clay and or iron pyrite held monomers together long enough for a bond to form between the monomers
   _____ Energy from UV radiation, lightning, and heat catalyzed the formation of organic monomers from inorganic compounds
   _____ Formation of protobionts

   _____ Miller & Urey experiment

   _____ Origin of genetic material

   _____ Polymers synthesized by dehydration synthesis

   _____ Produce polymers by dripping a solution with monomers on hot clay or sand

_____ Production of liposomes

_____ Ribozymes

_____ RNA abiotically synthesized

4. Why was the origin of genetic material important to the origin of life on Earth?

_____

_____

_____

5. How can an RNA molecule have both a genotype and a phenotype?

_____

_____

6. How did the structure of RNA provide a mechanism for natural selection?

_____

_____

_____

7. Match the term with the correct description or definition.

_____	Before life	A.	Abiotic
_____	Without life; inorganic	B.	Prebiotic
_____	Abiotically synthesized proteins	C.	Protenoids
_____	Aggregates of abiotically produced molecules that maintain an internal environment different from the external	D.	Protobionts

8. Define Panspermia.

_____

_____

What evidence, if any, supports Panspermia?

_____

_____

9. RNA may not have been the first hereditary system to develop. Explain.

_____

_____

_____

10. Where, according to the current hypothesis, did life begin on Earth?

_____

Why is this hypothesis being challenged?

_____

What alternative is being proposed as to where life began on Earth?

_____

11. Indicate if each of the following is true of Domain **B**acteria, Domain **A**rchaea, or Domain **E**ukarya.

_____ Nuclear envelope and membrane-bound organelles absent

_____ Nuclear envelope and membrane-bound organelles present

_____ Peptidoglycan present in cell walls

_____ Peptidoglycan absent in cell walls

_____ Membrane lipids have unbranched hydrocarbon chains

_____ Some membrane lipids have branched hydrocarbon chains

_____ One kind of RNA polymerase

_____ Several kinds of RNA polymerase

_____ Formyl-methionine is the first amino acid added during protein synthesis

_____ Methionine is the first amino acid added during protein synthesis

_____ No Introns in genes

_____ Some genes have Introns

_____ Introns present in genes

_____ Growth inhibited by antibiotics

_____ Growth not inhibited by antibiotics

_____ Protists, plants, fungi, animals

_____ Methanogens, halophiles, thermophiles

_____ Proteobacteria, cyanobacteria, spirochetes, Chlamydias, Mycoplasms