Origin of Life (History of Earth)

Early Earth Environment

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* No major source of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Atmosphere

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* No major source of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Supporting Evidence – Miller Urey Experiment

 Combined the elements and conditions

 found in the early atmosphere to

 determine if they could produce

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_.

 This also led to the development of the

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, a large ordered

 structure considered

 the precursor to an actual cell.

“Let there be water…..and life.”

1. The first organisms were \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organisms
3. Once oxygen was available in the atmosphere \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ became more successful, providing even more oxygen to the atmosphere.
4. Finally \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organisms.

 Supporting Evidence – Endosymbiotic Theory



Review - Use each of the terms below just once to complete the passage.

Chemosynthesis symbiotic bacteria oxygen

amino acids chloroplast endosymbiotic hydrothermal vents

heterotrophic mitochondria photosynthesis anaerobic

Early Earth

Scientists believe that early Earth was very different from the Earth we live on today. One of the most important differences was the lack of (1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. While it may seem like nothing could have existed on this early Earth Miller and Urey disproved this by an experiment that was capable of producing (2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_, which are a major building block for a living organism. Life might have begun in a newly discovered area of the ocean called (3)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_. These organisms did not need oxygen so they are considered (4)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. They obtained their food from the ocean making them (5)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Later organisms had the ability to make their own food using the process of (6)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and later (7)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Eukaryotes evolved through a (8)\_\_\_\_\_\_\_\_\_\_\_\_ relationship between different prokaryotes. This theory is called the (9)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ theory. It is believed that the (10)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and (11)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which are organelles in a eukaryotic cell were once (12)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Where do living organisms come from? *Spontaneous Generation vs. Biogenesis***

Original idea proposed by Aristotle– Spontaneous Generation (Also called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

*Spontaneous Generation – Living things arise from non-living matter*

Examples of this philosophy: Observation – Nile River flooded each year, when the water went away there were frogs that were left behind…..arose spontaneously from the mud.

Disproving this theory:

|  |  |
| --- | --- |
| Redi – Maggots and the MeatImage result for redi's experiment on spontaneous generationHow do the results differ in the two jars?What might you conclude from these results?What is the purpose of a control group in science? | Pasteur – Swan neck flasks and microbesRelated imageIf Redi had just completed an experiment to disprove spontaneous generation, then why did Pasteur do the same thing?How did Pasteur’s Experiment finally disprove spontaneous generation? |

With multiple experiments disproving the idea of spontaneous generation a new idea was finally accepted:

Biogenesis –

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nonliving matter S-shaped disproved Francesco Redi

organisms broth air microscope

spontaneously spontaneous generation

Early Research

Early scientists believed that life arose from (1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through a process they called (2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. In 1668, the Italian physician (3) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ conducted an experiment with flies that (4) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ this idea. At about the same time, biologists began to use an important new research tool, the (5) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. They soon discovered the vast world of (6) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The number and diversity of these organisms was so great that scientists were led to believe once again that these organisms must have arisen (7) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

By the mid-1800s, however, (8) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ was able to disprove this hypothesis once and for all. He set up an experiment, using flasks with unique (9) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ necks. These flasks allowed (10) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but no organisms, to come into contact with a broth containing nutrients. If some (11) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ existed, as had been suggested, it would be able to get into the (12) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through the open neck of the flask. His experiment proved that organisms arise only from other (13) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This idea, called (14) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, is one of the cornerstones of biology today.

Key

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Early scientists believed that life arose from **(1) non-living matter** through a process they called **(2) spontaneous generation**. In 1668, the Italian physician **(3) Francesco Redi** conducted an experiment with flies that **(4) disproved** this idea. At about the same time, biologists began to use an important new research tool, the **(5) microscope**. They soon discovered the vast world of **(6) microorganisms**. The number and diversity of these organisms was so great that scientists were led to believe once again that these organisms must have arisen **(7) spontaneously**. By the mid-1800s, however, **(8) Louis Pasteur** was able to disprove this hypothesis once and for all. He set up an experiment, using flasks with unique **(9) s-shaped** necks. These flasks allowed **(10) air**, but no organisms, to come into contact with a broth containing nutrients. If some **(11) vital force** existed, as had been suggested, it would be able to get into the **(12) broth** through the open neck of the flask. His experiment proved that organisms arise only from other **(13) organisms**. This idea, called **(14) biogenesis**, is one of the cornerstones of biology today.