

# Biology chapter 14 section 2 study guide

## answers

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**What two places on early Earth where organic molecules could have been?**

Experiments suggest that organic molecules could have been synthesized in the atmosphere of early Earth and rained down into the oceans.

**What is the idea to explain the origin of organelles?** Endosymbiotic theory goes back over 100 years. It explains the similarity of chloroplasts and mitochondria to free-living prokaryotes by suggesting that the organelles arose from prokaryotes through (endo)symbiosis.

**What Redi observed in each flask as the meat decayed?** To test the hypothesis, Francesco Redi placed fresh meat in open containers [left, above]. As expected, the rotting meat attracted flies, and the meat was soon swarming with maggots, which hatched into flies [left, below].

**What was the first organic molecule?** Summary. The first organic molecules formed about 4 billion years ago. This may have happened when lightning sparked chemical reactions in Earth's early atmosphere. RNA may have been the first organic molecule to form as well as the basis of early life.

**How many years has there been life on Earth?** When did life on Earth begin? Earth is about 4.5 billion years old. Scientists think that by 4.3 billion years ago, Earth may have developed conditions suitable to support life. The oldest known fossils, however, are only 3.7 billion years old.

**What was the first organelle?** In 1833, Brown observed and described the nucleus, the first organelle. In 1838, the many and various observations were converted into a

cell theory by Schleiden, who proposed that all plant tissues were composed of nucleated cells.

**How many organelles are in a cell?** Eukaryotic animal cells consist of 6 major organelles (and many minor ones).

**What are the 12 organelles in a cell?** Within the cytoplasm, the major organelles and cellular structures include: (1) nucleolus (2) nucleus (3) ribosome (4) vesicle (5) rough endoplasmic reticulum (6) Golgi apparatus (7) cytoskeleton (8) smooth endoplasmic reticulum (9) mitochondria (10) vacuole (11) cytosol (12) lysosome (13) centriole.

**What did Redi prove in the first experiment?** In his experiments, Redi showed that cells did not come from nonliving matter. His results showed the opposite. They showed living things must come from other living things, adding the third pillar of cell theory. Cell theory is a basic set of ideas about cells biologists hold to be true.

**What disproved the idea of spontaneous generation in an experiment involving jars of meat Francesco Redi?** Experimentation by Francesco Redi in the 17th century presented the first significant evidence refuting spontaneous generation by showing that flies must have access to meat for maggots to develop on the meat.

**Who placed rotting meat into a flask to disprove the idea of spontaneous generation?** Pasteur and Tyndall Louis Pasteur's 1859 experiment is widely seen as having settled the question of spontaneous generation. He boiled a meat broth in a swan neck flask; the bend in the neck of the flask prevented falling particles from reaching the broth, while still allowing the free flow of air.

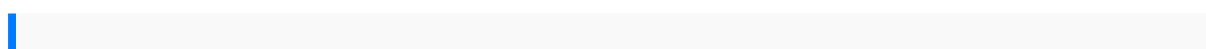
**What are two possible places that the organic molecules on Earth could have come from?** Many scientists favor the RNA world hypothesis, in which RNA, not DNA, was the first genetic molecule of life on Earth. Other ideas include the pre-RNA world hypothesis and the metabolism-first hypothesis. Organic compounds could have been delivered to early Earth by meteorites and other celestial objects.

**What are two possible sources of simple organic compounds on early Earth?** What are the two possible origins of simple organic compounds on Early Earth? Earth or space are the two possible origins of simple organic compounds on early

Earth. What makes coacervates and microspheres similar to cells? Coacervates and microspheres have a layer around them (contained) making them similar to cells.

**Where else besides Earth have organic molecules been found?** One piece of evidence is the presence of organic molecules in meteorites and comets. These molecules are thought to have formed in the early solar system, and they may have been delivered to Earth by comets and meteorites.

**What are the three known sources of organic molecules in the early Earth?** The figure below from Bernstein 2006 shows the 3 major sources of organic molecules on pre-life Earth: atmospheric synthesis by Miller-Urey chemistry, synthesis at deep-sea hydrothermal vents, and in-fall of organic molecules synthesized in outer space.



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