Organic evolution

Organic evolution is the origin of life (evolution of non-living material)

How did life get started?

Here are some texts

'The history of life on earth began approximately 3.5 billion years ago. How this occurred, has been and will be a topic for enquiry' [1]

'In the early 1950s, Urey turned his attention to the studies of geochemistry, astrophysics, and the origin of life. He wanted to know how the earth and solar system came to be. His vast knowledge of biology, physics and chemistry helped him conduct research and write many articles on geochemistry. He reviewed many theories on how the sun and planets were formed. He studied the chemical reactions of gases that existed in the Earth's primitive atmosphere, and he was the first to show that amino acids could have formed in the atmosphere. Although he never proved how life originated, he did add evidence to the theory that life could have started by itself on the primitive earth' [2]

'The first living cells emerged between 4-3.8 billion years ago. There is no record of the event' [3]

The most famous evidence for organic evolution occurred in the 1953 Miller-Urey experiment. This experiment produced some of the chemical building blocks of life by sending an electric spark through a mixture of gases they though simulated the Earth's primitive atmosphere (Figure 14.12)

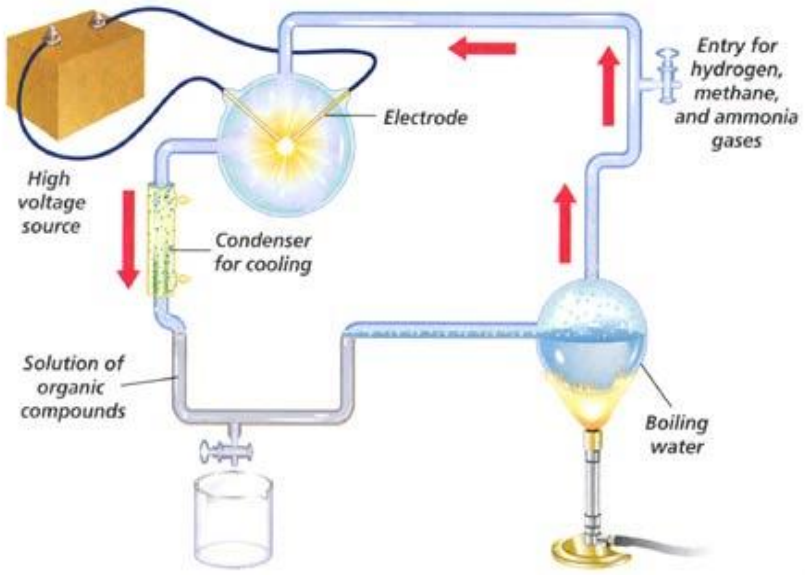


Figure 14.12 Miller and Urey's experiments showed that under the proposed conditions on early Earth, small organic molecules, such as amino acids, could form.

[1] Holt, *Biology*, 2001 p. 250
[2] H.B.J. 1989 p. 357
[3] *Biology The Unity and diversity of life*, Wadsworth (1992) p. 300

The Miller-Urey experiment

The Miller-Urey experiment generated enormous excitement in the scientific community, and soon found its way into almost every high school and college textbook as evidence of the origin of life. This experiment is still featured prominently in textbooks, magazines, and television documentaries as an icon of evolution even though it was demonstrated in 1953.

In 1952 Harold Urey concluded that the early atmosphere consisted primarily of hydrogen, methane, ammonia and water vapour – just as previous scientists Oparin and Haldane had postulated. [4]

Basically Miller assembled a closed glass apparatus in Urey's laboratory, pumped out the air, and replaced it with methane, ammonia, hydrogen and water. He then heated the water and circulated the gases past a high-voltage electric spark to simulate lightning (Fig 14.12). After several days Miller removed some of the water for chemical analysis and identified several organic compounds. These included glycine and lanine, the two simplest amino acids found in proteins.

Notice from this experiment air was removed; this meant that oxygen was taken out of the process. Why was oxygen taken out of the process?

Did the primitive atmosphere really lack oxygen?

Oparin and Haldane postulated in the 1920's that the gases of the Earth's early atmosphere were reducing. This meant high in hydrogen, low in oxygen.

By the 1960s, however, geochemists were beginning to doubt that conditions on the early Earth were the ones Oparin and Haldane had postulated.

"What is the evidence for a primitive methane-ammonia atmosphere on Earth? The answer is that there is no evidence for it, but much against it." [5] (Oxygen is replaced with methane-ammonia)

In 1975 Belgian biochemist Marcel Florkin announced that "the concept of a reducing (rich in hydrogen, poor in oxygen) atmosphere has been abandoned," and the Miller-Urey experiment is "not now considered geologically adequate" [6]

Jon Cohen wrote in *Science* in 1995, many origin-of-life researchers now dismiss the 1953 experiment because "the early atmosphere looked nothing like the Miller-Urey simulation."

As John Horgan wrote in Scientific American in 1991, an atmosphere of carbon dioxide, nitrogen, and water vapour "would not have been conducive to the synthesis of amino acids." [7] Water vapour is

[4] Harold Urey, "On the Early Chemical History of the Earth and the Origin of Life," *Proceedings of the National Academy of Sciences USA* 38 (1952), pp. 351-363
[5] Philip h. Abelson, "Chemical Events on the Primitive Earth," *Proceedings of the National Academy of Sciences USA 55* (1966), pp. 1365-1372
[6] Marcel Florkin, "Ideas and Experiments in the Field of Pre-biological Chemical Evolution," (1975)
[7] John Horgan, "In the Beginning.....," *Scientific American* (February 1991), pp. 116-126

hydrogen combined with oxygen. Therefore if any oxygen gas is present in the process the experiment falls apart. It is unable to produce any amino acids.

Over the last 20 years most geochemists have been convinced that the experiment failed to simulate conditions on the early Earth, and thus the experiment is invalid.

The March 1998 issue of *National Geographic* presents Miller standing next to his experimental apparatus. The headline says "Approximating conditions on the early Earth in a 1952 experiment, Stanley Miller produced amino acids. Several pages later the *National Geographic* article explains: "Many scientists now suspect that the early atmosphere was different from what Miller first supposed." [8]

The Miller-Urey experiment fails anyway

Even if the right primitive gases were used in the process, all that resulted was two simple amino acids. There are 20 essential amino acids, and a long chain of amino acids is required to make a protein. Importantly it takes the correct type of amino acids in the right order to make a single protein. Amino acids are three types of nucleotides of the DNA code (A, T, G, and C) and if the incorrect number or order of the amino acid occurs the protein fails to synthesise. It takes hundreds-thousands of proteins to make a living cell. The typical mammalian is estimated to contain approximately 2000 polypeptides (proteins)[9].

This is also combined with estimates that the human body contains about 50000 different kinds of proteins and 10-50 trillion cells.

Spontaneous generation

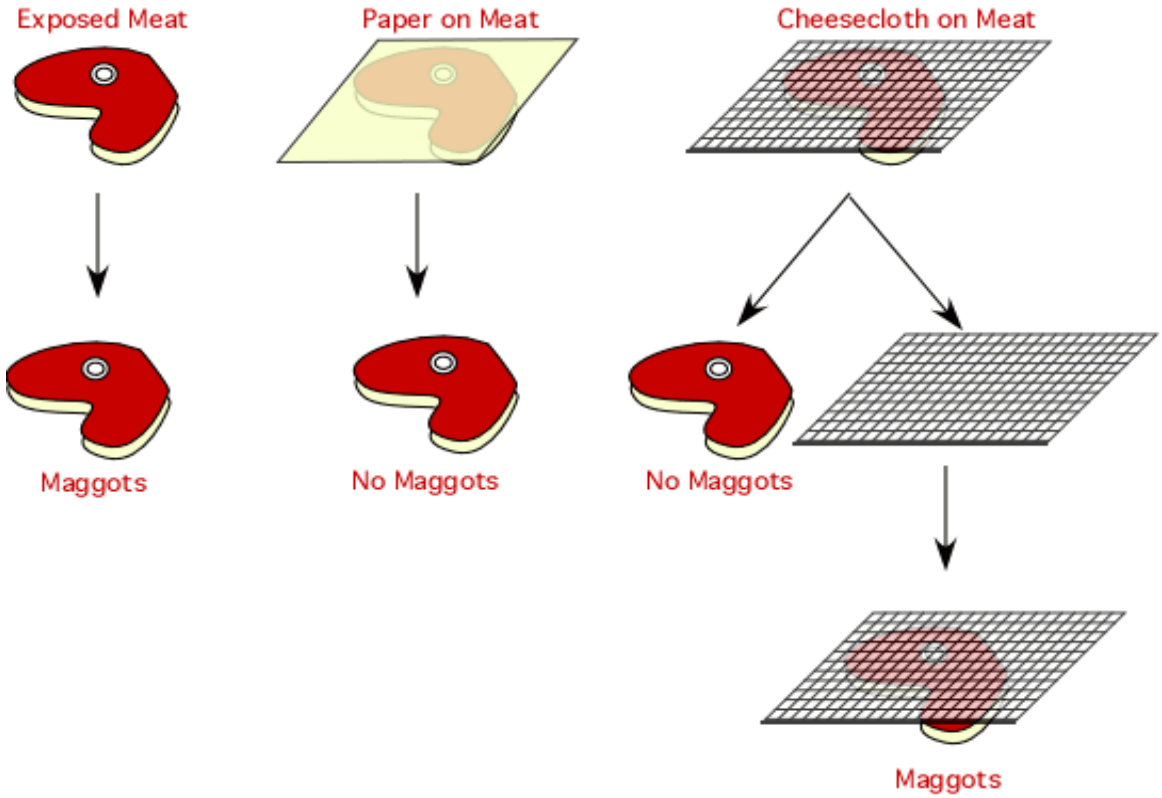
Spontaneous generation is the belief that living matter arises from non-living matter. Despite scientific evidence disproving this theory it must have occurred if organic evolution is true. Here is a text:

"Today we do not believe that life arises spontaneously from nonlife, and we say that "life comes only from life." But the very first living thing had to have come from nonliving chemicals. Under the conditions of the primitive Earth, it is possible that a chemical evolution produced the first cell(s)."[10]

An often used example to support spontaneous generation in the past was the generation of maggots from meat that was left in the open. In 1668 Francesco Redi performed an experiment to counter this. He used three pieces of meat (Fig B). One piece of meat was placed under a piece of paper. The flies could not lay eggs onto the meat and no maggots developed. The second piece was left in the open air, resulting in maggots. In the final test, a third piece of meat was overlaid with cheesecloth. The flies were able to lay the eggs into the cheesecloth and when this was removed no maggots developed. However, if the cheesecloth containing the eggs was placed on a fresh piece of meat, maggots developed, showing it was the eggs that "caused" flies and not spontaneous generation.[11]

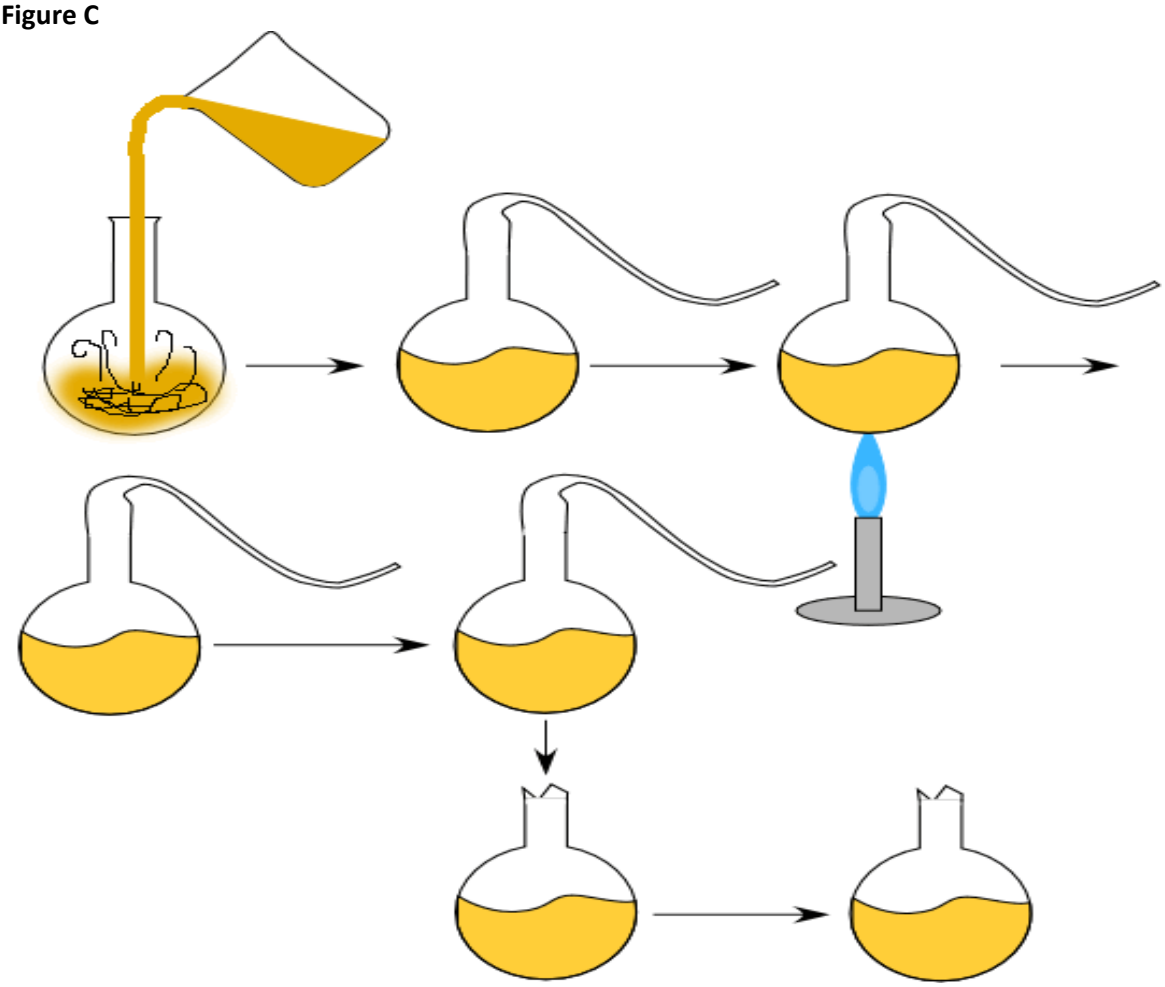
[8] Richard Monastersky, "The Rise of Life on Earth," *National Geographic* 193 (March 1998), pp. 54-81
[9] *Clinical Chemistry* 28: 749-755, 1982
[10] Silvia Mader, "Inquiry into Life" (11th edition), (2006)
[11] T. Paustian & G. Roberts, "*Through the microscope: A look at things small"* (2006)

Figure B



However this was not enough to convince all scientists that spontaneous generation fails to occur. It was not until nearly 200 years later that Louis Pasteur put the idea of spontaneous generation to rest. In 1859 Pasteur performed an experiment with heat used to kill the microbes, but left the end of the flask open to the air (Fig C). In a simple modification the neck of the flask was heated to melting and drawn out into a long S-shaped curve, preventing the dust particles and their load of microbes from ever reaching the flask. After prolonged incubation the flasks remained free of life. (See footnote 11)

Figure C



The S-shaped neck of the flask prevented microorganisms in the air from easily entering the flask, yet allowed some air interchange. If the neck of the flask was broken, microbes readily entered the flask and grew. This was convincing evidence that spontaneous generation cannot occur, and was widely accepted by scientists.

Summary

- There is no good evidence that the origin of life arose billions of years ago by chance.
- There is no good evidence, but plenty of counter evidence that the Earth's primitive gases were a reducing atmosphere.
- The Miller-Urey experiment has done very little, if anything at all, to show how life got started.
- The Miller-Urey experiment fails once oxygen is added to the experiment, and the current Earth's atmosphere contains 20% oxygen.
- The Miller-Urey experiment is miles away from producing a living cell. Obtaining two amino acids does not mean that you have life. You are still missing 18 essential amino acids, hundreds-thousands of proteins, and both of these need to combine correctly in an ordered and complex system to create one living cell. There are trillions of cells in the human body.
- Organic evolution goes against a disproven theory that life can originate from non-life. Just saying that the first living thing had to arise from nonliving matter is speculation rather than scientific.
- Why is the best evidence gathered on organic evolution based on an experiment performed in 1953? 57 years have passed and surely technological advancements and increased scientific knowledge would present more current and accurate evidence. On the contrary recent years have suggested that the Miller-Urey experiment was not an accurate picture of what occurred on the early Earth.

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