

The Origin of Life: A Demonstration of Redi's Experiment

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Central to almost any classroom discussion of the possible origins of life on Earth is a description of Francesco Redi's classical experiment that disproved the belief that flies and other insects are spontaneously generated from decomposing organic matter. However, verbal descriptions and even printed illustrations of this pivotal work often fail to have the desired effect because many students in introductory biology classes are unfamiliar with the complex morphological changes that accompany stages in the life cycles of insects. Thus, they do not comprehend how even scholars like Aristotle could have accepted spontaneous generation or how great must have been the impact of Redi's experi-

ment in dispelling this concept.

To rectify this situation, we developed a simple demonstration to stimulate Redi's experiment using the readily available fruit fly. It proved to be a most interesting and provocative display, especially when placed in a strategic location in our laboratory several days prior to its discussion in lecture. Moreover if left beyond the time required to complete the discussion of the origins of life, the demonstration proved to be an excellent motivational tool for units on sexual reproduction and genetics.

All that is required for this demonstration are the following:

- a culture of fruit flies;
- three small jars with lids (similar to those used to con-

tain baby food);

- some well-washed cotton or linen cloth;
- blue-colored fruit fly medium;
- white absorbent towelling;
- 2-inch wide masking tape;
- three white index cards;
- a rubber band or twist-tie (the kind used to secure plastic trash bags) and;
- a small, preferably all-plastic, fish tank.

We found that commercially prepared fruit fly medium with blue coloring agent worked best in this demonstration because it was easier to see the larvae (maggots) moving about. The medium is prepared according to manufacturer's directions. Each jar is filled with medium to about 5 mm from the lip. One jar is then sealed with a lid; the second jar is covered with a small piece of cloth (to simulate the gauze covering used by Redi) secured by a rubber band or twist-tie; and the third jar is left uncovered. The three jars are then placed in the empty fish tank, the bottom of which has been covered with white, absorbent towelling to increase overall visibility. Index cards may be folded in half and placed in front of the jars to label the sealed, gauze-covered, and open conditions. A small quantity (about 20) of anesthetized fruit flies is then placed on the towelling at the bottom of the tank. Finally, the tank is covered with cloth which is secured with masking tape to prevent escape of the insects (figure 1).



FIGURE 1. A simple demonstration that simulates the classical experiment of Francesco Redi that disproved the widely held belief that flies are spontaneously generated from decomposing matter.

Within a short time the flies recover and begin to actively seek food. Soon thereafter, they deposit almost microscopic eggs that, within a few days, hatch into larvae. At this time students can observe larvae actively feeding on the medium in the open jar. On rare occasions a few tiny larvae may be detected on the cloth of the gauze-covered jar, but these soon die. No larvae appear in or on the sealed container.

This demonstration is also useful

is stimulating discussion of related topics. It provides a good opportunity to emphasize the power of the controlled experiment in problem solving as well as to introduce the ideas of Thomas Kuhn which "attempt to display the historical integrity of that science in its own time" (Kuhn 1962). Students quickly realize how, in the early development of a science, distinct and mutually incompatible views of Nature compete before one view gains general acceptance. They also

see how a scientific theory is considered valid only so long as it explains observable fact and how it is discarded or modified when it fails to do so.

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References

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