

Case study

In groups of two:

- Read pages 144-147
- discuss and answer questions a to q

Spontaneous Generation

NOTE:

If a student in your group is not contributing to your discussion they will be removed and asked to work on the case study by themselves.

→ living things came from non-living things
Flies came from dead meat

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ANSWERS TO QUESTIONS

Observation Questions

- No one has ever been hit by a frog or fish falling from the sky during a rainstorm.
- Flies collect on meat. Many other examples are possible.
- Flies will not collect on the meat if it is in a sealed package. Many other examples are possible.
- Any reasonable prediction should be accepted.
- Accept a variety of answers. Many students will agree with Needham's conclusions at this point. The question is designed not to produce a correct answer, but to initiate thinking about Needham's experiment.
- Accept a variety of suggestions such as: check more of the broth for microbes, boil the broth longer, or check the seal on the flask.
- There may be only a few microbes left in the flask; however, the drops of fluid containing the microbes are not examined under the microscope. Only a few drops of fluid are examined.
- All of the microbes could be killed by increasing boiling times.
- It would prevent the invasion of airborne microbes into the nutrient broth.
- Fewer microbes or no microbes found.
- All the microbes have been killed by increasing boiling time.
- These few microbes reproduced into a great many offspring.
- New microbes are introduced.
- Microbes did not contaminate the beef broth in the flasks. The microbes were trapped in the neck of the flask; however, fresh air flowed into the flask.
- Yes, because when the flask was tipped and the broth ran into the neck of the flask, microbes trapped in the neck entered the beef broth and began reproducing.
- Microbes were found in the flask after it was tilted. Beef broth was inoculated with microbes (procedure B, see diagram c).
- In procedure A the flask was not tilted. The beef broth did not come into contact with the microbes trapped in the neck of the flask.

Understanding Concepts

Understanding Concepts

- Spontaneous generation theory proposes that nonliving things can be transformed into living things spontaneously.
- Redi was attempting to control access of flies to the meat.
- Boiling time and amount of time the flasks were left undisturbed.

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- Spallanzani increased the boiling time.
- Microbes entered the broth from the air.
- Pasteur conducted two identical experiments, (Figure 6). In one experiment, he tipped the flask inoculating the beef broth with the microbes trapped in the neck of the flask. The fact that the flask became cloudy demonstrated that the microbes must have remained in the neck of the flask, because the flask untipped remained clear. The undisturbed flask was the control. It helped prove that tipping the flask and having the broth run into the neck introduced microbes.
- If the boiled broth remains sealed, microbes will not be formed.

Exploring

- Many possible suggestions. One might be to watch a cell as it undergoes cell division and becomes two cells. Although the student witnessed cell division, this does not mean that every cell divides the same way to produce new cells. Because you are unable to watch all cells divide, scientists suggest that you can never really prove any theory completely. The first cell created by spontaneous generation would cause the cell theory to be modified.
- Students can duplicate Needham's procedure. If an autoclave is present, all microbes in solutions can be destroyed. Caution must be exercised if an autoclave is used. Follow the directions provided by the manufacturer.