

Louis Pasteur (1822–1895) founded the study of microbes (called ‘microbiology’). Microbes were first seen by a Dutch scientist called Antoni van Leeuwenhoek in 1674, but nobody realised their importance and people thought they were produced by **spontaneous generation**. This theory said that the food or drink that they were found in had *created* them.

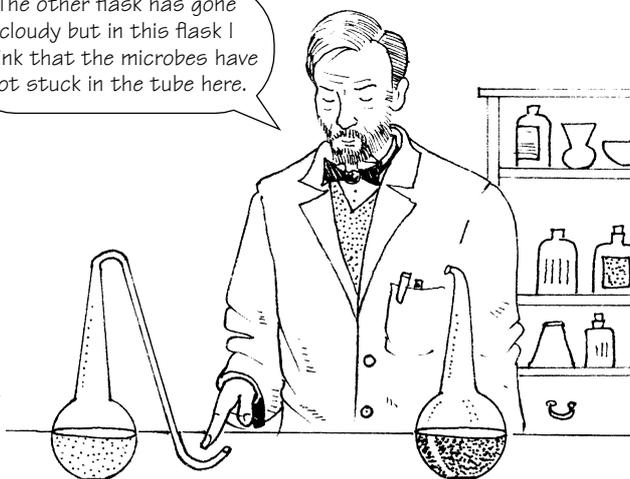
A brewer called Bigo asked Pasteur to help him work out why wine sometimes went off when it was **fermenting**. Pasteur discovered that fermentation was caused by a microbe and that the wine went off if other sorts of microbes got into it at the same time.

He also discovered that the microbes that made the wine go off came from the air. He demonstrated this by taking flasks of a clear soup called broth. Some flasks had large curled tubes, and others did not. He boiled the broth in the flasks and then left them to sit around his laboratory. The broth in the flasks with the long tubes did not go off, because the microbes got stuck in the tubes and could not reach the broth. This disproved the theory of spontaneous generation.

Emperor Napoleon III then asked Pasteur to find a way of stopping his wine going off after it had been bottled. Pasteur invented pasteurisation to stop this happening.

Pasteur later showed that some diseases were caused by microbes from the air. He came up with what is called the **germ theory of disease** which we now know is correct.

The other flask has gone cloudy but in this flask I think that the microbes have got stuck in the tube here.



- ?**
- a** Who was the first person to see microbes?

b What is the study of microbes called?
 - a** Before Pasteur, how did people think that microbes came to be in food and drink?

b What was this theory called?

c What would have happened in Pasteur's flasks if this theory had been correct?
 - Some people thought that microbes were caused by the air itself, rather than microbes in the air. How does Pasteur's experiment also disprove this theory?
 - a** Pasteur discovered that a microbe caused fermentation. Which microbe?

b Suggest what other sort of microbe might have made the wine go bad.
 - a** Why do you think wine that tasted all right before it was bottled might go off in the bottles?

b Name the process Pasteur invented to stop this happening.

c What common drink is this process also used for today?

S literacy, knowledge