report in a journal or in a poster form at meeting. This depends on the situation the person is in. For example, a scientist would publish their findings in a scientific journal as a final report.

## The Germ Theory

What is the germ theory? The germ theory is a concept that shows there are certain microscopic organisms which cause specific diseases. For example, bacterium causes salmonella, typhoid and tuberculosis in humans. The theory was developed and accepted in Europe and in the US in the 1800s. It took a very long time for the theory to be accepted because there was a lack of evidence and not many scientists were looking into this. Louis Pasteur was the main reason why this was accepted because he was helped by scientists and physicians such as Robert Koch in his journey to prove that organisms cause diseases. Who is Louis Pasteur? Louis Pasteur, Born on the 27th of December 1822 in Dole, France and died on the 28th of September 1895, was a French chemist and microbiologist. He discovered that microbes were responsible for making alcohol sour so he came up with a brilliant process called pasteurisation, where he would kill bacteria by heating it and then allowing it to cool. He and his team also created vaccines for anthrax and rabies.

The observation made by Louis Pasteur was that he was asked by a tradesman to see why fine vinegar made from beet juice was spoiling. To answer the tradesmen's question, he examined the fine vinegar and the spoiled vinegar under a microscope. He had already known that the beet juice is fermented using yeast and he knew that yeast is a live organism. Pasteur's hypothesis was that 'small microbes' were also living organism that could be killed by boiling the liquid'. The process that Louis Pasteur used to kill the microbes in the vinegar was to heat the vinegar to 50-60 degrees Celsius and then to rapidly cool it. This makes sure that the microbes were dead and that they wouldn't be able to grow back quickly in the casks. Nowadays the method used for pasteurisation is called high-temperature short-time pasteurisation which is used for pasteurising high volumes of milk. This method is used nowadays because it is faster and more energy efficient than batch pasteurisation however because of the high temperature, this gives the milk a slightly cooked flavour. There are more steps in this process but it is much quicker than the other process. Firstly, cold milk at a temperature of 4 degrees Celsius is passed into the pasteurisation factory. Secondly, the milk passes through the heating section of the plate heat exchanger. There are 2 chambers which are full of staked plates with gaps in-between them. In the first chamber, cold milk is flowing through the chamber while milk that has already been heated and pasteurised is being pumped through the second chamber. Heat is passed on to the first chamber from the second chamber through steel plates. This warms up the milk to 60 degrees Celsius. Thirdly, milk flows through to the heating section of the plate heat exchanger. At this point, hot water in the second chamber heats the milk to 72 degrees Celsius which is the perfect temperature for the high-temperature short-time pasteurisation. Fourthly, the milk is passed through a holding tube which takes 15 seconds

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