

Louis Pasteur (1822-1895) – forefather of microbiology and pioneer of contemporary medicine

Revolutionary Microbes



KAZIMIERZ KOCHMAN

Kielanowski Institute of Animal Physiology and Nutrition, Jabłonna

Polish Academy of Sciences

office@ifzz.pan.pl

Prof. Kazimierz Kochman is a neuroendocrinologist with a passion for the history of science.

The shift from traditional to contemporary medicine in the early 19th century was as fundamental as it was rapid. This revolution was driven by the development of new, effective methods of fighting infections, with the French scholar Louis Pasteur leading the way

Pasteur was born in late 1822 in Dole in the Jura Mountain region, and he spent his childhood in Arbois, where his father had a modest tannery business. In 1842, he graduated from the École Normale Supérieure where he specialized in chemistry. His early research into tartaric acid crystals led to the discovery of a natural link between two scientific disciplines: crystallography and polarimetry.

In recognition of his achievements, the young scientist was nominated for the post of chemistry professor at the University of Strasbourg. He soon fell in love with Marie Laurent, daughter of the university's rector. He wrote a letter to his beloved's father, saying, "I have no fortune. What I do have is good health, a good heart, and a position at the university." The rector consented to their marriage. In 1854, the family moved to Lille, where Pasteur went on to make a number of famous scientific discoveries.

Laboratory in Lille

In the mid-19th century, local producers of beer, alcohol, and vinegar were concerned by the major losses they were making; aware of Pasteur's reputation, they approached him asking for help. In 1864, he conducted studies into the fermentation of wine at a laboratory in his hometown of Arbois, discovering that the process is driven by specific microorganisms. He also demonstrated that different microbes can lead to the formation of undesirable compounds in the fermentation broth, which

in turn can lead to spoilage. Pasteurization – a gentle heating process that destroys most bacteria and molds in food products without affecting the taste and quality – earned Pasteur the gratitude of manufacturers, as well as one of the Grand Prizes at the World's Fair.

Although it was not the only distinction he was awarded, Pasteur received little financial support from the government and therefore used any monetary prizes to fund his laboratory. It was a struggle at times, yet he always rejected offers of paid positions where he would nevertheless be just a figurehead.

Prior to becoming hailed as one of the proponents of germ theory and shifting his research focus to infectious diseases of livestock, Pasteur studied silkworm disease on request of his friend and colleague, J.B. Dumas. This work was of great economic importance; he demonstrated that silkworms are prone to several different diseases, each caused by a distinct pathogen, and devised diagnostic and prevention methods. The discoveries provided a direct incentive for further microbiology research.

Fermentation and pathogens

Pasteur's research into fermentation led him to the conclusion that other infectious diseases are also likely caused by microorganisms. This provided the foundation of his work on aseptic conditions and his research into vaccinations; it also made him a proponent of sanitation in hospitals. His initial experiments were conducted on animals; he soon discovered that those inoculated with damaged, weakened microorganisms at certain doses were able to recover.

On 6 July 1885, a nine-year-old boy and an adult man arrived at Pasteur's laboratory at Ulm Street; both had been mauled by a rabid dog. Young Joseph Meister suffered several deep wounds. Although Pasteur previously hesitated to test this rabies vaccine on humans, here he was faced with a life-and-death situation; he consulted Alfred Vulpian and Jacques-Joseph Grancher during a meeting at the Academy of Sciences later the same day. His colleagues had no doubt that the boy was infected with rabies; since existing medical treatment wouldn't have been able to save him, Pasteur was cleared to administer his vaccine.

He inoculated the boy over the course of ten days between 7 and 16 July 1885. His personal conviction that the treatment would be life-saving overran his fears of injecting the boy with the rabies virus. Joseph was the



Louis Pasteur had a great belief in the results of his experiments. "True scientists should know what they wish to achieve before obtaining confirmation by experiment," he used to say to his coworkers

first patient to recover from this deadly disease. Others soon followed, including Jean-Baptiste Jupille.

For the benefit of humankind

Later the same year, during a conference of the French Academy of Sciences, Pasteur announced that of 150 people treated with the vaccine, only one did not recover. The Academy responded immediately and unanimously by forming a committee authorized to create an institution striving to prevent rabies, laying the foundation for the Pasteur Institute.

During a speech delivered as part of the celebrations of his 70th birthday in 1892, Pasteur said to the scien-

tists gathered from around the globe, "Science knows no country, because knowledge belongs to humanity, and is the torch which illuminates the world. Science is the highest personification of the nation because that nation will remain the first which carries the furthest the works of thought and intelligence." ■

Further reading:

- Topilko A. (2006). *Les Polonais et l'institut Pasteur. Annales Centre Scientifique Academie Polonaise des Sciences*, Varsovie-Paris. 9: 123-131.
- Chabrier P. (1980). Évolution de la recherche publique: quelques aspects du cas français. *Le Courrier du CNRS*, no. 36, avril 1980.
- Yallery-Radot R. (1953). *La Vie de Pasteur*. Flammarion, 1953, pp. 641-642.