People @ Virology

Biography of Professor Louis Pasteur
Shengnan Guo
National Institute of Food and Drug Control, Beijing City P.R. China 100050

Main achievement

✦ Molecular asymmetry

In Pasteur's early time, he examined the chemical, optical and crystallographic properties of a group of compounds known as tartrates. He resolved a problem concerning the nature of tartaric acid. Pasteur not only showed that optical activity was related to the shape of the crystals, but also an asymmetric internal arrangement of the molecules was responsible for twisting the light. The (2R, 3R) - and (2S, 3S) - tartrates were isometric, non-superposable mirror images of each other. This was the first time anyone had demonstrated molecular chirality, and also the first explanation of isomerism. Pasteur's work was considered in this area to be his "most profound and most original contributions to science".

✦ Fermentation and germ theory of diseases

Pasteur demonstrated that fermentation is caused by the growth of micro-organisms, and the emergent growth of bacteria in

Shengnan Guo, M.D., Major in the Pathogen biology
Tel: +86-010-67095194 Fax: +86-010-67095194
E-mail: guoshengnangsn@163.com
nutrient broths is due not to spontaneous generation, but rather to biogenesis. He thought that yeast was responsible for fermentation to produce alcohol from sugar, and that air was not required. He also demonstrated that fermentation could also produce lactic acid (due to bacterial contamination), which make wines sour. This is regarded as the foundation of Pasteur's fermentation experiment and disprove of spontaneous generation of life.

While Pasteur was not the first to propose the germ heory, he conducted experiments that clearly indicated its correctness. Today, he is often regarded as the father of germ theory.

✧ Spontaneous generation

Pasteur exposed boiled broths to air in swan-neck flasks that contained a filter to prevent all particles from passing through to the growth medium, and even in flasks with no filter at all, with air being admitted via a long tortuous tube that would not allow dust particles to pass. Nothing grew in the broths unless the flasks were broken open, showing that the living organisms that grew in such broths came from outside, as spores on dust, rather than spontaneously generated within the broth. This was one of the last and most important experiments disproving the theory of spontaneous generation for which Pasteur won the Alhumbert Prize in 1862.

✧ Immunology and vaccination

Edward Jenner had also discovered vaccination using Vaccinia to give cross-immunity to smallpox in 1796, and by Pasteur's time this had generally replaced the use of actual smallpox material in inoculation. The difference between smallpox vaccination and anthrax or chicken cholera vaccination was that the weakened form of the latter two disease organisms had been "generated artificially", so a naturally weak form of the disease organism did not need to be found. This discovery revolutionized work in infectious diseases, and Pasteur gave these artificially weakened diseases the generic name of "vaccines", in honour of Jenner's discovery. The vaccine had been tested in 50 dogs before its first human trial. This vaccine was first used on 9-year old Joseph Meister, on July 6, 1885, after the boy was badly mauled by a rabid dog. Three months later he examined Meister and found that he was in good health. The treatment's success laid the foundations for the manufacture of many other vaccines. The first of the Pasteur Institutes was also built on the basis of this achievement.

Education & work experience

✧ In 1839, he entered the Collège Royal de Besançon and earned his baccalauréat (BA) degree in 1840.
✧ In 1845, he received the Bachelor of Science degree.
✧ Pasteur was appointed to the Chair of Chemistry in the faculty of sciences of the University of Strasbourg in 1848.
In 1854, he was named dean of the new faculty of sciences at Lille University, where he began his studies on fermentation.

In Paris, he established the Pasteur Institute in 1887, in which he was its director for the rest of his life.

Additionally:

In 1995, the 100th anniversary of his death, to honor Pasteur's many contributions to mankind, to coincide with the event in celebration of Pasteur Centennial held by the French, a commemorative stamp, using Pasteur's portrait as the design, was issued (see figure 1).

Reference


Figure 1: 100th anniversary of the passing away of Louis Pasteur commemorative issue
(Issue date:1995-09-27 Designed by Chang Chia-cheng)