Louis Pasteur

Chemist, founder of physio-chemistry, father of bacteriology, inventor of bio-therapeutics; born at Dole, Jura, France, 27 December, 1822; died near Sevres, 28 September, 1895. His father was a poor tanner who moved to Arbois when his son was but two months old. Pasteur received his early education at the College Communal of Arbois, but paid little attention to his books, devoting himself to fishing and sketching. For a time it seemed as though he would become a painter. When science was reached in the course he grew interested. He received his degree at Besançon and then in order to devote himself to science went to Paris to study under Dumas, Balard, and Biot. His father helped him, but he had to support himself partly by his own labours. His first original work was done on crystals. Mitscherlich announced that two tartaric acids, apparently identical in chemical qualities and in crystalline form, acted differently in solution toward polarized light. Refusing to accept this dictum, Pasteur demonstrated that the crystals thought to be similar were different, and explained the seeming inconsistency.

His discovery attracted wide attention. As a result he devoted himself to the study of what he called dissymmetry, pointing out that inorganic substances are not dissymmetrical in their crystallization, while all the products of vegetable and animal life are dissymmetric. He concluded that there was some great biological principle underlying this. As the result of his discovery he was made (1848) professor of physics at the Lycee of Dijon; three months later he became deputy professor of chemistry at the University of Strasburg, and full professor in 1852; in 1854 dean and professor of chemistry at the new University of Lille; in 1856 the English Royal Society conferred on him the Rumford Medal for researches on the polarization of light with hemihedrism of crystals; in 1857 he became director of scientific studies at the Paris Ecole Normal, in 1863 professor of geology and chemistry at the Ecole des Beaux Arts, in 1867 professor of chemistry at the Sorbonne, where he remained till 1889, when he became the Director of the Pasteur Institute, founded in his honour.

His early chemical studies led him to the investigation of fermentation and putrefaction, which he showed were due to living germs of various kinds. From this the demonstration that spontaneous generation does not take place was but a step. He showed that in highly-organized material, if the living germs are all destroyed, and if further access of germs be prevented, even though air may be allowed free access, fermentation or putrefaction does not take place. A piece of cotton wool, or a mere bending of the neck of the flask to keep germs from entering, is sufficient after sterilization to keep organic solutions quite sterile. The study of fermentations led Pasteur to studies in vinegar, wine, and beer. As the result of his successful investigation of ferments he was asked by the Empress Eugenie whether he would not now devote himself to the organization of great manufacturing industries for the benefit of France. He replied that he considered it quite beneath the dignity for a scientist to give up his time to commerce, and while he was willing that others should take advantage of his discoveries he wanted to push on to further scientific work.

This was a fortunate decision. His successful investigations led the French Government to appeal to him to study the silk-worm disease. This had produced such ravages in the silk industry in France that the end of it seemed not far off. Many expedients and supposed remedies had been tried. Fresh silk-worms had been brought from China on a number of occasions, but they succumbed to the disease, or their progeny became affected by it. Nothing availed and the case seemed hopeless. Pasteur found the silk-worm had been suffering from two diseases, pebrine and flacherie, and that the spread of these diseases could be prevented by careful segregation of healthy worms from those diseased. The announcement seemed too good to be true and was scouted. Pasteur demonstrated its absolute truth and his practical ability by taking charge of the villa of the French Prince Imperial, where the silk industry

had been ruined. At the end of the year the sale of cocoons gave a net profit of 26,000,000 francs (over $5,000,000).

Naturally Pasteur proceeded to the study of diseases of animals and human beings. He demonstrated the bacterial cause of anthrax, which had made serious ravages among cattle in France. The organism was distributed by contact, real contagion. Earthworms, he showed, carry it up from the bodies of animals buried in shallow graves to infect grazing animals. He found further that he could by heat reduce the vitality of the anthrax microbe, so that it produced but a mild form of the disease which would protect cattle against the fatal form. Then he discovered the cause of fowl cholera. He cultivated it artificially and after a time his cultures would not produce the disease in fowl, though it served to protect them against injections of virulent cultures which would kill "control" fowl. The discoveries of vaccinating viruses for these two diseases saved France millions of dollars every year.

Pasteur proceeded with the development of bacteriology and its relation to disease. Having studied many cases of child-bed fever at the hospitals, he declared before a medical society that he had seen its cause, and challenged he drew a picture resembling a rosary of what we now know as a streptococcus, or chain coccus. He discovered other coccus (berry) forms of pathological microbes, some of them arranged in bunches like grapes, thence called staphylococci. Finally came his work on rabies. Unable to find the cause of the disease, which has not yet been discovered, he succeeded in making from the dessicated spinal cords of animals dead from the disease a vaccinating virus, which protects human beings bitten by a rabid animal again the development of rabies. This treatment met with great opposition. The Germans talked sneeringly of "a remedy of which we know nothing for a disease of which we know less". With time Pasteur's vindication came. The Russians, who suffered severely from rabies, from the bites of mad wolves on the steppes, found it of great service, and the tsar honoured Pasteur by a personal visit. Next the British in India found it wonder-working. Other countries adopted it. Finally the German Government established Pasteur Institutes, and acclaimed the discovery.

Many honours came to Pasteur. Besides the Rumford and Copley Medals (1856-1874), in 1868 the Austrian Government gave him a prize of 10,000 francs for this work on silk- worms; in 1873 the French Société d'Encouragement, a prize of 12,000 francs; the Russian Society of Rural Economy, a medal (1882); the Albert medal (1882); the Bressa Prize, 5000 francs (Turin Academy, 1888); the French Government, an annual pension of 12,000 francs (1874), increased in 1883 to 25,000 francs, and besides all the degrees of the Legion of Honour orders were conferred on him by Russia, Denmark, Greece, Brazil, Sweden, Turkey, Norway, and Portugal. Oxford gave him a D.C.L., Bonn, an honorary M.D., the English Royal Society, foreign membership, and the French Academy, its membership (1881). He was made Perpetual Secretary of the Academy of Sciences in 1887. There was a magnificent celebration of his jubilee on his seventieth birthday, 27 December, 1892, to which contributions were sent from every civilized country and all the great institutions of learning.

Pasteur's faith was as genuine as his science. In his panegyric of Littré, whose fauteuil he took, he said:

Happy the man who bears within him a divinity, an ideal of beauty and obeys it; and ideal of art, and ideal of science, an ideal of country, and ideal of the virtues of the Gospel.

These words are graven above his tomb in the Institut Pasteur. In his address Pasteur said further "These are the living springs of great thoughts and great actions. Everything grows clear in the reflections from the Infinite". Some of his letters to his children breathe profound simple piety. He declared "The more I know, the more nearly is my faith that of the Breton peasant. Could I but know all I would have the faith of a Breton peasant woman." What he could not above all understand is the

failure of scientists to recognize the demonstration of the existence of the Creator that there is in the world around us. He died with his rosary in his hand, after listening to the life of St. Vincent de Paul which he had asked to have read to him, because he thought that his work like that of St. Vincent would do much to save suffering children.

Pasteur's principal works are: "Etudes sur gVin", (1866); "Etudes sur le Vinnaigre" (1868); "Etudes sur la Maladie des Vers à Soie" (2 vols., 1870); "Quelques Réflexions sur la Science en France" (1871); "Etudes sur la Bière" (1876); "Les Microbes organisés, leur rôle dans la Fermentation, la Putréfaction et la Contagion" (1878); "Discours de Réception de M.L. Pasteur à l'Académie Française" (1882); "Traitement de la Rage" (1886).