



**Louis Pasteur in His Laboratory**

## PASTEUR, SCIENTIST AND CATHOLIC

(1822-1922)

Of all the charges brought against the Church, by far the most popular in our day is her so-called opposition to science. Science and faith, say her enemies, are mutually exclusive; and realizing this, Rome has ever stood opposed to the forward march of science, fearful lest new discoveries should prove the death of her vast array of dogmas. Such is the gist of the objection to be found in works of the materialistic scientists of the day. It has been met and answered in many ways. It is most simply and most effectively met by pointing to the list of those who have writ their names high on the honor roll of science, and inscribed them proudly in the register of faith. From the long and glorious list we shall select but one name. It is on the lips of the world of science today, for this month they celebrate the centenary of the birth of him who bore it. It is the name of Louis Pasteur,—the Prince of Science, the Pride of France, and the Glory of the Catholic Church.

The story of Pasteur's work in the domain of science is too well known to need retelling here. It is good, however, to run over briefly the list of his most glorious triumphs, lest silence beget forgetfulness, and forgetfulness lay us open to the charge of ingratitude.

Pasteur thought first to find his life work in the chemical laboratory, and at the age of twenty-six he made his name known throughout the scientific world by his work on the internal structure of the molecule, and his discovery of the dissymmetry of the crystals of racemic acid. Fortunately, however, for the greater good of mankind, his attention was soon turned to the field of bacteriology, which he was to establish as a science, and in which he was to find his destined vocation. At the age of thirty-two he was appointed the first Dean of the Faculty of Sciences which had just been created in the industrial center of Lille. Here, brought into close touch with one of the leading industries of the district,—the production of alcohol from beet-root and grain,—Pasteur's interests were turned toward the hitherto unexplained phenomenon of fermentation. The problem riveted his attention, and he bent himself to its solution with that enthusiasm which carried him successfully to the untangling of every problem he undertook. He soon found that

the true cause of the phenomenon was the presence in the liquid of minute living organisms called ferments. His next step was to find a means for holding in check the action of the ferments, and so to prevent them from working harmful alterations in the beverages manufactured. This he did by a method as simple as it is scientific. He soon discovered that heating the liquid was fatal to the life of the ferment. We are all familiar with this method today from its use in the sterilization of milk, and we give constant tribute to the genius of its discoverer when we call the product thus treated Pasteurized milk.

Whence come these ferments? How account for their presence in the liquids? Do they arise spontaneously within the fluid, or is their source to be looked for elsewhere? These questions led Pasteur to the investigation of the problem of spontaneous generation; and the answers his painstaking experiments disclosed finally unlocked the secret of one of the oldest riddles known to man. For Pasteur soon discovered that the ferments were present in countless myriads throughout the atmosphere, and from the atmosphere entered into the organic compounds, finding in the fluids abundant food and a most congenial breeding-ground. Once the medium was thoroughly sterilized and all possibility of foreign living matter entering into it precluded, no form of life was found to be present in it. Pasteur then took in turn the various experiments which less careful observers had pronounced capable of producing life spontaneously, performed each of them time and again with meticulous care to prevent the entrance of life from without, and then announced the result of his researches to a committee of scientists in the Sorbonne: "There is not one circumstance known at the present day which justifies the assertion that microscopic organisms come into the world without germs, or parents like themselves. Those who maintain the contrary have been the dupes of illusions and of ill-conducted experiments, tainted with errors which they know not how either to perceive or avoid. Spontaneous generation is a chimera." Positive words, indeed, but not to be gainsaid. They proved the funeral oration of the long-accepted theory, which since their utterance is recognized by every scientist worthy of the name to be dead beyond all hope of resuscitation.

Now that he had become acquainted with the world of the "infinitely little," Pasteur set himself to learn the influence of

microbes on the higher forms of life. Two centuries earlier, the chemist Robert Boyle with rare penetration had prophesied that "he who thoroughly understands the nature of ferments and fermentations shall probably be much better able than he that ignores them to give a fair account of divers phenomena of certain diseases (as well fevers as others), which will perhaps be never properly understood without an insight in the doctrine of fermentations." This prophecy was literally fulfilled; for Pasteur, who first understood the nature of fermentations, was enabled by the knowledge thus gained to unravel the mystery of contagious disease and its origin. He at once suspected that the microscopic beings floating in myriads in the atmosphere, and producing such harmful effects on organic liquids, might also be responsible for the diseases of animal organisms. His first venture in this field amply justified his suspicion. At the request of the government, he undertook to find the cause and provide a remedy for the disease that had affected the silkworm, and was threatening with extinction the silk industry of France. After three years of research he was able to show that the plague was due to certain microbes with which the silkworms were affected, and to suggest a remedy that rescued from certain destruction one of the most profitable industries of his country.

Pasteur's attention was next directed to the infectious diseases of domestic animals and of men. Here, too, his predictions were wonderfully verified, for he found that the origin of splenic fever, the first case to which he devoted himself, was due to the presence of microbes in the infected organism. But the cure of the disease for the time being eluded his most careful search. He turned to the study of chicken cholera, and found that it, like splenic fever, was caused by bacteria. In his search for a counteractive he was not only successful in finding the object of his quest, but at the same time hit upon a discovery that was to establish on a scientific basis the principle of vaccination, and to furnish him with the desired remedy for splenic fever, and with a method of fighting other contagious diseases as well. He found, after a number of experiments, that he could attenuate the virus of chicken cholera and of the other diseases to any desired strength, and that the virus thus weakened could be used to inoculate against the disease itself. The announcement of this discovery was received at first with sceptical cau-

tion, but once demonstrated it was hailed with the enthusiasm it richly deserved.

The rest of Pasteur's work in the field of disease is, for the most part, but an application of this principle. The crowning glory of all, coming toward the end of his life, was the discovery of a cure by inoculation for the dread disease, rabies, caused by the bite of an animal afflicted with hydrophobia, and nearly always fatal in its results. Out of gratitude for this great boon, the people of France subscribed to the erection of the first Institute bearing the name of their benefactor, and set aside for the investigation of the cause and of various methods for the cure of rabies. Since then other Pasteur Institutes, dedicated to the same purpose, have been erected in numerous medical centers of the world. The method found by Pasteur is so successful that the death rate of the disease has been reduced to less than one per cent.

These various discoveries were destined to be far-reaching in their effects. A little thought will reveal the place they hold in various industries of the world of commerce. But their prime benefit lies in their application to the treatment of disease. They have lifted the study of medicine from its former abyss of mystery and the resulting haphazard guess work to the level of an exact science. They have made possible the modern miracles of surgery. Lister, the founder of modern surgical methods, addressing Pasteur on the occasion of his seventieth birthday, said: "Truly there does not exist in the entire world any individual to whom the medical sciences owe more than they do to you. Your researches on fermentation have thrown a powerful beam, which has lightened the baleful darkness of surgery, and has transformed the treatment of wounds from a matter of uncertain and too often disastrous empiricism into a scientific art of sure beneficence. Thanks to you, surgery has undergone a complete revolution, which has deprived it of its terrors, and has extended almost without limit its efficacious power."

Such are the outstanding features of Pasteur's life-work as a scientist. But just as the man himself was prouder of being a Catholic than of being an Academician, so our interest is more deeply stirred by his profound Catholicity than by the vast array of his scientific achievements. Living in an age when scepticism was the watchword of the hour, when it was considered clever to shrug ones shoulders at the mention of the supernatural, and

scientific to see in materialism the be all and the end all of life, Pasteur was a shining example to others by the sturdiness and simplicity of his faith. Asked on one occasion by a friend how one of his intelligence and genius could still cling to the age-worn dogmas of Rome, he gave utterance to the confession that will be admired as long as the name of Pasteur is recalled: "All my learning has engendered in me the faith of a Breton peasant; if I had learned still more, I should have the faith of a Breton peasant woman."

It was this passionate attachment to his faith that lent such enthusiasm to his researches on the problem of spontaneous generation. The doctrine was an essential tenet of the materialistic philosophy rampant in his day, and in refuting it he saw with delight that he could be of service to Christianity. His triumph was the triumph of truth over error. His solution laid bare a fatally vulnerable spot in the armor of the enemies of the Church, and furnished the Christian philosopher a most powerful weapon against the monstrous doctrine of materialistic evolution.

But it is, after all, in the private life of the man that we shall find the strongest evidence of his sterling Christian character. Outside of the laboratory he doffed his mantle of learning, and showed himself a docile, simple child of the Church, indistinguishable by his unaffected piety from the lowliest of the faithful with whom he knelt at services. He was assiduously regular in his attendance at Mass and in the reception of the sacraments. His respect for the laws of the Church was profound. On several occasions he gave public demonstration of this by refusing, if it chanced to be a day of abstinence, to partake of delicate meats served to grace the occasion at banquets given in his honor. So careful was he to observe in every detail the discipline of the Church, and to refrain from any action that might be to others a cause of scandal or disedification.

Pasteur, however, was not content with merely not giving scandal. He knew the power for good as well as for evil invested in a public character, and was ever ready with good example when the prestige of his name could be of service to religion. An example of this trait is afforded us in one of the finest incidents of his life. It was the custom of the vine-dressers of Arbois, where he used to pass the summer, to make each year, on the eve of the feast of the patron of the village,

St. Just, an enormous artificial grape, composed of the fruits of their labor. On the morning of St. Just's day, the grape was borne in solemn procession to the parish church, where it was blessed and offered before the altar. In 1885 the peasants had been persuaded by certain persons, among them the mayor of the town, that the old religious custom was unbecoming their dignity as intelligent vine-dressers and free thinkers. The feast was in consequence to have passed without the customary offering. But on the morning of September 6, the feast of St. Just, a magnificent grape was borne in procession to the village church, with a goodly number of the peasants marching before as escort, and with Pasteur, hat in hand, following reverently behind. This he did, not only in 1885, but also on the three following years. And so he saved for Arbois one of its most religious and picturesque customs. The more "enlightened" amongst the simple villagers had dubbed it superstition; they dared not call it such when done by the great Pasteur.

The pictures of Pasteur with which we are most familiar represent the man of science at work in his laboratory. It will be well for us, if we wish a fuller and more correct knowledge of the man, to store up in our memory incidents from his life that represent also this religious side of his character: such as Pasteur, taper in hand, walking in the processions of his parish church, or Pasteur, on the occasion of his seventieth birthday, weeping with childlike emotion at the reception of the congratulations and apostolic blessing of the Father of Christendom. The finest picture of all, however, and one we should imprint indelibly on our mind, is afforded on the reception of Pasteur into the French Academy. It shows us the scientist and the Catholic combined. Pasteur was elected to succeed Littré, who in life had been one of the principle champions of positivism. Renan, the apostate, presided. Here was a golden opportunity to give testimony before the most august assemblage in France to the faith that was in him, and Pasteur was too much a man to let it pass. After the customary eulogy of his predecessor, which as an Academician he was required to pronounce, and which his long friendship with Littré permitted him to do with all sincerity, he launched forth into a denunciation of the tenets of positivism. The notion of the infinite, which this system repudiated, Pasteur found expressed everywhere in the world, and with it, as a consollary, the notion of the super-

natural and of an infinite God. He reminded his audience with pardonable pride of the defence of the supernatural he had furnished in his refutation of the materialistic doctrine of spontaneous generation. He challenged the positivists to bring forth a single philosophical or scientific fact that required the rejection of the tenets he held so dear. At the end of his oration he gave utterance to the confession of faith which has, in part, been placed on his tomb: "Happy the man who bears within him a divinity, an ideal of beauty and obeys it; an ideal of art, an ideal of science, an ideal of country, an ideal of the virtue of the Gospel. . . . These are the living springs of great thoughts and great actions. . . . Everything grows clear in the reflections from the Infinite."

Pasteur's death was as edifying as his life. After a long illness borne with admirable patience, and fortified by the sacraments of the Church, he passed into eternity on the 28th of September, 1895. His final resting place, most fittingly, is in the Pasteur Institute of Paris. There, amidst the laboratories he loved and served so well, is the little chapel which contains his tomb. Above the walls on which are recorded his contributions to the world of science, are four mosaic panels of angelic figures, representing Faith, Hope, Charity, and Science,—the guiding principles of his life.

"Not 'mid the dead should he be laid asleep,  
Who wagem still with death triumphant strife,  
Who sowed the good that centuries shall reap,  
And took its terror from the healer's knife.  
Defender of the living he shall keep  
His slumber in the arsenal of life."\*

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\*"Pasteur's Grave," a sonnet by Alfred Hayes.

—Bro. Louis Clark, O. P.

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