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CONTENTS:

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LOUIS PASTEUR.

NEVER has the world been called upon to lament the death of one whose life was so full of gifts to humanity as that of Louis Pasteur. Others have lived with equal genius, others there have been whose influence upon thought has been equal or greater. Others have achieved an equal reputation from achievements of various kinds; but no other man in the history of the world has given to mankind so many valuable gifts as those which have come from the labors of Pasteur. That Pasteur possessed great genius is manifest, but yet it was not wholly genius that explains his marked preëminence, for a certain modicum must be attributed to the timeliness of his work. His greatness was due in a measure to the fact that early in life he had the fortune to have presented to his attention and the wisdom to seize upon great problems for solution. He early seized for his own an almost new field of research and brought to this new field an equipment entirely different from that which any other scientist had possessed. Pasteur is regarded as the father of modern bacteriology, but we must remember that he was not a pioneer in these lines of work. There was hardly a problem that he studied which had not been already recognized, and even studied to a greater or less extent by his predecessors; but at the same time there was not a single problem which Pasteur undertook to solve

which was not when he undertook it in a most crude, unsatisfactory condition, and when he left it in its almost perfect form. It was in reaping fruits where others failed, and in perfecting the work which had been begun by less competent scientists, that Pasteur's merit lies. Others discovered facts, Pasteur determined laws.

In looking over the life of Pasteur as a whole we are struck forcibly with two characteristics. The first was its almost uniform success. Doubtless Pasteur occasionally failed in his experimental work. But of this the world has known nothing for his conclusions seem to have been always correct. So far as Pasteur has appeared before the public from the beginning to the end of his career he has enjoyed an uninterupted success. The French people have slowly learned to recognize this and finally acquired such a confidence in him that it has been a popular saying which has met all criticisms that '*Pasteur never makes mistakes.*' This unique testimony of public confidence is unexampled, but it seems to have been well deserved, for certainly no scientist has ever held such a position before the public and made so few mistakes. This is the more remarkable when we remember that he was working in an almost unexplored field. The reason for this uniform success lies primarily doubtless in the nature of the man; but not a little of it we may attribute to the fact that in his early training Pasteur was a chemist rather than a biologist. While Pasteur's reputation will rest upon his work in biology he was educated as a chemist, and to this education we may attribute no little of the uniformity of the success of experiments. The science of biology is extremely inexact. Owing to the complicated conditions of life one is ever expecting to find exceptions to the general rules and our scientists have found it utterly impossible to lay down absolute definitions or any absolute lines of distinction between groups in biological phenomena. The very essence of biological science is the fact that the phenomena grade into each other. Influenced by this fundamental principle biologists have commonly fallen into a habit of slackness in dealing with phenomena. Knowing that whatsoever law they may discover will be sure to have its modifications, its variations and its exceptions, they inevitably get into the habit of feeling that an approximation toward accuracy is almost sufficient. Now the peculiar nature of the field of experimentation in bacteriology demands above all things most rigid accuracy. His training as an analytical chemist gave to Pasteur a recognition of the importance of exactness. One who has carried on experiments in molecular physics recognizes that failure is sure to result from inaccuracy, and it was the fact that until he was 30 years of age Pasteur was trained in this kind of accurate experimental manipulation that, when he turned his attention finally to biology and problems connected with the microscopical world, his methods of experimentation and the results of the experiment showed at once a vast advance over those of all of the biologists which had preceded him. For the first time accuracy began to be seen in this field.

A second striking feature in Pasteur's life was its dramatic character. One hardly looks for the dramatic in the achievement of scientific results. But Pasteur was a Frenchman, and, although thoroughly modest, he was, like other Frenchmen, alive to the advantage of public demonstrations. As we look through his life we can see him taking many and many an opportunity of presenting his scientific results in as dramatic a style as possible. Meeting with opposition almost constantly during the years of his active investigations, time and time again he planned public tests in which his results should be brought before the

public eye for demonstration in such a fashion as to appeal in a striking manner to the world. No other scientist has ever achieved so many brilliant public successes. We must above all things learn from Pasteur's life that after all the chief reason that his reputation advanced so rapidly in the comparatively few years of his active work was in no small measure the fact that he had the wisdom to see that it is to the application of science to practical life that the world in general gives the greatest admiration. There is ever a tendency among scientists to belittle one of their number who attempts to apply to practical life the results of research. In spite of every plea that may be made for pure science it is the application of science to the life of man that has the greatest interest to mankind. As we look through Pasteur's life and study the growth of his wide reputation we shall find that this reputation was largely founded upon the brilliant epochs in his history where he applied to practical subjects the results of the scientific investigation. The advance in his reputation came at those occasions when the public learned of his work because it had been applied to something that interested the world. The homage that the world has given to Pasteur testifies to the value of practical science, testifies to the truth of the position that pure science is of value to man chiefly as it can be applied to facts that influence practical life. While, then, applied science is frequently mentioned with a slight disdain by the modern advanced scientist, it is well to remember that Pasteur, whose reputation as a scientist has perhaps outranked that of any man of the last 50 years, made his reputation and achieved his world-wide fame because he applied to the practical things of life the discoveries revealed to him by his microscope.

The active part of Pasteur's life was so full of investigations in many lines that it is impossible in a brief review that they should receive the weight which they deserve. Only the most important of them can be here mentioned, a selection being made of those upon which his reputation has been chiefly built. Pasteur received an early training as a chemist, and the first work of his life was chemical. Until he had reached about the age of 32 the work he had been doing had been mostly in the line of molecular physics, and certain papers upon the structure of crystals appeared from his pen which even in those early years showed signs of genius. He would have probably made his mark as a chemist had not his attention been turned to a more fruitful field. In 1854 he was appointed Dean of the University of Lille, and it was at this place that his attention was first turned in the direction which subsequently made him famous. A simple incident led him to the study of fermentations in the manufacture of certain chemicals. The crystallization of tartrates had earlier interested him, but now he noticed that tartrate of lime had a tendency to ferment. This fact attracted his attention and led him into observations and experiments upon the nature of the fermentation of tartrates. These experiments demonstrated to his microscope the universal presence of living organisms in the fermenting material. Finding these fermentations universally accompanied by living organisms it appeared to him as probable that the fact must be part of some general law. It was not a pure accident that living organisms were present, but in some way he believed there was a connection between the fermentations and the presence of the organisms. A general law he formulated, and reached the inference that fermentations in general are produced by living organisms, microscopical in size but of very great potency. This conclusion was, of course, a simple inference as yet undemonstrated, but it was the in-

ference which started Pasteur along the line of his experiments in fermentation. It was the guiding star of Pasteur's life. From the moment the inference was drawn until his death this law, that fermentations, putrefactions and all similar chemical changes were produced by the growth of microorganisms, was the basis of every line of investigation which was undertaken by him. Every new problem in his life was attacked by him from this standpoint. The great success of Pasteur's work lay in the fact that his guiding principle was a correct one, his great merit in his wisdom in early adopting it as a law, and his genius in demonstrating it. If he had drawn an inaccurate conclusion from these early experiments he might in time have corrected the error, but we must look upon the fact that he had the wisdom to draw a correct inference from this first work as the foundation of Pasteur's success in life.

Pasteur now became interested in the subject of fermentation. His home was in one of the important seats of fermentative industries, and study of fermentation as a general phenomena at once received his attention, not only from its general interest, but as especially appropriate to his life at Lille. He was thus led away from the line of pure chemistry into biological work, but the change was almost imperceptible. Up to the time when Pasteur began his studies fermentation had been regarded as a chemical phenomenon, and it was natural that a chemist should study it. In the few decades that preceded the work of Pasteur, fermentation had been carefully studied by a number of our chemists and microscopists. While different theories had been advanced, the theory of fermentation, which was almost universally held at the time when Pasteur began his experiments, was that of the chemist Liebig and was a purely chemical theory. In accordance with this theory of Liebig, fermentation is simply the chemical decomposition of bodies produced by the unstable equilibrium of their molecules. This theory held that the molecules of fermentable materials were very unstable and were easily broken to pieces into simpler compounds. The ferment was held to be simply an exciting cause which started this chemical decomposition. Fermentation was thus a purely chemical subject at the time when Pasteur began his studies, and the first work which he attempted was to show that the chemical theory of the scientists of his day should be replaced by the physiological or biological theory which he was convinced from his experiments was the correct one. Upon this task he set himself at once, and by the study of the lactic fermentation of milk, the butyric fermentation of milk, the acetic acid fermentation in the manufacture of vinegar, and by the numerous careful experiments along these various lines which he devised in his laboratory, it required only four or five years for him to undermine completely the chemical theory of Liebig and to put in its place, on a somewhat unstable basis at first, perhaps, the theory that all types of fermentation are organic in their nature and produced by the life of microscopic organisms. Even at this early day we can see his recognition of the value of the practical application of science, for among the very early pieces of work which he performed was the study of the acetic acid fermentation in the making of vinegar, and by a practical application of his results to this industry he developed a vast improvement in the manufacture of vinegar and a great cheapening of the process.

Pasteur had thus made something *his own*, and at this date, in the vicinity of 1860, he became recognized as the exponent of the biological theory of fermentation. From this time he progressed rapidly. The fermentation of wine next claimed his attention. Here was a second fermentative indus-

try in which unexplained difficulties were constantly occurring. He soon found the cause of the various failures of the vintner by which were produced many of the so-called 'diseases of wine.' These diseases he found were all due to the presence of improper micro-organisms during the fermentation instead of the pure fermenting yeasts, and he quickly devised a remedy for them in a process that has subsequently been known by his name as the process of *pasteurization*. This method of preventing the evils involving the heating of wine, was received with great opposition on the ground that the heating injured the flavor. After a great deal of more or less violent disputing on the matter Pasteur arranged for a public test of the question by getting together a large number of experts and convincing them against their will, by ingeniously devised deceits, that they were unable to distinguish between wines that had been pasteurized by his process and wines that had not been subject to heat. Having previously shown that the method of pasteurization was almost a sure remedy against the various diseases, this first public demonstration was thus a brilliant success and at once obtained for his method the acceptance of the vintner.

Meantime he had been giving his attention to the vexed problem of the last two or three centuries, namely, the question of spotaneous generation. Believing, as he did, that all fermentation was caused by micro-organisms, it was a foregone conclusion that he would be an opponent to the view of spontaneous generation. The studies upon fermentation which he had been carrying on, and his accurate methods, trained him especially well for this subject of spontaneous generation, and the experiments which he instituted brought this question into the condition of demonstration. The experiments of early scientists were repeated by him with greater care; many new experiments of his own were devised; the microscope was brought into requisition in new ways. A brilliant conclusion was reached, that by the exercise of sufficient care all traces of life could be avoided and no spontaneous generation ever occurred. It is true that the conclusions of Pasteur were not at once everywhere accepted. In England, particularly, objectors arose who advocated a belief in spontaneous generation, and these objections were not silenced until the English physicist Tyndall took up the experiments that Pasteur had been making and even more satisfactorily reached the same conclusion. But Tyndall's results were only those that Pasteur had reached before, and we recognize to-day that the only basis of the objections that were made to Pasteur's conclusions was the inaccuracy and lack of care with which his opponents performed their experiments. With brilliant rhetoric and loose experimenting, spontaneous generation was still advocated, but the disproof was given by Pasteur in spite of the fact that opposition still arose after the disproof had been reached.

But now Pasteur's attention was to be turned again and in a direction that again changed his whole life and has revolutionized modern medicine. One of the great industries of France is that of the silk-worm raising. About 1850 there appeared upon the silk-worm farms a disease of the silk worm known as pèbrine. This disease spread rapidly from farm to farm, greatly reduced the productions of the silk-worm farms and actually threatened the entire destruction of the silk-worm industry. From 57,000,000 pounds per year in 13 years this industry had fallen to 8,000,000 pounds, all because of the great devastation produced by this disease. Many had been the attempts made to cure it and many the attempts made to discover its cause. Men with a reputation greater than that possessed by Pasteur, at the time, had

attacked the problem and failed. In the year 1865 no remedy had been discovered, no cause was known and the silk-worm industry was threatened with immediate destruction. Pasteur was asked to investigate the question and at first refused to do so. His success in the study of fermentation had opened to him a prosperous career; he knew nothing whatsoever of silk-worm raising, and he was afraid that the investigation, even if successful, would lead him too far from his own chosen line of work. He was, however, over-persuaded and finally accepted the task of investigating pèbrine, little thinking that it was only the continuation of his studies on fermentation and that along the line opened to him by this investigation he was to find his life work and world-wide reputation. Pasteur undertook the investigation of pèbrine already prepared for his discoveries, for living micro-organisms were for him potent agents in nature. He very soon discovered that the cause of the disease was a microscopic organism living in the moth. He was not the first to discover this organism, for others had seen it and described it. That Pasteur succeeded where others failed was due to the fact of his belief in the powers of the microscopic world. Others regarded these organisms as of no importance, but Pasteur had become so imbued by his study of fermentation with the important agency of microscopic organisms that the very first question that he asked was whether living bodies were not the cause of the disease that he had been set to investigate. If organisms could produce fermentations in dead material why might they not produce disease in living creatures? The result of his work here we need not dwell upon. It was a brilliant success. It demonstrated that the disease was caused by the organisms and it devised a remedy against the trouble by simply breeding from healthy moths. The world laughed at him; those interested in the silk worm industry refused to adopt his methods as those of a fanatical microscopist, and too simple. He met at first with nothing but opposition, but the man arose to the occasion and so sure was he that he was right that he again arranged for a public demonstration. An abandoned silk-worm farm was put into his hands and, although at the time an invalid and unable to travel by ordinary means, he had himself transported across France and personally directed the work on this silk-worm farm, although he was unable to do anything himself. It is not, perhaps, generally known that from this time to his death Pasteur was partially paralyzed and unable to perform the work of his own experiments. There is something truly pathetic and dramatic as we think of him, an invalid, simply capable of directing others in their work, and yet fired with the belief that he was right and with the determination to convince the world that he was right. Again Pasteur's genius demonstrated itself and, by using his simple remedy, in a short time this silk worm farm, abandoned because of the presence of the disease, was restored to a condition in which it was one of the best paying silk-worm farms in France. The disease was practically eradicated from it. With a bound Pasteur's reputation spread throughout France and the world. The silk-worm industry in France began to adopt his methods at once and rapidly assumed its old condition of prosperity. From now on the Frenchmen were ready to accept almost anything that Pasteur would say. He had saved them their beloved silk-worm industry and had been the means of saving to the peasants of France a sum of money almost beyond belief.

The next important work in Pasteur's life was his investigations upon the subject of the fermentations of beer. The Franco-Prussian war and its results had deprived

the French people of their beer makers, who had been largely German, and when the French people began to make their own beer they found themselves for awhile in difficulties. In spite of careful methods various imperfections in fermentations were of frequent occurrence. By this time the French public had become confident in Pasteur's abilities, and it was only natural that he should be requested to find the solution for this puzzle. As usual, success attended his efforts. His microscope soon showed him that the trouble was due to the use of impure yeasts. The brewer's yeast was liable to be mixed with various species of bacteria as well as improper species of yeasts, and his genius soon showed methods of removing the difficulties and bringing the fermentative industry into a condition of uniformity. Upon the basis of these experiments has been founded the whole of our modern brewing industries. The large brewery of to-day is impossible without the microscope, and to the stimulus given by these discoveries of Pasteur has been due the great centralization of brewing.

The next problem that attracted the attention of Pasteur was the dreaded anthrax. For several years this devastating disease had been the subject of scientific investigation. Already its connection with micro-organisms had been made probable and indeed had been demonstrated. Many problems had been solved, but many still remain to be solved in connection with this pestilence of the agriculturist. As usual Pasteur began at the beginning taking nothing for granted, even of the facts that had been essentially demonstrated. His experiments resulted in a more complete demonstration of the relation between the anthrax bacillus and the disease, showed the method of action of the germ, demonstrated the source from which it was frequently derived by cattle, differentiated between this disease and one or two others closely resembling it among animals, disproved all of the objections that had been raised by those who disbelieved in the causal nature of the bacilli, and, in short, brought this subject upon the same sure foundation as that of pèbrine which he had so triumphantly solved ten years before. Nor was this all. The greatest discovery of his life was to follow. To Pasteur's peculiar trait of mind it was not enough to discover the cause without searching for the remedy. It was the *practical* question which appealed to him. Pasteur recognized the fact that in the human race one attack of an infectious disease frequently renders an individual immune against a second attack. He also remembered that protection against small pox had been known to be produced by vaccination. Acting upon these suggestions the question arose in his mind whether it were not possible to give to domestic animals, subject to this devastating disease, a milder type of the disease in question, from which they should readily recover, but which would give them immunity against a second attack. The principle was a new one and outlined a new, bold plunge into the mysteries of nature. It was not, however, in the investigations of anthrax that the remedy first suggested itself, but rather in a side investigation upon the subject of another germ disease known as fowl cholera. Every one is familiar with the results. He discovered a method of rendering the invading organisms of fowl cholera so impaired in their action as to be unable to produce death, giving rise, on the contrary, simply to a slight indisposition; but demonstration soon showed him that this slight indisposition was followed by immunity against the more severe disease. To anthrax he turned the same line of investigation, and after patient, laborious search discovered a means of rendering the anthrax

germ impaired in its vigor. His preliminary experiments convinced him that he had achieved success, and then came one of those dramatic public exhibitions in which Pasteur so delighted and which have so impressed the world. Almost before the public had learned that he had obtained a possible method of preventing this dread disease among agriculturists, Pasteur made arrangements for a public test of his method, and in the presence of an audience of some 200 experts made up of physicians, veterinarians, Senators, prefects, farmers, members of the French Academy and others of high standing, he demonstrated by a simple experiment, lasting about a week, that he could with unerring certainty prevent cattle from acquiring anthrax; that he could give to them a practically absolute immunity against this almost surely fatal disease by infecting them with a very mild indisposition a few days before. The effect upon the audience was electrical and their enthusiasm knew no bounds. Pasteur's experiments spread at once over the world, and from this further practical application of his scientific research his reputation made another advance. His anthrax vaccine was distributed through the civilized world, was used by grazing communities everywhere, and it has been thought to have saved the life of hundreds of thousands of cattle. The greatness of this discovery can hardly be appreciated to-day. It was a logical discovery of a new method of meeting disease. While other even more valuable discoveries in the same line have followed and are still to follow, none can equal in significance this first application of the studies of the microscope to the treatment of disease.

Following the work upon anthrax various other lines of bacteriological research connected with diseases of animals attracted his attention and demanded his time. It It was not, however, until he had attacked the problem of the most dreaded of all human diseases, hydrophobia, that he again attracted the public eye. His experiments upon hydrophobia were, perhaps, the boldest in the line of experimentation that had ever occurred, for here for the first time in history laboratory experiments were transferred to the human being. Hydrophobia had fascinated Pasteur for a long time. Experimental work had shown him that the disease was not a purely nervous excitation, as had been claimed, but that there was an actual disease under this name. Experiments showed him further that the disease bears every similarity to infectious germ diseases, although neither he nor anyone else, even to the present day, have succeeded in demonstrating the organism which produces the diseases. Experiments upon dogs and rabbits in his laboratory followed each other rapidly,and with his usual genius he devised many a method of hastening the experiments and of rapidly reaching results which would normally take months. His success with other diseases made him ambitious also to find a method of preventing this disease, and, while the methods which he had used in fowl cholera and anthrax proved useless in the case of hydrophobia, the same general line of work led him finally to a method of inoculating animals which rendered them immune against this disease. Not only so, but the same method when applied in a slightly different way was found to be efficacious in warding off the disease in an animal which had been previously inoculated therewith. He found himself able with certainty to inoculate an animal with hydrophobia and then, by treating him with the various subdermic injections which he had devised, prevent the appearance of the disease which would have otherwise inevitably occurred. Laboratory experiments were a success, and next the bold step was taken of applying to mankind laboratory methods, which had been hither-

to tried upon animals alone. A youth who had been severely bitten by an unquestionably rabid dog was brought to him at his laboratory. The youth's life was despaired of by the physicians, inasmuch as with certainty he would develop hydrophobia. Under the circumstances Pasteur felt justified in trying upon this youth the experiments that had succeeded with dogs and rabbits. The experiment so far as could be demonstrated was a success. The youth failed to develop this disease. But for a final demonstration that his methods were successful was required a long series of public experiments which were not to be obtained by any one dramatic incident. To obtain such testimony no means appeared to be possible except to announce to the public the discovery of a method of preventing hydrophobia. Such an announcement was made by Pasteur. The public had such unlimited confidence in the man that they at once accepted the conclusion as correct. Certain it is that no one else could have taken the public into his experiments, but his uninterrupted success in previous years gave all a belief that he had made no mistake here. Opportunities for experiment began to multiply, and scores and then hundred of individuals who had been bitten by animals, either rabid or supposed to be rabid, flocked to the laboratory of Pasteur to be treated by his method. The experiments thus begun have continued for eight years, and even yet can hardly be considered as concluded. The opinion of the public, and especially of the medical world, has vibrated from one side to the other. At first Pasteur's conclusions were accepted as probable simply on the basis of the great reputation of the man, and the fact that Pasteur made so few mistakes. Later, flying to the other extreme, the whole efficacy of the method as practiced by Pasteur was doubted. Most violent opposition arose, and it is thought that this opposition contributed to undermine Pasteur's health and check his active life. Later again the world became slowly convinced, by the accumulating testimony in his Institute, that here too no mistake had been made. At the present time there is hardly a question that Pasteur's methods, even in the case of hydrophobia, have demonstrated themselves as successful. While statistics are a very uncertain kind of evidence, one cannot read of the success which has attended the inoculation in Pasteur's Institute for eight years without being convinced that Pasteur's methods are correct. In his Institute have been treated several thousands of cases of persons bitten by animals supposed to have been rabid, and among those that have been treated the number of deaths has only been a trifle over one per cent. With this exceptionally small percentage, even after we say everything possible as to the uncertainty of statistics, we can hardly question that truth underlies these methods, and that Pasteur's last great work was as successful as those of his earlier years.

This work upon hydrophobia was the last piece of work which we have directly from Pasteur's own personality. A Pasteur Institute was established, and from that Institute has come, and is still coming, a series of investigations along the lines that Pasteur began, which are yearly adding not only to our scientific knowledge, but to our practical method of dealing with disease. While Pasteur's name is no longer attached to these individual researches, the master's hand gave the inspiration for them all. For several years the experiments have all been in the hands of his assistants. While we have looked upon them as his assistants, we must recognize them as independent and as having achieved their own reputation, but nevertheless, we must feel that the work that has come from Pasteur's Institute, and that will for a number of years be given to the

world from that source, must be directly or indirectly attributed to the inspiration of the master for whom the Institute was founded.

The world's debt to Pasteur we cannot estimate. His financial gifts we can realize, when we remember that he saved the silk-worm industry, that he taught the vintners how to make wine, that he established the fermentative industry the world over, and that he gave to the agriculturists a method of preventing anthrax, we can see that the financial value of his life to the world was far beyond that of any other person that ever lived. The debt of theoretical science to him is equally great, though not measurable in any terms. He disclosed a new world; he discovered a new series of phenomena taking place below the realm of human vision and he opened to the world a new field of science. To medicine again his gifts were beyond measure. To him more than any other is due the demonstration of the germ nature of disease, and to his work we owe our hopes for medical science in the future. The practice of medicine has been almost purely empirical. To-day we are hoping that it is gradually becoming a matter of science. As we know the causes so we can search for the remedies against disease, and to Pasteur is due the first attempt to place medicine upon a scientific basis. Surgery has already become a science, and this too is indirectly attributable to him. While modern surgical methods were developed by Lister, the methods of Lister were devised as the result of the study of Pasteur's work in fermentation. Pasteur has opened to us a new world and given to us a new science, has established upon a firm basis a science of medicine and a science of surgery, and has added to the financial stores of the world accumulations of great magnitude. It was all done by slow work. The field was not a new one, for already investigators had made inroads therein, but no one with anything like certainty and accuracy. For years it was Pasteur alone who was capable of investigating bacteriologically with anything like a certainty of successful issues. Bacteriological methods were too difficult to be handled by anything but a master. To-day it is true the methods have been so simplified that far less genius is required to handle them, and to-day the bacteriologist has multiplied in every direction. But at the time when Pasteur was the pioneer the methods were so difficult as to be beyond the reach of any except those of the greatest genius. Nor can we measure our debt to Pasteur by his own work. This, indeed, was great, but our debt to him must be also measured by the work of followers who were inspired by him. In France, in England, in Germany, in America, we find the study into this realm of the microscope inspired by the long, laborious and successful work of the French master. Even in the latest achievement, the use of antitoxine, we have the direct result of Pasteur's life. Where one leads others may follow. For a long time Pasteur stood alone, and it was only work that he had done that could be looked upon as demonstrated. Little by little, however, others came into the line of research, and when to-day Pasteur is taken from the field of activity there are many capable of carrying on his work. No man that France has created is so worthy of her pride. No man who has lived in history has done so much for humanity. No one who has lived will be remembered by posterity as having had such an influence upon the world in the way of discovering facts which advance the health and prosperity of mankind. But, perhaps, the proudest achievement he attained, viewed from the standpoint of a scientist, was earning the right to the claim that '*Pasteur never makes mistakes.*'

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