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CATALOG OF AN EXHIBIT

in Honor of the

Sesquicentennial of the Birth of

LOUIS PASTEUR

National Library of Medicine
Bethesda, Maryland
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CATALOG OF PASTEUR EXHIBIT

This catalog lists the manuscripts, books, journals, pamphlets, offprints, and original pictures from the collections of the National Library of Medicine shown at the exhibit in honor of the sesquicentennial of the birth of Louis Pasteur. All items are by Louis Pasteur unless otherwise noted. The Library also wishes to acknowledge its indebtedness to the Pasteur Institute for providing a number of photographs that have enhanced the value of the exhibit.

Case I — CRYSTALLOGRAPHY

Trained as a chemist, Pasteur's earliest research was in the field of crystallography and the optical rotation of polarized light in various solutions.

1. Recherches sur le dimorphisme. Paris, 1848. Offprint from Comptes rendus de l'Académie des Sciences.

Pasteur's first scientific paper, presented to the Académie des Sciences on 20 March 1848. These studies in crystallography helped prepare the way for his first great discovery.

2. Mitscherlich, E. Note. Comptes rendus de l'Académie des Sciences, 19:720, 14 October 1844.

Mitscherlich reported through Jean Baptiste Biot, France's leading crystallographer, that sodium-ammonium tartrate and paratartrate were identical in composition, crystalline form, and other physico-chemical characteristics except that the first rotated a beam of polarized light and the second did not. This note stimulated Pasteur's first important research.

3. Recherches sur les relations qui peuvent exister entre la forme cristalline, la composition chimique et le sens de la polarisation rotatoire. Paris, 1848. Offprint from Annales de chimie et de physique.

Pasteur discovered that the crystals of both the tartrate and paratartrate discussed by Mitscherlich had hemihedral facets; that those of tartrate were all identical but that those of paratartrate included both right-handed and left-handed forms. When separated these too were optically active, but in opposite directions. His work immediately received the warm approbation of Biot.

4. Notes for experiments on crystallization, 1858.

Pasteur continued active investigations in crystallography and molecular dyssymmetry for over ten years. These are notes for experiments to be undertaken.

5. History of crystallography, 1878.

In 1878 Pasteur planned to bring out a collection of studies on molecular dyssymmetry. This text represents part of a historical introduction prepared for that work.

6. Notes for preparation of revised version, never published, of Pasteur's first memoir on tartrates and paratartrates.

7. Draft of letter to J. B. Biot, 16 October 1856.

Pasteur is seeking Biot's advice on a question of publishing preliminary findings. Pasteur feared that another scientist, C. A. H. Marbach, might reach the same conclusions and publish first.

Case II FERMENTATION

As a chemist, Pasteur turned to research on fermentation. He demonstrated conclusively that fermentation resulted from the life processes of specific microorganisms, each with its own mode of action, and he discovered anaerobic life.

1. Leeuwenhoek, Antoni van. Ondervindingen en Beschouwingen der Onsigtbare Geschapene Waarheden. 2d ed. Delft, 1694.

In his letter of 14 June 1680, Leeuwenhoek for the first time described the microscopic image of brewer's yeast, observed in fermenting beer. This same letter also marks the discovery of anaerobic fermentative bacteria--a discovery that was forgotten until rediscovered by Pasteur.

2. Fabbroni, Adamo. Dell' arte di fare il vino. Florence, 1787.

Fabbroni was the first to identify the ferment of wine as an albuminoid substance. He believed it was contained within the grapes and released upon crushing. As Pasteur remarked, "It was a step forward. It gave an indication of the place yeast should occupy among the organic products."

3. Cagniard-Latour, Charles. Mémoire sur la fermentation vineuse. Annales de chimie et de physique, 2 ser. 68:206-222, 1838.

In a series of studies presented in 1835-37 and summed up in this paper, Cagniard-Latour concluded that brewer's yeast was a living plant which produced by budding and that its vegetative processes caused the breakdown of sugar into carbon dioxide and alcohol. However, his theory was attacked by Liebig, Germany's leading organic chemist.

4. Mémoire sur l'alcool amylique. Comptes rendus de l'Académie des Sciences, 41:296-300, 20 August 1855.

Because of his interest in molecular dyssymmetry, Pasteur studied the optical activity of amyl alcohol, a frequent fermentation byproduct. Most chemists in the 1840's following Liebig held that fermentation, and putrefaction, were essentially chemical processes. Pasteur, convinced that life alone could create new dyssymmetries, began his study of fermentation predisposed to believe that it resulted from biological action. Thus molecular dyssymmetry was linked to fermentation by amyl alcohol.

5. Mémoire sur la fermentation appelée lactique. Annales de chimie et de physique, 3 ser. 52:404-418, 1858.

Pasteur's first paper on fermentation, which put forth the view that lactic fermentation was caused by a specific "lactic yeast," contains in essence the "germ theory" of fermentation. It also introduced the use of a purely artificial and reproducible medium for fermentation experiments.

6. Mémoire sur la fermentation alcoolique. Annales de chimie et de physique, 3 ser. 58:323-426, 1860.

In a series of inquiries Pasteur demolished Liebig's antivitalistic theory of fermentation, establishing that yeast is a living organism and that sugar undergoes alcoholic fermentation only in the presence of living yeast. He also described and measured the various fermentation products accurately.

7. Animalcules infusoires vivant sans gaz oxygène libre et déterminant des fermentations. Paris, 1861. Offprint from Comptes rendus de l'Académie des Sciences.

While studying lactic fermentation, Pasteur also found a specific butyric "ferment," which he called an infusorium. He wrote: "It is, I believe, the first example known of animal ferments, and also of animals living without free oxygen gas." He had in fact discovered anaerobic bacteria.

Case III — VINEGAR

Unlike many 19th century scientists, Pasteur kept firmly in mind the importance to society of applying science to practical ends. His research on vinegar led to significant improvements in the industry.

1. Nouveau procédé industriel de fabrication du vinaigre. Paris, 1862. Reprinted with changes from the Comptes rendus de l'Académie des Sciences.

Investigating "acetic fermentation," Pasteur demonstrated that it resulted from the oxidation of alcohol into acetic acid by Mycoderma aceti. This finding enabled him to suggest new methods for producing vinegar.

2. Mémoire sur la fermentation acétique. Paris, 1864. Offprint from Annales scientifiques de l'École Normale Supérieure.

Presentation copy to Marcellin Berthelot, the noted organic chemist. Pasteur's primary memoir on acetic fermentation and the production of vinegar.

3. Études sur le vinaigre, sa fabrication, ses maladies, moyens de les prévenir. Paris, 1868.

Pasteur published in this volume his "Lecture on the vinegar of wine," presented by request of the Mayor and Chamber of Commerce at Orléans, the center of vinegar production in France, to make the information more widely available for public benefit. "Nothing is more pleasing to men devoted to a career in science," Pasteur concluded, "than to enlarge the number of discoveries, but when the practical utility of their observations is immediate, their joy attains the highest pitch."

DISEASES OF WINE

In 1863, at the command of Emperor Napoleon III, Pasteur undertook a study of the "diseases" of wine and the problems of transporting and preserving them. These studies followed naturally upon his work in fermentation. Examining different wines microscopically, he discovered a variety of contaminating microorganisms and proved their specific relationship to acid, "turned," "oily," "bitter," and other types of spoiled wines. To kill the parasites and preserve the wine he recommended heating to 50°-60° C. for a short period. The process, since then applied to many foods, is now known as pasteurization.

4. Draft of letter to Minister of Agriculture, 16 March 1865, requesting funds.

Like many scientists, Pasteur had difficulty getting money to carry out his research, even when sponsored by the Emperor.

5. Études sur le vin. Paris, 1866.

Pasteur's chief work on wine, completed in only three years, reports in detail his findings on the causes and means of preventing "diseases" of wine.

6. Draft of letter to Alfred de Vergnette-Lamotte, 7 May 1864.

In his research, Pasteur sought the assistance of wine producers. In this letter he discusses causes of bitterness in wine and requests the aid of de Vergnette-Lamotte in obtaining samples.

7. Draft of letter to de Vergnette-Lamotte, 5 February 1865.

Pasteur expresses thanks for de Vergnette-Lamotte's offer of help and requests wines of various qualities and ages to pursue his studies. He is reluctant to publish his results, Pasteur writes, being not yet fully satisfied, but hopes to finish before the next harvest.

8. Procédé pratique de conservation et d'amélioration des vins. Comptes rendus de l'Académie des Sciences, 60:899-901, 1 May 1865.

In this communication Pasteur announced the process of heating wine briefly to about 60° C. in order to preserve it. It followed immediately upon the presentation by de Vergnette-Lamotte of a different method of heating for preservation. This led to an unfortunate quarrel over priority. As Pasteur's long-time associate Émile Duclaux wrote, "All profound faith is necessarily a little intolerant, and Pasteur had that faith." It often enabled him to triumph in more important causes.

9. Draft of letter to Le Moniteur Vinicole, 14 May 1865, with the editor's reply.

Pasteur points out the difference between his method of preservation and that suggested by de Vergnette-Lamotte.

10. Conservation des vins. Lettre . . . à M. Quesneville. Paris, 1866.

Pasteur fought ardently for his convictions and for his claims to priority.

Case IV SPONTANEOUS GENERATION

Pasteur's experiments were fundamental in overthrowing persistent beliefs in the continuing regeneration of living organisms from nonliving matter.

1. Redi, Francesco. Esperienze intorno alla generazione degl'insetti. Florence, 1668.

Redi demolished the idea that maggots arose spontaneously in decaying meat by demonstrating in a series of simple yet convincing experiments that they came from eggs laid by flies.

2. Joblot, Louis. Descriptions et usages de plusieurs nouveaux microscopes. Paris, 1718.

Joblot was apparently the first to experiment on boiled hay infusions. Animalcules did not appear when the mixture was stoppered immediately after boiling but did appear after the stopper was removed. He concluded that they came from minute creatures floating in the air.

3. Schwann, Theodor. Vorläufige Mittheilung, betreffend Versuche über die Weingährung und Fäulniss. Annalen der Physik und Chemie, 2 ser. 11:184-193, 1837.

Schwann showed that sterile infusions would not putrefy even when air was admitted if the air was heated first, indicating that it was not air as such, but something in air, that caused putrefaction. His experiments with fermentation were less unequivocal.

4. Pouchet, F. A. Hétérogénie ou traité de la génération spontanée, basé sur de nouvelles expériences. Paris, 1859.

A well-known and respected scientist, Pouchet demonstrated, as he thought, that life could be generated in solutions of materials formed by previously living organisms. Pouchet's work turned Pasteur to an attack on spontaneous generation as a necessary support for his germ theory of fermentation.

5. Mémoire sur les corpuscules organisés qui existent dans l'atmosphère; examen de la doctrine des générations spontanées. Annales de chimie et de physique, 3 ser. 64:5-110, January 1862.

In a set of masterly experiments fully reported in this classic paper, Pasteur demonstrated beyond doubt the existence of living germs floating in the air and their role in originating putrefaction.

6. Lister, Joseph. On a new method of treating compound fracture, abscess, etc. Lancet, 1867, 1:326-329.

In this first paper on the antiseptic method, Lister acknowledges his indebtedness to the research of Pasteur in leading him to this great advance in surgery.

7. La Théorie des germes et ses applications à la médecine et à la chirurgie. Paris, 1878. Offprint from Bulletin de l'Académie de Médecine.

Visiting hospitals, Pasteur became convinced that contaminated persons, dressings, and instruments were more important than airborne germs in surgical infection. In this lecture to the Académie de Médecine, he urged surgeons to use some of the aseptic precautions that had played such a large role in his own successful bacteriological investigations.

"This water, this sponge, this lint with which you wash or cover a wound," he told the surgeons, "deposit germs which have the power of

multiplying rapidly within the tissues and which would inevitably bring death to the patients in a very short time if the vital processes did not counteract the multiplication of the germs."

Case V

DISEASE OF SILKWORMS

At the request of his old teacher Jean Baptiste Dumas and the Minister of Agriculture, Pasteur in 1865 undertook a study of pébrine, a disease that was destroying silkworms and silk production in France. Within a few weeks he outlined a practical method of control by examining moths for the "corpuscles" associated with the disease. For two years, however, Pasteur resisted the view that the corpuscles were the causative agent of pébrine rather than the result of a pathological process.

Partly, he failed at first to distinguish between two diseases affecting silkworms; partly he was unfamiliar with protozoology. Only through a lengthy process of experiment and reason did he reach the conclusion that the corpuscles (a protozoan) caused the disease.

1. Bassi, Agostino. Del Mal del Segno, Calcinnaccio, o Moscardino. Lodi, 1835-36.

2. ---. Tre Nuove Memorie. Lodi, 1844.

Bassi was the first to demonstrate that a specific parasitic microorganism caused and transmitted a specific contagious disease in an animal species. The disease was the calcino of silkworms, the agent a fungus now named Botrytis bassiana. He argued that his theory of contagion, demonstrated in silkworm disease, might also be applied to smallpox, typhus, and Asiatic cholera. Pasteur was aware of Bassi's work and cited it in his studies on silkworm disease.

3. Observations sur la maladie des vers à soie. Comptes rendus de l'Académie des Sciences, 61:506-512, 25 September 1865.

Pasteur's first report on silkworm disease, proposing control by selection of eggs from moths without corpuscles. This paper was first presented to the Agricultural Committee of Alais on 26 June 1865, only 19 days after Pasteur arrived at Alais to commence his experiments.

4. Draft of letter to Minister of Agriculture, 18 January 1868.

As usual, Pasteur had to importune the Minister of Agriculture for funds to support his research.

5. Lettres sur la sériculture. Montpellier, 1869. Offprint from Messager agricole.

Pasteur was vitally concerned about the practical application of his research, and so sought to disseminate information in agricultural journals as well as through the Académie des Sciences.

6. Études sur la maladie des vers à soie. 2 v. Paris, 1870.

Pasteur's full study on pébrine and flacherie, another silkworm disease.

7. Toast to International Congress of Sericulture, 1876.

As Honorary President and representative from France, Pasteur presented this toast ". . . to the peaceful contests of science."

8. Draft of letter to President of Academy of Medicine, 19 November 1879.

Pasteur was still being consulted about silkworm production. He blamed the poor results in 1879 on the unusually cold weather in April and May.

STUDIES ON BEER

9. Études sur la bière. Paris, 1876.

Following the débacle of 1870, Pasteur turned his attention to beer, hoping that French brewers might compete more successfully with the Germans. The work also contains many of Pasteur's fundamental researches on microorganisms and fermentation in general, extending and reinforcing his earlier work and establishing firmly techniques and principles of microbiology.

10. Notes for an experiment on beer.

Case VI GERM THEORY OF DISEASE

Increasingly interested in problems of contagious disease, during the 1870's Pasteur turned first to anthrax. He confirmed and extended the earlier work of Davaine and Koch and showed how the disease was transmitted under field conditions. He discovered the relation of the vibrion septique to septicemia, the streptococcus to childbed fever, and the staphylococcus to boils and osteomyelitis. He was a tireless advocate of the germ theory of disease. Its eventual acceptance was due to his discoveries and arguments as much as to those of any single man.

1. Boyle, Robert. Some Considerations Touching the Usefulness of Experimental Natural Philosophy. 2d ed. London, 1664.

In a prescient passage, Boyle seems almost to have foreseen the relationship between Pasteur's early work on fermentation and his later work on infectious diseases: ". . . he that throughly understands the nature of Ferments . . . shall probably be much better able then he that ignores them, to give a fair account of divers Phaenomena of several diseases. . . ."

2. Davaine, C. J. Recherches sur les infusoires du sang dans la maladie connue sous le nom de sang de rate. Comptes rendus de l'Académie des Sciences, 57:220-223, 27 July 1863.

In a series of papers extending from this one to 1870, Davaine investigated the pathogenesis of anthrax and argued cogently that the rod-shaped bodies constantly found in association with the disease must be its cause.

3. Koch, Robert. Die Aetiologie der Milzbrand-Krankheit, begründet auf die Entwicklungsgeschichte des Bacillus anthracis. Beitrage zur Biologie der Pflanzen, 2:277-310, 1876.

Koch first isolated a pure culture of the anthrax bacillus, described its complete life history, and convincingly demonstrated that it was the cause of the disease.

4. Charbon et septicémie. Paris, 1877.

This is a separate printing, combining Pasteur's first two papers on anthrax, presented at the Académie des Sciences on 30 April and 16 July 1877.

5. Notes on anthrax in chickens.

Pasteur found that anthrax did not normally grow in birds, but if he lowered their body temperature to that of animals susceptible to anthrax, then chickens also contracted the disease.

6. Notes relating to experiments on septicemia.

7. De l'extension de la théorie des germes à l'étiologie de quelques maladies communes. Comptes rendus de l'Académie des Sciences, 90:1033-1044, 3 May 1880.

Pasteur's observations on the causative organisms of boils, osteomyelitis, and puerperal fever.

Case VII — VACCINATION

Discovering through a chance observation in 1879 that a culture of the germ of chicken cholera, attenuated by age, protected the animals against

infection by a fresh, virulent culture, Pasteur conceived the idea of attenuating other cultures intentionally. In short order he created vaccines, heretofore known only for smallpox, for chicken cholera (by aging), anthrax (by culturing at high temperature), and swine erysipelas (by passage through rabbits).

1. Jenner, Edward. An Inquiry into the Causes and Effects of the Variolae Vaccinae . . . Known by the Name of the Cow Pox. London, 1798.

Jenner introduced inoculation with cowpox as a preventive of smallpox. Pasteur read Jenner's work early in 1879 and it was much on his mind as he experimented with chicken cholera.

2. Sur les maladies virulentes et en particulier sur la maladie appelée vulgairement choléra des poules. Paris, 1880. Offprint from Bulletin de l'Académie de Médecine.

Pasteur announced the discovery that the infectious microbe of chicken cholera might be diminished in virulence so that inoculated birds would not die but would be protected against the usually fatal effects of subsequent inoculation with fully virulent germs. Once attenuated, the germs maintained this condition through successive cultures. This made the inoculum, wrote Pasteur, a true vaccine.

3. De l'atténuation des virus et de leur retour à la virulence. Comptes rendus de l'Académie des Sciences, 92:429-435, 28 February 1881.

Pasteur in 1881 succeeded in attenuating the anthrax bacillus by holding a culture for eight days at 42°-43° C. at which temperature spores did not form. With this he prepared a new vaccine.

4. Notes on the non-recurrence of contagious diseases, 1884.

The non-recurrence of certain infectious diseases among persons (or animals) was a key factor in Pasteur's development of vaccines.

5. Notes for vaccination experiments, 11 November 1881.

Rabbits previously vaccinated against anthrax were to be inoculated with chicken cholera to see if the vaccine would have any effect against another disease. Pasteur did not expect that it would.

6. Letter from Pasteur concerning inoculation experiments, 26 August 1882.

7. De l'atténuation des virus. Revue scientifique, 30:353-361, 16 September 1882.

Pasteur's report on anthrax vaccine presented to the International Congress of Hygiene and Demography on 5 September 1882 was immediately carried in the scientific news press. In it Pasteur replied sharply to some criticisms by Koch, which led to a heated exchange between the two.

8. La vaccination charbonneuse; réponse de M. Pasteur à un mémoire de M. Koch. Paris, 1883. Offprint from Revue scientifique.

Presentation copy from Pasteur.

9. Letter relating to vaccine for swine erysipelas, 20 December 1884.

The letter concerns the efficacy of a batch of vaccine.

Case VIII RABIES

Pasteur began his studies on rabies in December 1880. By 1885 he had found a method of cultivating the virus in living nervous tissue of rabbits, attenuating it, and protecting dogs against infection. On 6 July 1885, confronted with a boy, Joseph Meister, who had been severely bitten and seemed sure to die, Pasteur decided, "not without strong and painful feelings of anxiety," to undertake his first trial on a human being. The rabies treatment was the crowning popular achievement of Pasteur's scientific career. Equally important for the future of medical science was the development of a method for cultivating and studying the filterable viruses.

1. Méthode pour prévenir la rage après morsure. Comptes rendus de l'Académie des Sciences, 101:765-773, 26 October 1885.

In this first report on the rabies treatment in humans, Pasteur sums up his experiments, his method, and the successful treatment of Meister.

2. Letter to Dr. Grancher, 21 December 1885.

Four children have just arrived from New York for the rabies treatment, accompanied by Dr. Frank S. Billings. Pasteur asks Grancher to start the inoculations immediately.

3. Résultats de l'application de la méthode pour prévenir la rage après morsure. Comptes rendus de l'Académie des Sciences, 1 March 1886.

Printer's proof, with annotations by Pasteur, of his second communication on the treatment of rabies.

4. Notes on the number of persons treated to 1 April 1886.

5. Note complémentaire sur les résultats de l'application de la méthode de prophylaxie de la rage après morsure. Paris, 1886. Offprint from Comptes rendus de l'Académie des Sciences.

By the time of this third report, presented on 12 April 1886, 726 persons had been treated or were under treatment.

6. Nouvelle communication sur la rage. Paris, 1886. Offprint from Bulletin de l'Académie de Médecine.

At the time of this fourth report on 2 November 1886, 2490 persons had come to Paris for the Pasteur treatment against rabies. 1726 were from France or Algeria, of whom 10 had died.

7. Various notes on rabies inoculation experiments, 1886.

Case IX OPPONENTS OF PASTEUR

A number of physicians attacked the Pasteur treatment for rabies as useless or dangerous, accusing him of hiding failures. An ardent controversialist, Pasteur reacted vigorously to such attacks.

1. Draft of letter, 1886, inquiring about rumored failures in Russia.

2. Draft of statement attacking Dr. Michel Peter, 12 July 1887.

The statement, charging one of Pasteur's inveterate opponents with incompetence in matters relating to rabies, was prepared for presentation to the Academy of Medicine, but it is not recorded in the Academy's Bulletin.

3. Draft of reply to Dr. Anton von Frisch, 1887.

Pasteur felt that Dr. Frisch of Vienna was another detractor.

4. Leblanc, C. La Rage; lecture faite à la Section d'économie du bétail et d'industrie laitière. Paris, 1887.

This offprint, a presentation copy from the author, includes rather acid marginal comments by Pasteur.

5. Letter urging election of Arnaldo Cantani to Académie de Médecine, 10 July 1888.

Pasteur strongly supports Cantani, who had set up the first antirabies center in Naples at his own expense and despite strong opposition from some of his colleagues.

PASTEUR INSTITUTE

After Pasteur's second communication on 1 March 1886, the Académie des Sciences recommended the establishment of a "Pasteur Institute" to give the antirabies treatment. Subscriptions soon poured in from all over the world.

6. Letter of thanks for donation to Pasteur Institute, 18 March 1886.

7. Letter to Dr. Grancher relating to organization of Pasteur Institute, 19 February 1887.

8. Lettre sur la rage. Annales de l'Institut Pasteur, vol. 1, no. 1, January 1887.

Appropriately, the new Annales de l'Institut Pasteur opened with a letter from Pasteur presenting further experiences with his treatment, especially in Russia where rabid wolves posed a serious problem.

Case X

PASTEUR THE TEACHER

During many of his most productive years, Pasteur served as professor and administrator in a succession of universities. He was known, among other things, as a strict disciplinarian.

1. Letter dated 29 January 1854.

As Professor of Chemistry at Strasbourg, Pasteur orders formic acid.

2. Draft of report for 1855 as Dean of Faculty of Science at Lille.

Pasteur is particularly concerned because expenses for heat and light exceeded the allowance by 306 francs 31 centimes.

3. Subjects for the Concours d'agrégation, 1859.

4. Notes on professional education, 10 November 1863.

Pasteur writes down some of his views, stemming from the oft repeated aphorism, "There are no applied sciences . . . there are applications of science."

5. Letter to father of a student, 1859.

The student spent two nights out of school without permission. Pasteur requests the application of parental pressure.

6. Rules of discipline, École Normale Supérieure, with changes in Pasteur's hand.

7. Report on the section of sciences, École Normale Supérieure, for 1863-64.

In his discussion of discipline, Pasteur decries the habit of smoking which is "so little worthy of future professors and which makes them lose time that is so precious."

Case XI PASTEUR AS PATRIOT

Son of a sergeant-major in the army of Napoleon, Pasteur was an ardent patriot with a deep love for his native land. While he believed science was international, he also strived especially to promote science in France and thereby the strength and glory of France.

1. Le Budget de la science. Paris, 1868.

Pasteur urged additional support for science, especially the construction of laboratories. Even Claude Bernard at the Collège de France had only miserable facilities.

2. Quelques réflexions sur la science en France. Paris, 1871.

Pasteur again urged support for science and attributed France's disaster in 1870-71 in part to her neglect of science.

3. Draft of note requesting more laboratory space at the École Normale Supérieure.

Pasteur cites the importance of his work for science and industry, as well as the favor of the Emperor.

4. Letter to J. L. Raulin, 1870.

Pasteur notes that it would advance the cause of science for the directors of laboratories to receive their lodging also, as in Germany.

5. Notebook kept by Pasteur, September-December, 1870.

Filled with notes on his thoughts and his reading and with clippings from contemporary journals, this notebook reveals how deeply affected Pasteur was by the tragedy that befell France in the disasters of 1870.

6. Un Correspondance entre un savant français et un savant prussien pendant la guerre. Paris, 1871.

Pasteur received an honorary M.D. from Bonn in 1868. He returned it in 1871 in protest against the "barbarity" of the German emperor.

7. Letter to editor of Avenir de Jura, 22 January 1876.

Pasteur stood for the French Senate in 1876, not as a party man but as a representative of science. A political conservative, he was defeated at the polls. This letter to the editor of Avenir de Jura, written in another hand but signed by Pasteur, explains his position.

8. Notes for speech at unveiling of statue of J. B. Dumas, 1889.

Pasteur praises those few scientists who, like Dumas, are able to continue their scientific work and at the same time "throw themselves into the battles of public life" so that their ideas may triumph. This, of course, is what Pasteur did himself.

Case XII VARIA

1. Two portraits of Pasteur, from photographs by Pierre Petit.

2. Calling card, with note.

3. Letter of 23 August 1847, forwarding theses.

4. Pensée, 5 May 1886.

5. Letter to Laurent Pasteur, 1 March 1887.

6. Eugène Chevreul. Examen d'un mémoire . . . par M. Ebelman, suivi de considérations historiques . . . Offprint from Journal des savants, 1848.

Marginal notes by Pasteur indicate his critical attention to historical aspects of his fields of research.

7. Draft of a report on the progress of physiological chemistry since 1848, undated.

The report, which is mostly about Lavoisier, was apparently not completed.

Case XIII SPEECHES AND HONORS

Pasteur became one of France's most honored scientists. He often spoke for the nation and at the great celebration of his 70th birthday in 1892 tributes flowed in from around the world.

1. Toast at International Congress of Medical Sciences, 1884.

As French delegate, Pasteur toasts Danish hospitality.

2. Opening words of speech at Edinburgh University tercentenary.

Pasteur repeats an anecdote of Henri IV to explain why he speaks in French.

3. Jubilé de M. Pasteur. Paris, 1893.

Ceremonies in honor of Pasteur's 70th birthday.

4. Letter of Mme. Jean Reynaud to Pasteur's daughter, 13 November 1886. With draft of Pasteur's reply.

Mme. Reynaud expresses her deep pleasure that the Prix Jean-Reynaud has been awarded to Pasteur.

5. Oeuvres de Pasteur, edited by Pasteur Vallery-Radot. 7 v. 1922-1939.

Case XIV JOURNALISTIC VIEWS OF PASTEUR

1. "M. Pasteur in his laboratory." Wood engraving, hand colored, 1885.

2. "The French chemist, M. Pasteur, experimenting on a chloroformed rabbit." Wood engraving, hand colored, 1885.

3. "Hydrophobia." Pasteur holding rabbits. Lithograph from Vanity Fair, 1887.

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