# The Ethics Of Louis Pasteur

Reviewed by **George B.** and **Laurie M. Kauffman**

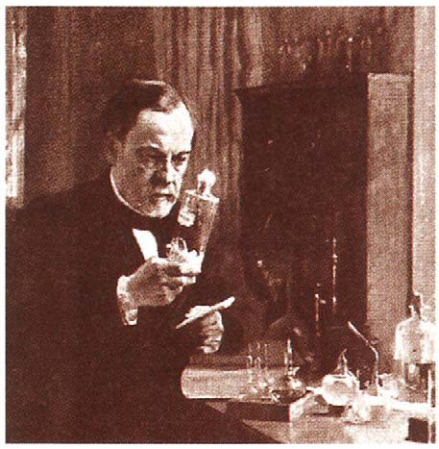
In these days of rampant chemophobia, widespread antiscientific attitudes in the press, and a largely scientifically illiterate public, the idealized myth of the scientific hero as an objective, selfless, and dedicated humanitarian seems quaint, sentimental, and positively antediluvian.

We come from a generation that grew up on such myths, and no one was more idealized than the French chemist and microbiologist Louis Pasteur (1822–95). For us, British scientist Stephen Paget's characterization of Pasteur as "the most perfect man who has ever entered the Kingdom of Science" seemed literal truth.

As children, we read of Pasteur as the scientific magus of Paul De Kruif's phenomenal bestseller "The Microbe Hunters," we saw his portrait on postage stamps of France and other countries, we knew of his famous maxim that "chance favors only the prepared mind," and we had seen the famous caricature from *Vanity Fair* depicting Pasteur as a scientific St. Francis of Assisi holding rabbits instead of birds.

The blessings of pasteurization were proclaimed on the caps of every bottle of milk. We became choked with emotion as Paul Muni—who won an Oscar for his portrayal of the title role in the hagiographic 1936 motion picture, "The Story of Louis Pasteur"—told his wife (played by Josephine Hutchinson) before the famous anthrax experiment at Pouilly-le-Fort, "The benefits of science are not for scientists, Marie; they're for humanity."

But times have changed. In keeping with the public's ambivalence toward subjects it does not understand, the old negative stereotype of the "mad scientist" as depicted in "Frankenstein" has resurfaced. Instead of an unrealistically optimistic view of science and scientists as purveyors of unlimited benefits, we now see a backlash against science and technology. Scientists are blamed for such technological disasters as Three Mile Island, Bhopal, and Chernobyl, and for current environmental problems such as pollution, the greenhouse effect, acid rain, and the depletion of the ozone layer. Furthermore, recent allegations of fraud in scientific disputes at the highest levels have provoked a questioning of the ethics of scientists.



**Examination of Pasteur's previously unavailable laboratory notebooks reveals some ethically dubious practices**

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**"The Private Science of Louis Pasteur,"** by Gerald L. Geison, Princeton University Press, 41 William St., Princeton, N.J. 08540, 1995, 378 pages, **$29.95**

Perhaps influenced by this trend, historians of science have taken both a more critical and a more realistic attitude in their portrayal of even the greatest scientists as human beings with human failings. An excellent and balanced example of this approach is Gerald L. Geison's meticulously documented and copiously illustrated biography, "The Private Science of Louis Pasteur." Published on the centenary of Pasteur's death, the book argues that some of Pasteur's conduct was "ethically dubious," a charge that is certain to provoke controversy among Pasteur aficionados, particularly in France, where Pasteur is a national hero.

Geison, professor of history at Princeton University and the author of numerous articles on Pasteur, is the ideal person to write this reassessment of Pasteur's life and career. He is the first scholar to make extensive use of Pasteur's 102 detailed handwritten laboratory notebooks (probably more than 10,000 pages) donated to the Bibliothèque Nationale in Paris by Pasteur's grandson Louis Pasteur Vallery-Radot in 1964. These notebooks, like the rest of the manuscripts that Pasteur left behind at his death, had previously remained in the hands of his immediate family and descendants. Access to these materials was restricted until Vallery-Radot's death in 1971.

Geison made repeated trips to Paris during a 15-year period to compare systematically what he calls Pasteur's "private science" with his published work. He spent a full year learning to decipher Pasteur's crabbed, microscopic scrawl. Geison has discovered frequent major discrepancies between the notebooks and the published record that he considers unethical both by today's standards and by those of Pasteur's time.

Although Geison presents a fairly detailed survey of Pasteur's entire life and career, he focuses on four episodes: the resolution of racemic acid, his debate over spontaneous generation, and his anthrax and rabies vaccines. In each of these cases, as in most of his published articles and lectures, Pasteur magnified the importance of his own work by giving the impression that he had no scientific predecessors and that his contributions stood entirely apart from the work of others that preceded them.

Although in the popular mind Pasteur's name is inextricably associated with microbiology, he began his 40-year career as a chemist. His 1848 discovery of the optical isomerism of the tartrates at age 26 brought Pasteur recognition by the French scientific community and raised his position in the

elaborate French social system. As the years passed, he abandoned his youthful flirtation with republicanism in favor of partisanship toward Emperor Louis-Napoléon, the French scientific and political establishment, and political conservatism.

His published accounts of his discovery of optical isomerism provide a typical example of the correlation between the scientific and political dimensions of his career. Although Pasteur consistently acknowledged his debt to Jean-Baptiste Dumas, whom Geison characterizes as "the quintessential establishment scientist," only his early works cite Auguste Laurent, who had a much more profound influence on Pasteur's research but whose career never attained any great success.

The correlation between the scientific and political dimensions of Pasteur's career is more blatant in his debate with Felix-Archimède Pouchet over spontaneous generation before the Academy of Sciences in Paris in 1864. The debate aroused wide public interest because of its presumed religious, philosophical, and political implications. Pouchet's results, in favor of spontaneous generation, were invoked to support materialism, evolutionism, and radical politics, whereas Pasteur's opposing results were invoked to support spiritualism, the Biblical creation account, and conservative politics.

Although Pasteur insisted that he had approached the issue without any preconceived ideas, Geison's book shows that he was so influenced by his desire to deny the existence of spontaneous generation that he automatically suspected errors in any experiment, including his own, which might support it. In addition, Pasteur accused Pouchet of technical errors without having carefully repeated his experiments.

Thus, Pasteur failed to adhere rigidly to two of the fundamental precepts of the so-called scientific method—to approach a question without preconceived ideas and to disprove any opposing hypothesis. To Geison, however, the fault is more a criticism of a simplistic and passé notion of the scientific method than of Pasteur, who, as a talented artist of the laboratory, did not rely on the routine applications of a mechanical method.

Geison finds the strongest evidence of deliberate fraud and deception in the case of Pasteur's celebrated vaccine against anthrax, a major killer of sheep that caused serious losses to French agriculture. Aware of the economic consequences of the disease, in 1881 Pasteur prematurely announced that he had developed a vaccine by attenuating the microbe with oxygen. Hippolyte Rossignol, a veterinarian and critic of Pasteur, suggested a public trial at his farm at the village of Pouilly-le-Fort, and Pasteur impulsively accepted the challenge.

When Pasteur found that his method of preparing the vaccine was not reproducible, he surreptitiously appropriated the chemical attenuation method of Jean-Joseph Henri Toussaint, an obscure veterinarian, who, following Pasteur's successful and highly publicized demonstration, suffered a nervous breakdown and died shortly thereafter. Thus, Pasteur deliberately deceived the French scientific community and public and simultaneously "pushed aside a rival by borrowing his technique." The fact that Pasteur later perfected his oxygen attenuation technique does not excuse his flagrant violation of scientific ethics to achieve his goal.

Geison is more ambivalent about Pasteur's use in July 1885 of an inconclusively tested rabies vaccine on a human subject, a treatment in which Pasteur's assistant, physician Emile Roux, refused to participate. Although this treatment violated the ethical standards of Pasteur's day and of our own, and Pasteur had previously refused to treat other bite victims who had written seeking treatment, he gave the vaccine to nine-year-old Joseph Meister, who had been bitten by a rabid dog, when confronted in person by the boy's pleading mother.

Although Pasteur had his share of critics during his lifetime, Geison effectively documents that the myth of Pasteur as a scientific hero above reproach was carefully and deliberately nurtured by Pasteur himself and by his family and coworkers. Geison, however, is not merely an iconoclast or muckraker. Despite Pasteur's faults, he still reveres him as "one of the greatest scientists who ever lived." Geison writes: "I am less concerned to *expose* Pasteur's public deceptions than to *explain* them." Geison's message for us is that "the superficially objective and dispassionate image of science" perpetuated by scientists such as Pasteur for their own advancement "is bought at the price of much of its zest and human appeal. We need no longer perpetuate Pasteur's image of himself."

*George B. Kauffman, professor of chemistry at California State University, Fresno, recently became the first recipient of the CSUF President's Medal of Distinction, the highest nondegree award presented by the university. Laurie M. Kauffman, his wife and frequent collaborator, is a retired schoolteacher interested in the humanistic aspects of science.* □

# Explaining, Regulating Toxic Chemicals

**"Toxic Watch 1995,"** compiled and published by Inform Inc., 120 Wall St., New York, N.Y. 10005-4001, 1995, 522 pages plus approximately 400 pages of appendices, **$125**

Reviewed by **Howard H. Fawcett**

"Toxic Watch 1995" organizes and explains many of the toxic chemical regulations that have appeared in the past 30 years. It also examines the major causes of environmental toxic contamination by industrial chemicals; how these chemicals move in commerce and are disposed of; and what information about them is available in major databases concerning waste generation, pollution prevention, and waste management.

Industrial synthetic chemicals, whose growth began in the 1940s, are now used at 200,000 facilities in the U.S. Of more than 72,000 synthetic chemicals in commerce, 340 are subject to federal reporting requirements that classify them as toxic. At least 38 billion lb of these latter compounds were produced at 24,000 manufacturing plants in 1992.

A chapter entitled "Tracking the Source of Environmental Toxics" discusses attempts by the federal government since the 1970s to control the presence of hazardous chemicals by regulations. Often called "end-of-the-pipe" programs, their original intent was to monitor and eventually control these