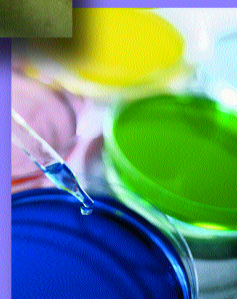
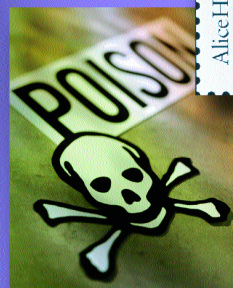


Alice Hamilton and the Development of
Occupational Medicine
September 21, 2002

Historic Chemical Landmark

A National Historic



*Occupational
Medicine*



AMERICAN CHEMICAL SOCIETY
SCIENCE THAT MATTERS

Alice Hamilton and the Development of Occupational Medicine

Celebrating Chemistry

The American Chemical Society designated Alice Hamilton and her work in industrial medicine a National Historic Chemical Landmark on September 21, 2002. For additional information see our web site: www.chemistry.org/landmarks.

Alice Hamilton: Pioneer

"It was also my experience at Hull-House that aroused my interest in industrial diseases. Living in a working-class quarter, coming in contact with laborers and their wives, I could not fail to hear tales of dangers that workmen faced, of cases of carbon-monoxide gassing in the great steel mills, of painters disabled by palsy, of pneumonia and rheumatism among the men in the stockyards."

Alice Hamilton, *Exploring the Dangerous Trades: The Autobiography of Alice Hamilton*



Alice Hamilton helped make the American workplace less dangerous. Her investigations into industrial poisons, first for the state of Illinois and later for the U.S. Department of Labor, underscored the dangerous working conditions in early twentieth-century America. In her quest to uncover industrial toxins, Hamilton—who dressed modestly, wore her hair in a bun, and spoke in a quiet voice—roamed the more dangerous parts of urban America, descended mines, and finagled her way into factories reluctant to admit her. As a pioneer in the field of industrial toxicology, Hamilton became a leading expert in chemical health and safety.

Alice Hamilton and Industrial Toxicology

Hull-House

In 1897 Alice Hamilton became a resident of Hull-House, the famous Chicago settlement house. Founded by Jane Addams and Ellen Starr Gates and supported by other socially conscious people, Hull-House attempted to bring the well off in contact with immigrants and the poor. According to Addams, Hull-House gave the well educated a sense of purpose and a chance to use their learning in a socially beneficial way. In turn, the poor received educational benefits and social services otherwise unavailable, and immigrants found in the settlement an institution that respected their customs.

Born in 1869 and raised in Fort Wayne, Indiana, Hamilton had earned a medical degree from the University of Michigan. At Hull-House, Hamilton treated poor immigrants for diseases often stemming from their jobs, and she established a well-baby clinic. In 1902, during Chicago's typhoid epidemic, she linked transmission of the disease to inadequate sewage disposal, contaminated water, and flies.

The Illinois Survey

In 1910 Hamilton undertook her first formal investigation into the connection between occupation and disease as head of a survey on industrial illness in Illinois. In addition to managing the investigation, Hamilton studied lead, the most widely used industrial poison. Other members of the survey team reported on arsenic, zinc smelting, brass manufacturing, turpentine, and carbon monoxide.

Hamilton and her assistants visited factories, read hospital records, and interviewed labor leaders and druggists to uncover instances of lead poisoning.



Lead exposure was known to be great in industries such as paint manufacturing, enamelware, and pottery. In addition, Hamilton found some less obvious instances of lead exposure for workers who polished cut glass and wrapped cigars in "tin foil," actually made from lead.

The Illinois report on industrial disease proved the connection between occupation and illness. As a result, the Illinois legislature in 1911 passed an occupational disease law requiring employers to implement new safety procedures, to provide monthly medical examinations for workers in dangerous trades, and to report illnesses to the Department of Factory Inspection, which had prosecutorial authority.

Federal Investigator

Hamilton's work in Illinois caught the attention of Charles Neill, the Commissioner of Labor (the United States Bureau of Labor was a part of the Department of Commerce until 1913). Neill asked her to do nationally what she had done in Illinois, first in the lead trades, then in other poisonous occupations. Hamilton described the limitations under which she worked: "I had, as a Federal agent, no right to enter any establishment – that must depend on the courtesy of the employer... I should not even receive a salary; only when the report was ready for publication would the government buy it from me at a price to be decided on."

Hamilton began her work for the federal government by investigating white lead, commonly used as a paint pigment. Building on what she learned while conducting the Illinois survey, Hamilton looked for lead dust and lead fumes since she was convinced the danger for workers came from breathing air laden with the toxic chemical, and not from ingesting lead. Already



Hamilton employed the techniques of “shoe-leather epidemiology” that marked all her probes: the careful and extensive use of hospital records to demonstrate the connection between specific illnesses and occupations, and the thorough investigation of factories to learn which industrial processes used dangerous chemicals.

During the First World War Hamilton conducted studies on the dangers of toxic chemicals in the burgeoning war industries. Because of the need for explosives, factories sprang up to produce TNT, picric acid, mercury fulminate, and many other substances. Her reports on the dangers in war industries led to the adoption of many safety procedures, and she later claimed that the war years helped make industrial toxicology a respectable field of study. Over the ensuing years, Hamilton studied aniline dye, carbon monoxide, mercury, benzene, and other toxic chemicals, continuing to issue reports for the Department of Labor on the dangerous trades.

Harvard University

In 1919 Hamilton was offered a position in industrial medicine at Harvard Medical School. Hamilton was the first woman on the Harvard faculty, and all her students were men, since the university still did not admit women. The faculty position came with three stipulations: she could not attend the Faculty Club; she could not get football tickets; and she could not march in the commencement procession. Hamilton had a stipulation of her own: to teach only one semester a year so she could continue

her investigations and return to Hull-House for part of each year. While at Harvard, Hamilton wrote *Industrial Poisons in the United States* (1925), the first text in the field, and *Industrial Toxicology* (1934). Hamilton was never promoted at Harvard and during her teaching career held only a succession of three-year appointments. She remained an assistant professor until forced into mandatory retirement at the age of 65, when she moved with her sister Margaret to Hadlyme, Connecticut.

Social Activist

Throughout her life, Alice Hamilton was interested in social issues, as demonstrated by her decision to live at Hull-House. In her autobiography, Hamilton noted what Hull-House taught her: “Life in a settlement does several things to you. Among others, it teaches you that education and culture have little to do with real wisdom, the wisdom that comes from life experiences.”

Hamilton, a pacifist, toured Belgium during the First World War and famine-struck Germany in 1919. The desolate graveyards and ruined houses destroyed by German artillery affected Hamilton deeply: “It is like killing kittens with machine guns, they are so small and helpless.” But twenty years later, with Nazi troops on the move, Hamilton confessed, “my clean cut principles no longer seemed to apply.”

In her long retirement, when she was in her eighties and nineties, Hamilton took an active role in campaigning against McCarthyism and what she considered the excesses of American anticommunism. In 1963, when she was ninety-four, she signed an open letter to President Kennedy asking for early withdrawal of U.S. troops from Vietnam.

Alice Hamilton celebrated her 100th birthday in 1969, and the many plaudits included a telegram from President Nixon praising her successes in industrial medicine. Hamilton died on September 22, 1970, at the age of 101. Three months later, Congress passed the Occupational Safety and Health Act.

Hazards of the Workplace

Industrial disease was common in early twentieth-century America. Workers in the “dangerous trades” were at particular risk. In manufacturing and related fields workers handled poisonous chemicals, breathed toxic dust and fumes, seldom washed their hands before eating, and wore clothing covered with poisons. Mercury poisoning in the felt hat industry caused uncontrollable jerking of arms and legs and mental illness: hence the phrase “mad as a hatter.” Those who made matches were subject to “phossy jaw,” an industrial disease that resulted from breathing fumes of white or yellow phosphorous which could penetrate the jawbone. The complications were severe, sometimes resulting in removal of the lower or upper jawbone, or both.

Lead, which enters the body slowly, was the most widely used toxic chemical in early twentieth century industry. Workers in many industries were at risk of lead exposure, including those in the pottery and enamel trades, paint manufacturing, lead smelting and refining, and storage battery manufacturing. No one knew the precise extent of lead poisoning in the years before the First World War, but the toll in illness and even death for workers was great. (Investigators were then unaware of the danger of lead poisoning in the general population, especially among children). Repeated small doses left no immediate symptoms, but since the body only slowly eliminates lead, the metal in time accumulates in sufficient amounts and causes severe poisoning. In acute cases, lead poisoning resulted in colic and convulsions. Lead harmed the nervous system, causing paralysis, most obvious in what was called wrist drop. In cases of chronic lead poisoning, victims suffered from loss of appetite and weight, constipation, high blood pressure, anemia, abdominal pain, fatigue, and premature senility. Pregnant women ran the risk of miscarriages and stillbirths.

Controlling the risks proved difficult. Many forms of industrial poisoning were not easy to recognize since it often took years for the most toxic effects to occur. Few studies of occupational diseases existed, leaving both employees and employers ignorant of the dangers from chemicals in the workplace. Few factories employed doctors to monitor the health of their workers. Many of the more dangerous trades employed unskilled labor fearful of their job security if they complained about unsafe conditions. And many of these workers were immigrants who often did not speak English, making it difficult for them to appeal to the appropriate authorities.



National Historic Chemical Landmark

The American Chemical Society designated the pioneering work of Alice Hamilton in industrial toxicology a National Historic Chemical Landmark on September 21, 2002. The plaque commemorating the event reads:

In 1897, Dr. Alice Hamilton (1869-1970) came to Hull-House, a social settlement founded to address the needs of immigrants living on Chicago's Near West Side. Through living and working in the Hull-House neighborhood, she identified occupational diseases plaguing those who worked in the "dangerous trades": rubber, dyes, lead, enamelware, copper and mercury production, and explosives and munitions. Collaborating with the U.S. Department of Labor, Hamilton documented the occupational diseases from which these workers suffered. Her reports on the effect of lead on industrial workers, particularly women, established her as a leader in the field of chemical health and safety.

About the National Historic Chemical Landmarks Program

The American Chemical Society, the world's largest scientific society with more than 163,000 members, has designated landmarks in the history of chemistry for more than a decade. The process begins at the local level. Members identify milestones in their cities or regions, document their importance, and nominate them for landmark designation. An international committee of chemists, chemical engineers, museum curators, and historians evaluates each nomination. For more information, please call the Office of Communications at 202-872-6274 or 800-227-5558, e-mail us at nhclp@acs.org, or visit our web site: www.chemistry.org/landmarks.

A nonprofit organization, the American Chemical Society publishes scientific journals and databases, convenes major research conferences, and provides educational, science policy, and career programs in chemistry. Its main offices are in Washington, DC, and Columbus, Ohio.

Acknowledgments

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