Book Review

American Poison: A Deadly Invention and the Woman Who Battled for Environmental Justice—Daniel Stone (New York, NY, USA: Dutton Publishers, 2025, 351 pp.)

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If you drove a car in the United States from 1975 to 1996, you would have found that, when you bought gasoline, you had a choice between leaded gas and unleaded gas. The leaded gas had an ingredient called ethyl, which was a trade name for a compound called tetraethyl lead. Had you bought gasoline previous to 1975, you would have discovered that most gas stations sold only leaded gas. Nowadays, there is no choice—all gasoline is unleaded. This curious history can be explained by a richly rewarding book, *American Poison* by Daniel Stone. The poison in question is lead.

This is a story with heroes and villains although it is difficult to say whether the villains are individuals or the profit motive in capitalism. Among the heroes, it is she who gets the most attention is Alice Hamilton.

Hamilton was born into a wealthy family in 1869 and grew up in Fort Wayne, IN, USA. Her sister was Edith Hamilton who went on to become a major scholar of ancient Greek and Roman culture. Alice, however, became a doctor at a time when few women went to medical school. In 1919, she was the first woman to be hired onto the Harvard faculty, principally because of her knowledge of workplace safety and hygiene.

At Hull House, during the progressive era, she was named by the Governor of Illinois to a state commission on occupational health, and as a result, she investigated the effects of lead on factory workers.

After medical school, starting in 1899, Hamilton lived and worked in Jane Addams's Hull House, a settlement house in Chicago. Caring for the sick in Chicago, she encountered men who were ill from lead in the workplace, as well as from numerous industrial accidents. It had long been known that lead was a poison—the ancient Romans suffered from lead poisoning—but, at this time, in the United States, there were no standards for exposure to lead. At Hull House, during the progressive era, she was named by the Governor of Illinois to a state commission on occupational health, and as a result, she investigated the effects of lead on factory workers. She signed off on a report sent to the governor, detailing her findings, which led to a worker's compensation bill passed by the Illinois legislature in 1911. The new law mandated

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safer conditions in the workplace and showed that capitalism could work constrained by moderate legal requirements. Companies were now required to buy insurance against workers' injuries, which meant that the insurance companies themselves would help enforce safer working conditions.

If the story has villains, they would be Thomas Midgley Jr., and his sometime boss Charles Kettering. We first encounter Midgley circa 1916, when he was a recent graduate of Cornell University with a degree in mechanical engineering. This is a period in which automobiles are changing rapidly, and their engines are being made more powerful. Unfortunately, as the compression in the engine is raised—with the goal of achieving more power—there is a tendency for its fuel vapor mixture to ignite prematurely, causing the engine to knock together with a failure to increase power.

Midgley attacked this problem while working for Delco Research Laboratories, Dayton, OH, USA, which was later a subsidiary of General Motors. Delco's head was its founder, Charles Kettering, who had invented the automobile electric self-starter in 1912. Prior to that time, starting a gasoline automobile engine required hand cranking—a difficult and sometimes dangerous activity. Midgley discovered in 1921 that an additive placed in gasoline, a lead compound called tetraethyl lead, prevented knocking, and this led to the development of more powerful gasoline engines. Kettering announced Midgley's discovery to the world in February 1922. In February 1923, Kettering staged the sales debut of ethyl "antiknock" gasoline in Dayton. It costs 24 cents per gallon as opposed to 20 cents for unleaded gas. By 1923, Midgley was already suffering from lead poisoning and was forced to take a vacation from Delco, and two boys who handled tetraethyl lead in bottles in Dayton had died.

The following year, General Motors and the Standard Oil Company of New Jersey started the Ethyl Gasoline Company to make and sell tetraethyl lead. For this purpose, the Ethyl Company built a chemical plant in Bayway, NJ, USA. The use of leaded gasoline by motorists was becoming commonplace. However, after being opened for but a few months, five workers in Bayway died of lead poisoning, and they and other employees had shown signs of insanity. The publicity in the New York press was abundant, and a friend and colleague of Hamilton, a physiologist at Yale, told the papers that the cause is the workers' exposure to tetraethyl lead. Midgley went from his home in Ohio to New York and proclaimed that the real cause was the carelessness of the workers. Philadelphia and New York City enforced a ban on the sale of ethyl in gas. In response to the crisis, the Bureau of Mines issued a report saying that normal exposure to gasoline fumes, e.g., to a person on the sidewalk, is remote.

Yet doubt remained, and Kettering reached out to the Surgeon General, asking for a public hearing. Hamilton does as well, and she enlists Walter Lippmann, the distinguished journalist, in her crusade against lead. She keeps up the pressure by visiting the Surgeon General twice in 1925 and maintains that lead is the greatest single matter of public health to face the American people. One is reminded her of the current debate in the United States over climate change.

In May 1925, a public meeting was held by the Surgeon General in Washington on the subject of lead. Every expert in the field, including Hamilton and her colleagues, is there. She tells Kettering that he is a murderer, while Midgley again asserts that men died because they were careless. The sale of Ethyl is temporarily suspended awaiting the outcome of a government investigation and report.

The investigation began in the fall of 1925. The committee spent only four weeks on its work. The seven scientists on board were loath to handicap American industry and concluded "there were no good grounds for prohibiting ethyl." The Ethyl Corporation began a major marketing campaign to restart the American use of its product. Midgley became very rich and built himself a mansion and became almost manic. The use of leaded gas was commonplace and remained so for five decades.

Starting in 1975, all new cars sold in America were equipped with catalytic converters. The exhaust from the car's engine passed through these chambers, which would remove harmful carbon monoxide and nitrous oxide. The converter would be destroyed, however, by traces of lead in the exhaust. By then, other antiknock techniques had been found, and one of the book's weaknesses is that it does not explain what they are. Thus, by 1975, one could buy unleaded gas at any brand of gas station to protect a new car, and by 1996, one could not buy leaded gas at all in the United States.

Hamilton's life suggests a comparison with that of Rachel Carson who is generally credited with the

abandonment of DDT as an insecticide, as well as general public concern about the spraying of chemicals. Lead in gasoline, however, was dropped because of a technological change—the catalytic converter—and it is only in retrospect that we see the wisdom of Hamilton's crusade as illustrated by the last chapter of the book, which would justify the book's title.

The UN Environment Program has called the prevalence and use of lead "one of the biggest environmental catastrophes in human history."

A Philadelphia pediatrician, Herbert Needleman, observed that many of the children he saw from his office window in South Philadelphia, most of them Black, appeared lethargic and listless. In 1979, suspecting that the cause might be lead poisoning, he began a program of buying up the baby teeth they lost (as new ones came in) by paying out 50 cents a tooth to the kids via their local dentists. He found that most of these children had been exposed to lead levels—sometimes high—during their entire childhood. Consulting with the children's teachers, he found a high correlation between elevated lead levels in a child and their ability to pay attention or difficulty in learning to read. The kids were given IQ tests, and low scores correlated strongly with their having high lead levels. In 1979, he published his findings in the *New England Journal of Medicine*. The publication led to other workers seeking data in the same discipline.

The graph of sales of leaded gasoline over time looks like a camel's hump, reaching a peak in the 1970s. An economist, Rick Nevin, plotted for comparison a graph of violent crime in America, which showed a rise in the 1960s and 1970s, reaching a peak in the 1990s and then falling. The two curves had roughly the same shape with the decline in crime following the decline in lead's use by about 20 years. This has resulted in the lead-crime hypothesis that other researchers have bolstered.

The Ethyl Corporation branched out to other products and still survives. Midgley became paralyzed with polio-like symptoms in his fifties—likely caused by lead poisoning—and committed suicide in 1944. In 1934, Hamilton wrote a major text in her field: *Industrial Toxicology*, which, with the aid of a co-author, went through many editions. Because of her history of anticapitalist politics, the FBI began following her movements in 1953 when she was 84. She lived to 101.

Stone's engaging book ends on a note that makes the reader uncomfortable and rightly so. The UN Environment Program has called the prevalence and use of lead "one of the biggest environmental catastrophes in human history." Stone raises the question of whether similar catastrophes await us and strongly suggests that they do. "Forever chemicals" are perfluorinated and polyfluorinated alkyl substances that never break down. Stone tells us, "They're in every consumer product, from food packaging to shampoo to dental floss and have already been linked to high blood pressure and certain types of cancer." To know their full impact will take decades. He reminds us that the need for activists such as Alice Hamilton is as great as ever. ■

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