Eben M. Byers died early on the morning of Thursday, March 31, 1932, the victim of a mysterious syndrome that for 18 months had ravaged his body, corroding his skeletal system until one by one his bones started to splinter and break. Byers had been a powerful man, a broad-chested athlete and sportsman who was an expert trapshooter and had been the U.S. Amateur Golf Champion in 1907 at the age of 27. As chairman of the A. M. Byers Iron Foundry, he had personified the Roaring Twenties, a millionaire socialite and tycoon who had clambered into the upper reaches of New York society. He continued to lead a life of privilege even after the stock market crash, maintaining homes in Pittsburgh, New York, Rhode Island and South Carolina, as well as horse-racing stables in New York and England.

When Byers died, his shriveled body must have been barely recognizable to friends who had known him as a robust athlete and ladies’ man. He weighed just 92 pounds. His face, once youthful and raffishly handsome, set off by dark, pomaded hair and deep-set eyes, had been disfigured by a series of last-ditch operations that had removed most of his jaw and part of his skull in a vain attempt to stop the destruction of bone. His marrow and kidneys had failed, giving his skin a sallow, ghastly cast. Although a brain abscess had left him nearly mute, he remained lucid almost to the end. He died at 7:30 A.M. at Doctors’ Hospital in New York City.

News of Byers’ death and its mysterious circumstances reached his former colleagues on Wall Street almost immediately. Over the next two weeks the stock of his company, already battered by the Great Depression, lost one third of its value. Worried friends and relatives had begun to contact Byers’ doctors from the day of his death to find out if he had died of something contagious. By the next afternoon, the authorities had begun a criminal poisoning investigation and were preparing the body for a forensic autopsy by the chief medical examiner of New York. The New York Times announced the preliminary results in a front-page headline: “Eben M. Byers Dies Of Radium Poisoning.”

Radium poisoning? How could a man of Byers’ position and wealth have suffered a malady that so far had been confined to a handful of radium chemists and dial painters who used radioactive ink to make watch faces glow in the dark, licking their brushes to draw a finer line? The answer to this question focused attention on a danger that public health officials had only just begun to recognize: even small amounts of toxic substances can kill, over time. The Byers case thus helped to create the presumption that medicines are dangerous until proved safe.

Byers’ radioactive saga had started on a chartered train returning from the Harvard-Yale game of 1927. Engaging in some late-night revelry in a private Pullman booth, Byers fell from his berth and injured his arm. Despite the best ministrations of his personal physicians and trainers, Byers complained that the ache simply would not go away. Soon the injury was affecting his golf game (and, it was rumored, his libido). Even-
ually Byers found his way to a Pittsburgh physician named Charles Clinton Moyar, who suggested that Byers try Radithor, a patent medicine whose manufacturer, the Bailey Radium Laboratory in New Jersey, described it as a cure for dyspepsia, high blood pressure, impotence and more than 150 other “endocrinologic” maladies.

Byers began drinking several bottles a day beginning in December 1927. He told friends that he felt invigorated and rejuvenated. So satisfied was he with the results that he sent cases to his friends, colleagues and female acquaintances and even fed some of the expensive potion to his racehorses. Like other ardent Radithor enthusiasts, Byers apparently consumed vast quantities of the nostrum, drinking between 1,000 and 1,500 bottles between 1927 and 1931. He probably accumulated a radiation dosage equivalent to thousands of x-rays—perhaps three times the lethal dose, if absorbed all at once.

The autopsy conducted the day after Byers died confirmed that his bones and organs were dangerously radioactive. Placed on a film-plate overnight in the dark, his extracted teeth and jawbone produced a dramatic film exposure pattern. As the evidence for radium poisoning grew, squads of public health officers pulled the dangerous materials off store shelves. Nervous citizens sheepishly came forward to turn in their own radioactive medicines. Among them was Mayor James J. Walker of New York City, who at first refused to give up his radioactive rejuvenator because, he said, it made him feel so good.

M y own involvement with the strange case of Eben Byers began in the fall of 1989, when I came across several empty bottles of Radithor in a medical antiques shop and bought one on a whim. Because my laboratory research centers on treating cancer with biologically targeted radio-active compounds, I knew it was possible to make water temporarily radioactive by incubating it with radium. The radium gives off radon, a radioactive gas whose half-life is short. I assumed that the maker of the patent medicine had resorted to this very inexpensive process and that the Radithor’s residual activity had decayed to insignificance long ago.

I was wrong. Tests performed by my colleagues John L. Humm and Marc R. Bellerive in our gamma-ray spectroscopy unit at the Dana-Farber Cancer Institute in Boston revealed that almost 70 years after it had been produced, the nearly empty bottle was still dangerously radioactive. We estimated that the original bottle must have contained approximately one microcurie each of radium 226 and radium 228. Intrigued, I bought the rest of the bottles. When they tested equally radioactive, I went to the Countway Medical Library rare book collection and the stacks of the Har-

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vard University Library to find out more about the lost story of Radithor, the Bailey Radium Laboratory and its director and chief scientist, an inventor, entrepreneur and marketing genius named “Doctor” William J. A. Bailey.

Although contemporaries, William Bailey and Eben Byers came from opposite ends of the social spectrum. In a sense, they represented the twin faces of the American dream during the early decades of the 20th century. Byers was born in 1880 into a life of privilege, attending St. Paul’s School and Yale University, where his suave demeanor and social conquests at nearby girls’ schools earned him the nickname “Foxy Grandpa.” After graduation in 1901, he dabbled in business, traveled and golfed, playing a major role in the Harvard-Yale defeat of the visiting Oxford-Cambridge golf team in 1903. The next year he became president and a director of the small Girard Iron Company, which had been built up by his father, Alexander Byers. In 1909, after the death of his older brother, Byers became president and eventually chairman of the iron foundry.

In contrast, William John Aloysius Bailey was born into a tough neighborhood in Boston on May 25, 1884. His father, a cook, died when he was young, and Bailey and his eight siblings were raised by their mother, Mary, on a weekly income of $15. Bailey attended Quincy Grammar School and graduated about 12th in his class from the prestigious Boston Public Latin School, long known as a stepping-stone to the Ivy League for poor boys with quick wits. He did poorly on his Harvard entrance examinations but managed to be admitted as a freshman in the fall of 1903. Mounting debts forced him to drop out two years later, and although Bailey later claimed to be a Harvard graduate with a doctorate from the University of Vienna, no evidence exists to support either claim.

Bailey moved to New York City, working in an import-export business and editing an export catalogue. His letters from the time speak enthusiastically of his master plan: to be appointed the unofficial U.S. trade ambassador to the imperial government of China. His scheme never materialized. Instead, in the years leading up to World War I, Bailey traveled widely, acquiring a cosmopolitan veneer that later served him well. The outbreak of war found him drilling oil in Russia, but he headed home to tinker in a mechanical workshop when wartime commerce proved impractical.

It is at this period that Bailey’s name first began to appear in connection with various scams. On May 8, 1915, the New York Times reported that he had been arrested on charges of running a mail-order swindle out of the Carnegie Engineering Corporation (a paper firm with no relation to the Carnegie steel empire). He accepted advance mail deposits for a $600 car to be assembled in Michigan and delivered to a pickup point in Pittsburgh. No factory existed, and Bailey and two others were found guilty and sentenced to 30 days in jail.

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a patent medicine for male impotence called Las-I-Go For Superb Manhood. Chemical analysis of these pills revealed that the active ingredient was strychnine. This episode appears to mark the beginning of Bailey’s fascination with sexual stimulants and aphrodisiacs.

Radiation research was a natural draw for Bailey because it had become a glamour field in medicine. This glamour derived from the novelty of the phenomenon and its evident value in imaging the body and destroying tumors. Workers generally believed other, more subtle applications were waiting to be found. For instance, Marie Curie, who with her husband, Pierre, had discovered radium in 1898, set as one of her major postwar tasks the investigation of the effects of minute quantities of radium on cells, animals and humans. In England, this field was called mild radium therapy to differentiate it from the use of much larger doses in the treatment of cancer.

Mild radium therapy can be traced to the homeopathic and physical medicine theories of the 19th century. They held that most healing processes were natural and that tiny quantities of naturally occurring materials, coupled with exercise and sunlight, could cure most maladies. Proponents of these theories believed in the legendary healing powers of the great European hot springs. One mystery persisted, however. The waters appeared to lose their potency just a few days after they were bottled. In 1903 the discovery was made that the apparent pharmacological agent dissolved in these waters was radon. After Ernest Rutherford’s investigation of alpha-particle emissions from radium and radon, the transient healing effects the hot springs were reputed to have were ascribed to these particles.

Workers hypothesized that the alpha particles might account for the operation of the endocrine system, a connection that is not as strange as it may seem. Both fields had recently come to fascinate the medical world, and each had won the highest honors. In 1921 Frederick Soddy received the Nobel Prize in Chemistry for his work on radioisotopes. In that same year, Frederick G. Banting and Charles H. Best isolated insulins, work for which Banting and John J. R. MacLeod won the 1923 Nobel Prize in Physiology or Medicine. The one discovery provided a new kind of energy, the other, a method of controlling the body’s transduction of energy—the process by which sugars and other basic foods are converted into more readily usable forms. Might radioactivity be the spark that set the biophysical machinery in motion?

The German physiologist George Wendt, in his address to the 13th International Congress of Physiologists, reported that human leukocytes exposed to low-level radium radiation began migrating toward the radium source and that moribund vitamin-starved rats could temporarily be rejuvenated by exposure to radium. Like the stuff of homeopathic legends, radium appeared to be a substance with two distinct modes of medical efficacy: in large quantities, it was destructive, but in trace amounts, it was beneficial, perhaps even necessary. Legends translated into products more quickly than they do now. The feeble jurisdiction of the Food and Drug Administration did not extend to radium, which it classified as a natural element rather than a drug. Radioactive candies, liniments, potions and creams were widely available by 1915. At first, the fashion appears to have been for the most part confined to Europe. In the U.S., interest in the medical “catalytic” properties of radium and its decay products surged after double Nobel laureate Marie Curie made a whistle-stop railway tour across the country in 1921.

It is not known whether William Bailey actually encountered Curie, but it is clear that beginning in the early 1920s he became enraptured with radioactivity and its effects on life. He produced a translation of Curie’s 1910 classic, Traité de Radioactivité. He incorporated a company in New York City called Associated Radium Chemists, Inc., which put out a line of radioactive patent medicines, including Dax for coughs, Clax for influenza and Arium for rundown metabolisms. Before the Byers affair, this operation was closed by the Department of Agriculture on grounds of fraudulent advertising.

Bailey soon went on to found two new firms in New York City. The Thorone Company (Thorium Hormones) produced cure-alls containing radium and thorium for “all glandular, metabolism and faulty chemistry conditions,” especially impotence. The American Endocrine Laboratory produced the Radiendocrinator, a gold-plated radium-containing harness that could be worn around the neck (to rejuvenate the thyroid), around the trunk (to irradiate the adrenals or ovaries) or, for energized males, under the scrotum in a special jockstrap. The device sold first for $1,000, then $500 and then finally $150 as the market became saturated.

Bailey sought opportunities to present his theories at legitimate scientific meetings. In a public relations coup, he managed to secure an invitation to speak at the medical products session of the American Chemical Society meeting in Washington, D.C., in 1924. “We have cornered aberration, disease, old age, and in fact life and death themselves in the endocrines!” Bailey thundered. “In and around these glands must center all future efforts for human regeneration.” The next day the New York Times excerpted the talk in a lengthy and complimentary article.

In 1925 Bailey moved to East Orange, N.J., and opened the Bailey Radium Laboratories. It was here that he created and bottled his promotional masterpiece, Radithor. Ironically, 1925 also marked the beginning of the end for mild radium therapy. A group of New Jersey radium chemists and dial painters working at the U.S. Radium Corporation died after a protracted and mysterious syndrome of kidney disease, low
Blood counts and widespread deterioration of their bones. Some experts muttered about possible radium poisoning, but Bailey disagreed. “There is no proof that radium was responsible for the deaths,” he opined, when called by the New York Times for an expert comment.

His company shipped promotional pamphlets to every registered physician in the U.S., filling them with testimonials from patients and physicians as well as with photographs purporting to show the extraction, purification and testing of radium at the Bailey Labs. In fact, Bailey simply bought purified radium wholesale from the nearby American Radium Laboratory, bottling it in distilled water and marking up the price by almost 500 percent. He offered physicians a 17 percent rebate as a “professional fee,” a practice that the American Medical Association condemned as “feesplitting quackery” in 1927.

The promotions quickly made Bailey a rich man. He sold more than 400,000 half-ounce bottles between 1925 and 1930. Yet although evidence began to mount that small quantities of radioactive material could be devastating to health, the public at first took little notice. No one seemed to worry about a sickness that had so far been confined to poor, working-class women who painted radium onto watch dials. The FDA issued warnings, but it had no recourse to legal action. The Federal Trade Commission therefore took the lead by beginning an investigation of Bailey’s claims in 1928. On February 5, 1930, the agency filed an official complaint charging Bailey with falsely advertising the efficacy and harmlessness of his products.

It was at about this time that Eben Byers began to experience unusual aches and pains. He told his private physician that he had lost “that toned-up feeling.” He began to lose weight and complained of headaches and toothaches. He was told that he just had a bad case of sinusitis but became alarmed when his teeth began falling out.

A radiologist in New York City, Joseph Steiner, looked at Byers’s radiographs and noticed some similarities between the developing bony lesions in Byers’s mandible and those described in the deceased radium dial painters. Frederick B. Flinn, the prominent radium expert from the department of industrial medicine at Columbia University, was called in as a consultant and confirmed Steiner’s suspicions: Byers’s body was slowly decomposing, the result of massive radium intoxication from the Radithor. Flinn’s conclusions were not made public, however, in part because other experts—including Byers’s personal physician—refused to accept them.

By September 1931 the commission’s investigation was well under way, and the ailing Byers was called to testify. He was too ill to travel, so a special attorney, Robert H. Winn, was sent to Byers’s Long Island mansion to take the deposition. He later described the scene: “A more gruesome experience in a more gorgeous setting would be hard to imagine. We went to Southampton where Byers had a magnificent home. There we discovered him in a condition which beggars description. Young in years and mentally alert, he could hardly speak. His head was swathed in bandages. He had undergone two successive jaw operations and his whole upper jaw, excepting two front teeth, and most of his lower jaw had been removed. All the remaining bone tissue of his body was slowly disintegrating, and holes were actually forming in his skull.”

On December 19, 1931, the commission issued a cease-and-desist order enjoining the Bailey Radium Laboratories from continuing to market Radithor. The ruling came too late to do Byers any good. With his death in 1932, the commission reopened its investigation, and the FDA began campaigning for more sweeping powers. Medical societies took the opportunity to denounce all patent medicine sales, and calls for radium-control laws were voiced throughout America and Europe. The forerunners of the current regulations restricting the sales of radiopharmaceuticals to authorized users actually date back to the Byers affair. With the institution of the regulations, the radioactive patent...
studied 29 patients (21 living and eight dead) under the 1st Fighter Command. He also invented a method of swimming in excreting the substances or in producing protective hormones (such as granulocyte colony-stimulating factor and the interleukins) that stimulate the growth of blood cells when the body is exposed to radiation. Among these comparatively lucky consumers of Radithor was Bailey himself.

Among the materials that Evans and his colleagues studied in the 1960s were the disinterred remains of two Radithor drinkers whose clinical stories correspond so closely to those of Eben Byers and William Bailey as to constitute a positive identification. The bones of both men showed severe radiation changes and were still dangerously radioactive, almost 50 years after the individuals had drained their last bottle of Bailey’s elixir. William Bailey, the dean of the radioactive quacks, thus played a major role in the beginning, the climax and the end of the era of mild radium therapy.

The study of the long-term effects of alpha radiation continues. Since my original publication of this research, other apparent victims of medicinal radium poisoning have contacted me, and my colleagues and I are studying their medical records and attempting to understand the radiation effects through experiments on rodents. Although the fad of radioactive patent medicines has long passed, some of the data it has bequeathed will continue to suggest answers to the problems posed by radon in the home and by nuclear waste in the environment.

These insights may also help workers to judge the costs and benefits of therapeutic alpha radiation, now being developed for cancer therapy. For, as Bailey noted with perhaps unwitting prescience and certainly with irony: “Radioactivity is one of the most remarkable agents in medical science. The discoveries relating to its action in the body have been so far-reaching that it is impossible to prophesy future development. It is perpetual sunshine.”

FURTHER READING

* A gray is an absorbed dose of one joule per kilogram.