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Substance of the Sun: The Cultural History of Radium Medicines in America

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Substance of the Sun: The Cultural History of Radium Medicines in America

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Substance of the Sun: The Cultural History of Radium Medicines in America

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From the moment Marie Curie announced the existence of radium, the strange new element captured the imagination of the American public. Radium, it seemed, could do anything. It gave off its own light and heat and appeared to realize the ancient alchemical dream of transmutation. It also showed promise as a medicine. The press ran with the idea that radium was a panacea that would cure everything from cancer to wife-beating. Soon it became impossible for the public to know what to believe when it came to radium and its effects on the body. Patent medicine companies exploited the murkiness surrounding ideas about radium, marketing a slew of products that claimed to harness the element's healing and energizing powers. Meanwhile, physicians made slow, careful progress in defining the parameters of radium therapy, narrowing their focus to cancer. The popularity of radium patent medicines peaked in the 1920's when hundreds of thousands of Americans purchased one or more of the dozens of radium products that proliferated at the time. Government regulators and members of the medical establishment sought to push these products from the market, but loopholes in the regulatory apparatus created under the Pure Food and Drug Act of 1906 allowed many of

these companies to operate freely. Two scandals—the saga of the “Radium Girls” and the death of Eben Byers, a well-known industrialist who died after drinking over 1000 bottles of a radioactive tonic called Radithor—damaged radium’s image in the 1920’s and 1930’s. By the late 1930’s, strengthened regulatory laws helped push radioactive products from the marketplace. During World War II, scientists discovered artificial isotopes that proved more effective and less expensive than radium in the treatment of disease. For decades Americans had struggled to make sense of a scientific discovery that seemed to challenge fundamental ideas about the nature of the body and its relationship to the physical world. The ambiguities surrounding the element posed a unique challenge to progressive ideals of expertise and professionalization while providing a malleable image of energy and health that a variety of commercial interests could deploy.

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Introduction

Along with my earaches and asthma, I had sinus trouble. There was some ‘new treatment’ for this ailment being discussed in the neighborhood. It involved stuffing *radium* into your sinus cavities. (Have you ever heard of this?)...The doctor had a long wire thing—maybe a foot or more, and on the end was a pellet of radium. He stuffed it up my nose and into my sinus cavities on both sides. (I should probably check to see if my handkerchief is glowing in the dark).¹

So wrote Frank Zappa in his 1989 autobiography *The Real Frank Zappa Book*.

Though told with Zappa’s trademark irreverence, the anecdote reveals a great deal about the public’s complex and often contradictory attitudes toward radium, an element that many hailed as a “miracle” when it was discovered around the turn of the century.

During the half century between the discovery of radium by Marie and Pierre Curie and Zappa’s childhood experience with the element, ideas about radium and radioactivity oscillated between wild enthusiasm and fear, but by the 1950’s, radium was on its way out. Artificial isotopes, a useful byproduct of the atomic bomb program, were replacing radium in the oncologist’s armamentarium. Strengthened regulatory laws made selling radioactive products over the counter illegal. The nasopharyngeal radium irradiation practiced by Zappa’s nameless doctor was one of the element’s last gasps, a vestige of its once wider use.

What had happened during the first half of the twentieth century that caused radium to fall so far? Zappa’s story is instructive. His experience with the element demonstrates the extent to which radium was never really well understood by the American public. The success of radiation treatments for cancer had been well

¹ Frank Zappa, with Peter Occhiogross, *The Real Frank Zappa Book* (New York: Touchstone, 1989), 20.

established by the first decade of the twentieth century. The mechanism of radioactive cancer treatment was fairly straightforward: rays bombarded the cancerous tissue and destroyed it while damaging as little healthy tissue as possible. Radium's effect on an ailment like sinus trouble, however, was more mysterious. The primary justification for the use of radium in such a case was the element's decades-old reputation as a miracle cure. Early newspaper stories trumpeted radium as the cure for virtually every ailment the flesh is heir to. This notion of radium as a cure-all had remarkable staying power and, even after fifty years, continued to make radium seem like a "new treatment" that would succeed where all others had failed.

Zappa's story, particularly the comment about the glowing handkerchief, also evokes the almost science fiction aura surrounding radioactivity. Although radium did in fact glow in the dark, the comment says more about the place of radiation in the imagination. As nuclear weapons and fallout replaced the mental space formerly occupied by radium, new associations were projected back onto the element. Radium's glow, seen as a positive during its heyday when it helped illuminate watch dials and fighter plane instrument panels, became a negative, a sign of mutation and contagion. Radioactivity became associated with war, fallout shelters, genetic oddities, and the Cold War. None of these ideas would have made sense to an American even a few decades earlier. Radium and radioactivity had been a source of hope more than anything else. Early commentators on radium predicted that a thimbleful of radium would fuel a fleet of warships, that a single power station would provide enough electricity for the entire nation.

Perhaps no hopes were raised like those pertaining to health. In the years following radium's discovery, newspaper articles appeared trumpeting radium as the cure for maladies from blindness to rabies, from arthritis to wife-beating. These early reports fueled high expectations for radium that lasted for decades and even continue on in a mutated fashion today.

An American was likely to encounter radium treatment in two very different ways. On one hand he or she might receive radium treatment from a doctor, probably for cancer. By the 1920's, tens of thousands of Americans were being treated by a growing number of specialists in radiology and oncology. Cancer was one of the first diseases found to be conducive to radioactive treatment, with the first batches of medical radium coming from the Curies themselves. In the decades that followed, radium specialists made slow, careful progress. They went through a process of professionalization that was typical of the time. The *Journal of Roentgenology* was expanded to become the *Journal of Roentgenology and Radiology*. The federal government became involved in 1913 when the National Radium Institute, a partnership between New York Memorial Hospital and the U.S. Bureau of Mines, was established. Soon, professional organizations began to appear, most notably the American Radium Society in 1916. Though less glamorous than the early headline-grabbing stories about radium, the early radium work in orthodox medical circles laid the groundwork for modern radiation treatment.

The hospital was not, however, the only place Americans went to pursue the benefits of radium. Hundreds of thousands of Americans encountered radium not

through their doctors but through advertisements and patent medicines. Hundreds of purportedly radioactive products appeared in the first half of the twentieth century, peaking in the 1920's. These nostrums had begun to appear on the heels of press reports about radium's marvelous physical qualities. When products like Radol, an alleged cancer cure, appeared on the market, radium was the most valuable substance in the world and was extremely scarce. The element would have been impossible for patent medicine interests to obtain let alone afford. So consumers bought solutions of water, alcohol, and an assortment of vegetable and mineral ingredients thinking they were getting the miracle cure they had read about. At around the same time, the Pure Food and Drug Act passed, allowing the government to eliminate the most egregiously deceitful offenders. But patent medicine companies were quick to adapt and continued to operate for decades under the nose of regulatory agencies. By the twenties, when the price of radium had come down substantially thanks to an increase in supply, the labels no longer had to lie because there really was radium inside.

Perhaps the most popular, and certainly the most notorious, of these certifiably radioactive elixirs was Radithor. Radithor's success, followed by its ignominious downfall, helped doom over-the-counter radium medicines just as they were reaching the pinnacle of their popularity. The scandal that brought down Radithor came in the wake of an even greater one. Since before World War I, one of radium's main uses was in the production of luminous paints used for painting watch dials, airplanes' instruments, light switches, and dozens of other items. One of the largest companies operating in this field was the United States Radium Corporation. At U.S. Radium's factory in New Jersey,

dozens of women painted tiny glow-in-the-dark numbers on watches. To make the points of their brushes as sharp as possible, they often licked them. Slowly but surely their bodies absorbed radiation, and eventually a handful of them became ill. For some Americans radium was beginning to seem less like a natural, benevolent healer and more like a potentially dangerous poison.

Forty years later, when he was battling prostate cancer, Zappa forewent radiation therapy in favor of more natural treatments. This distinction might have confused Americans at the turn of the century. Radium was, after all, a natural treatment itself. It came right out of the ground and required no processing to give off the alpha, beta, and gamma rays that made it useful against tumors. The element's status as a natural substance was a great boon to patent medicine peddlers. In particular, sun imagery proved particularly useful as a symbol of radium's healing rays. The notion of radium as "liquid sunshine" was one of the earliest and most persistent themes throughout the fifty years of the radium era.

Yet for all its natural wonders, radium was also a product of modern science. It came from the laboratory of Nobel Prize-winning scientists, and the challenge of deciphering the element's strange properties was the domain of some of the world's leading minds. This dual nature of radium—at once natural and scientific—was at the heart of its appeal as a medicine. One person's nature cure could be another's cutting edge therapy. Commercial interests mined this two-sided aspect of radium by borrowing from scientific language one moment while highlighting the element's natural side the next.

Radium's ability both to heal and destroy was another of its ambiguous characteristics. Early radium workers such as the Curies and Henri Becquerel were among the first to discover the danger of prolonged exposure to radium's rays. Painful burns were a standard occupational hazard for early researchers into the nature of radioactivity. Yet the discovery of radium's physiological effects led to their use as a therapeutic agent. Radium seemed to have a selectively destructive effect on diseased tissue and tumors. Again, radium defied easy characterization. Whether the element was helpful or harmful depended on one's exposure, susceptibility, and, perspective.

Ultimately, the ambiguity that most defined radium was its existence in the murky territory between fact and fiction. Radium posed such a fundamental challenge to ideas about matter, the universe, and the human body, that no one was on solid ground in trying to understand it. Facts and false trails coexisted within the scientific community and in the press. With the truth so hard to nail down, yet so captivating, it became easy for Americans to believe that anything was possible when it came to radium. The haziness surrounding knowledge of the element and its effect on the body offered patent medicine companies the perfect entry point. When it came to radium, Americans were ready to swallow anything, figuratively and literally. This dissertation explores the ramifications of radium's inherent ambiguities on the press, the medical establishment, the commercial medicine industry, and most of all the American people.

Chapter One recounts the often-told story of the discovery of radium and looks in depth at America's initial response to the element's amazing properties. Even before

radium was discovered, several events had helped prepare the imaginations of Americans for their confrontation with the substance. As Spencer Weart has argued, notions of invisible rays that interacted with human life have existed for eons. More immediately, mesmerism, electricity, and x-rays helped establish some of the symbolic resonances that radium would carry into the twentieth century. The America press went mad for radium, reporting new and increasingly wonderful qualities of the element every day. This flurry of information led to a murkiness surrounding just what could be believed when it came to radium and radioactivity. Enthusiasm mixed with confusion in newspaper articles, short stories, comic strips, and poems. In the scientific community's impatient rush to find "the next radium," a handful of false rays appeared, most famously Henri Blondlot's N-Rays. Radium it seemed would transform all aspects of life: how we powered our cities, how we ate, even how we determined the genders of our children. However, fact and fiction were becoming impossible to separate, and when it came to radium's effect on the body, it became impossible for the public to know what to believe. Some articles were already claiming that radium was the secret to life itself.

Chapter Two picks up on the media frenzy surrounding radium and focuses in on radium's promise as a medicine. An American newspaper reader around 1905 would have found articles touting radium as the cure to an astonishing array of illnesses. Blindness, diphtheria, tuberculosis, malaria, Hodgkin's Disease, and many others would all succumb to radium's healing rays. Radium's rays seemed to resemble the vitalizing beams of the sun, earning it the nickname "liquid sunshine." This symbolic link between radium and the sun would later prove handy for patent medicine companies, who

frequently piggybacked on the idea. Americans might not understand exactly what radium was or how it worked, but the idea that it was a powerful disease fighter was difficult to miss. This chapter establishes the raised expectations concerning radium's promise as a healer that patent medicine companies would soon exploit.

The first attempts at commercial exploitation of America's "radiomania" form the basis for Chapter Three. Within a couple years of radium's discovery, ads began appearing that echoed, and often resembled, the articles they accompanied. Dennis DuPuis, the first high-profile peddler of a purportedly radioactive over-the-counter medicine, claimed that he held a chair in Radiotherapy at the Post-Graduate College of Electrotherapeutics in St. Louis. The title was a blatant rip-off of that of William Morton, legitimate doctor and popularizer of the idea of radium as "liquid sunshine." DuPuis, calling himself Rupert Wells, marketed Radol as a cure for cancer and other maladies. Like all products in this period, when radium was the most valuable substance on Earth, it contained no radium at all. The fraudulent labels on his Radol bottles earned DuPuis one of the first Notices of Judgment under the new Pure Food and Drug Act. DuPuis's short career on the fuzzy border between orthodox and unorthodox medicine was typical of an era in which the very nature of truth about radium was uncertain. Some began their careers toeing the orthodox line only to be seduced by the promise of big profits to be made in the patent medicine game. Some were downright deceitful. This chapter argues that Progressive Era ideals of expertise and truth tended to break down when it came to something as unprecedented as radium. Opponents of patent medicines in the AMA,

FTC, and FDA tried with some success to clamp down on the proliferation of radium products, but peddlers and regulators would continue to wrangle for decades to come.

Chapter Four surveys developments in orthodox radium medicine during the first half of the twentieth century. The Curies themselves had predicted that for all its physical wonders, radium's primary use would probably be in medicine. Though the element had other uses, notably the production of luminous paint that siphoned supply away from medical uses, a small group of specialists worked to advance the nascent field of radium therapy. The earliest experimenters had taken an empirical approach, aiming rays at any willing patient, but their prospects were limited by lack of both knowledge and radium. By the 1920's, things looked very different. Medical uses had narrowed toward cancer, and a rich new vein of radioactive ore in Belgian Congo vastly expanded the radium supply. While radioactive patent medicines multiplied, orthodox medicine professionalized, establishing professional organizations and publishing peer-reviewed journals. Orthodox and unorthodox radium medicines essentially grew in parallel, but by the 1920's they increasingly butted heads. Physicians and government regulators made the elimination of what they saw as quackery one of the primary goals of their profession. If radiation therapy were going to take its place among the established branches of organized medicine, it would have to eliminate its embarrassing relatives in the commercial medicine business.

Chapter Five is in many respects the centerpiece of the dissertation. It examines the 1920's heyday of commercial radium medicines, a period in which these products peaked and which sowed the seeds of their destruction. It was in this period that radium

prices had fallen low enough that commercial interests could afford to include physiologically significant amounts of radioactive material in their products. Still, most of the popular products remained largely innocuous. However, even an inert product could be dangerous if it kept someone from seeking professional help for a serious illness. The biggest sellers were the radium emanation jars that purported to energize ordinary water with the healing power of radioactivity. The jars were typically made from clay that contained tiny amounts of radioactive uranium. Patients were told that if they filled their jars at night, by morning they would awake to “activated” water that would remove their sickness and replace it with vital energy. Often the language in advertisements for these products revealed a preoccupation with sexual potency that would have been obvious to anyone savvy enough to read between the lines about “youthful vitality” and “vigor.”

The chapter argues that radium products peaked in the 1920’s, not only because radium itself was more readily available, but because the imagery of radioactive energy dovetailed well with the famously fast pace of the decade. As the partygoers of novels like *The Great Gatsby* danced until dawn and a new type of music called jazz captured the quick tempo of the era, many Americans questioned their own ability to keep up. For decades Americans had read that radium seemed to give off enormous amounts of energy without any indication that the well would ever dry up. Patent medicine makers offered to bottle that force and pass it on to the consumer. Whether advertisements tied radium to the ancient healing power of mineral springs or the cutting edge science of subatomic

particles, these products sold the energy that Americans would need to keep step with the “modern temper” of life in the Jazz Age.

However, the story was not one of unmitigated success for the radium interests. Government regulators worked to keep the most dangerous products off the shelves under the jurisdiction of the Pure Food and Drug Act. Numerous loopholes and a regulatory system that lacked sufficient manpower and resources allowed dozens of companies to prosper, but by the end of the decade the writing was on the wall for the radium patent medicine industry. In New Jersey a group of women who painted luminescent dials on watches fell ill and died. The saga of the “Radium Girls” became a national news story, and radium lost some of its luster. Though scientists had long known that radium could be dangerous, the public had its first real glimpse of the deadly potential of radioactivity. There were more on the way.

While dozens of radium patent medicines prospered in the 1920’s, one product in particular would come to embody the boom and bust trajectory of the industry. Radithor, the subject of Chapter Six, was just one of an impressive line of items marketed by a failed con man named William J. A. Bailey. Bailey, after an unsuccessful attempt at entering the already crowded aphrodisiac market, hit upon the idea of exploiting public enthusiasm for radium some time in the early 1920’s. By the middle of the decade he was marketing an array of products under a handful of business names. Most played on the idea of radium as an invigorator and restorer of “lost manhood.” However, it was Radithor for which Bailey would be remembered.

Thanks to newly discovered sources of radium in the Belgian Congo that helped drive down the previously stratospheric price of radium, Radithor could boast something most of its predecessors could not: a substantial amount of radioactive material. Every bottle was certified to contain genuine radium and mesothorium, an isotope of radium that comes from the radioactive decay of thorium. At a time when drug regulations mandated little more than honest labels, Bailey was operating legally as long as he delivered the promised measurements of radioactivity. Radithor succeeded in large part thanks to Bailey's prodigious marketing efforts. He mailed pamphlets to doctors, bought advertising space, published a book called *Modern Rejuvenating Methods*, printed a periodical called the *Radithor Bulletin*, and blanketed the nation in testimonials. One high profile imbiber of Radithor was industrialist and amateur golf champion Eben Byers. Byers began taking Radithor on doctor's orders after injuring his arm in a fall. He became an avid fan, claiming that the elixir helped him maintain the manly vigor that made him a known ladies' man. However, after drinking over 1000 bottles, a new series of health problems surfaced. Cancer weakened his system, leading to broken bones and a surgery that removed most of his jaw. It was not long before Byers withered away to a husk of his former robust self and died a gruesome public death. The story made national headlines and revealed in glaring detail the danger inherent in over-the-counter radium products. The FDA, hampered by an inadequate Pure Food and Drug Act, had been unable to move against Bailey in spite of detailed knowledge of his questionable business practices. The AMA had failed to appreciate the seriousness of the public health threat

posed by Radithor. Bailey, meanwhile, maintained that his own good health attested to Radithor's harmlessness.

The fallout from the Radithor scandal, coupled with the deaths of the Radium Girls, helped end the era of radium patent medicines. Strengthened regulatory laws included radium in the list of ingredients that could not be included in any commercial product. From then on, medical radium would be in the hands of physicians. However, even in orthodox circles, radium's days were numbered. The Manhattan Project, though designed to create a weapon of mass destruction, helped make a positive contribution to radiological medicine. New artificial isotopes of cobalt, iodine, and other elements proved cheaper, safer, and more convenient than radium. Iodine, for example, with its tendency to be taken up by the thyroid glands, could be used to treat cancer in the thyroid system. New sources of powerful Supervoltage beams like those produced at MIT and Cal Tech during the 1930's helped create x-ray machines that also helped push radium from the spotlight. The Epilogue explores this period of decline for radium. However, like radium itself, the image of radioactivity's health-giving properties continued to transmute into new forms. In the wake of the horrors of Hiroshima and Nagasaki, uranium became the element most linked to radioactivity in the public's mind. Despite the fact that uranium's radioactivity was much weaker than that of radium, it drew thousands of Americans to the now empty uranium mines that had fed the American radium industry and the atomic bomb project. People suffering from arthritis and other ailments paid the proprietors of the mines for the privilege of descending into the mineshafts to breath the mildly radioactive air. As if the deaths of the Radium Girls,

Eben Byers, and hundreds of thousands of Japanese civilians had never happened, the idea that radioactivity could cure intractable diseases where all other treatments had failed persisted. The Free Enterprise Mine in Colorado continues to operate. The emanation from the uranium, now referred to as radon, is considered a health hazard when found in our basements, but a core of people continue to reaffirm the powerful imagery of miraculous cures that were first established in the first decade after the Curies' announcement of the existence of a strange new element called radium.

Literature Review

Historical writing on radiation medicine sits within a larger historiography of the history of radiation. There are numerous books on the history of radiation and radioactivity that range from basic overviews to narrow, focused monographs. On the broad end of the spectrum are books like G.I. Brown's *Invisible Rays: The History of Radioactivity* (2002). Brown assembles mostly well-known stories from the discovery of uranium in 1789 (before its radioactivity had been identified), through the work of Roentgen, Becquerel, and the Curies, to the development of the atomic bomb and beyond. Brown's focus throughout is on the great scientists and their quest to understand the nature of the atom and harness its power.

Though several of the signal events in the history of radiation occurred abroad, America has seen its share of important developments in radiation science. Lawrence Badash examines the first decades of this scientific work in his *Radioactivity in America: Growth and Decay of a Science* (1979). Badash argues that, in spite of the fact that they were responsible for few major breakthroughs, American scientists laid crucial

groundwork and filled in many of the gaps that allowed subsequent scientists to keep moving the field forward. This “normal science” “imparts a truer picture than do the triumphs”² when surveying the broad history of radiation. In particular, Americans did much of the grunt work in tracing uranium-radium genetics and establishing decay series. These developments revealed “radioactivity as a social activity” in which scientists from several fields working in a handful of countries worked together and in parallel to learn more about how radioactivity worked. By the end of World War I, this international cooperation had succeeded in answering most of the radiochemical questions that scientists had. Though the applications of radioactivity continued to be medically and cultural important, the scientific exploration of it declined. Badash looks briefly at the cultural response to radium, but for the most part he focuses on the scientific community and the way in which it matured through the successes and dead ends of two decades of inquiry into the nature of radioactivity.

A substantial portion of the historical writing on the medical specialty of radiology concentrates on x-rays and their implementation. Largely eschewing the cultural and social impact they tend to focus on technological advances and developments within the profession. An example of this approach is *The Rays: A History of Radiology in the United States and Canada* (1969) by Ruth and Edward Brecher. The husband and wife Brecher team describes the initial discovery of x-rays by Wilhelm Roentgen as well as the handful of scientists and doctors who helped create an American field of radiology. Though they dip into moments of cultural impact, including the role of Thomas Edison in

² Lawrence Badash, *Radioactivity in America: Growth and Decay of a Science* (Baltimore: The Johns Hopkins Press, 1979), 2.

helping to introduce x-rays to the wider population, the Brechers generally stick to the challenges and successes of the x-ray specialists themselves. Issues of safety, measurement, dosage, delivery, and professionalization all receive detailed attention in what remains an important and frequently cited work on the topic. My own work builds on the frame they erected by shifting the focus toward radium and examining the cultural and commercial impact that radiation had outside of the doctor's office.

In the mid-1990's, radiologists celebrated the one hundredth anniversary of Wilhelm Roentgen's discovery of x-rays and looked back on a century of progress in the field. The evolution of radiation science, from a few stray pulses of electromagnetic energy escaping a cathode ray tube to state-of-the-art imaging technology and a multi-billion dollar industry, merited a congratulatory look back at advances made and lives saved. To mark the occasion, Radiation Centennial, Inc. commissioned an ambitious historical project to assess the past of radiology and help point the way forward. The result was the three-volume *A History of the Radiological Sciences* (1996). Written and compiled by a number of historians and physicians, the three volumes, *Diagnosis*, *Radiation Oncology*, and *Radiation Physics* offered a comprehensive account of the history of the radiological field. Focusing principally on x-rays and x-ray technology, the books chart the development of key technologies like the Coolidge Tube in 1912 and the supervoltage machines of the post-war era. Professional developments such as the founding of radiological societies, the publishing of new journals, and the proliferation of radiology departments in hospitals all receive detailed attention. Even groups like

women and African-Americans, whose stories often go untold in standard accounts, receive overdue credit for their role in advancing the field.

Though radium and natural radiation do receive substantial attention, series editor Raymond Gagliardi admits that that part of the story would benefit from its own comprehensive treatment, possibly in commemoration of radium's hundredth birthday. If anything is left out of the narrative of *A History of the Radiological Sciences*, it is the patients. The contributors understand that their focus is on the medical field, not the social and cultural impact of radiation medicine. Roger Macklis and David DiSantis contribute articles that discuss "Radiomedical Fraud" and "Radiation and Popular Culture," but their pieces mainly draw from secondary sources and offer only an overview of the rich cultural response to radium and its health effects. This dissertation complements the story of radiology's progress by chronicling commercial radium medicines that operated parallel to their orthodox counterparts. While many Americans received radiological treatment at top-notch facilities like those of New York's Memorial Hospital (later the Sloan-Kettering Medical Center), many others took products like Radol and Radithor. The orthodox and unorthodox treatments must be examined in tandem in order to fully understand the ways in which Americans understood radium's promise as a health-giver.

J. Newell Stannard's mammoth *Radioactivity and Health: A History* (1988) is the most comprehensive work on radioactive isotopes in medicine. Over two thousand pages, Stannard's work traces radiation medicine from the naturally occurring elements radium, radon, and uranium, to the artificially available isotopes that came out of World

War II. Stannard was himself a pioneer researcher in the health effects of radioisotopes and prepared the book for the US Department of Energy's Office of Health and Environment Research. While Stannard focuses primarily on progress in laboratory work on radioisotopes, he sometimes examines broader events in the history of radiation and health including the plight of uranium miners in the Czech Republic and the saga of the Radium Girls. Due to its length and limited publication, Stannard's audience is necessarily small and specialized. He presents a wealth of technical data, but the cultural impact of radium and its relationship to the body is mostly unexplored.

Despite the fact that the atomic bomb had been hanging over American life for decades, it was not until the 1980's that historians began to examine the cultural impact of radiation in a serious way. The first book to offer an in-depth look at American culture during the "Atomic Age" was Paul Boyer's *By the Bomb's Early Light* (1985). In the book's introduction, Boyer marvels at the fact that despite years of duck-and-cover drills and images of mushroom clouds, cultural and intellectual historians seemed to deny that "such a thing as nuclear weapons had existed."³ Boyer examines the five years that followed the explosion of "Little Boy" and the ways in which American intellectuals, journalists, politicians, scientists, artists, and ordinary people responded to the new world that emerged from the mushroom cloud over Hiroshima.

Though Boyer's work does not explicitly deal with radium or the period covered by the bulk of this dissertation, it does grapple with some of the same themes of how the public responds to scientific developments that spill into virtually all areas of American

³ Paul Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age* (New York: Pantheon Books. 1985), xv.

life. Boyer gives considerable attention to the health effects of radiation, both positive and negative. From the death and suffering of Hiroshima and Nagasaki to Utopian fantasies a “golden age of atomic medicine,”⁴ the relationship between radiation and the body was at the heart of much of the discussion in these years. The potential of radioactive isotopes, a happy byproduct of the Manhattan Project, offered a glimmering source of hope to counteract the devastation already wrought. Headlines about slain diseases and radioactive fertilizers echoed almost verbatim long-forgotten articles that had appeared in the wake of the Curies’ discovery of radium. Once again the symbol of radiation as capable both of tremendous destruction and wonderful creation was front and center in the American imagination.

Spencer Weart built on Boyer’s work on the cultural impact of radiation with his sprawling *Nuclear Fear: A History of Images* (1988). In it Weart examines the myriad symbolic threads that all become entwined in the story of radiation. *Nuclear Fear* traces radiation images to their prehistory in alchemy and primitive religion. Like Boyer, Weart highlights the juxtaposition of hope and fear that permeated much of the thinking about radiation. From the gleaming utopian White City to the apocalypse, from dangerous weapons to miracle cures, radiation presented a Janus-face visage that could transform itself depending on the viewer.

The scope of Weart’s monograph goes well beyond this dissertation in terms of both subject and periodization. Much of the book is given over to the 1950’s and beyond and discusses the debate over the pros and cons of nuclear power. Weart, originally

⁴ Boyer, 119.

trained as a physicist, was for many years the Director of the Center for History of Physics of the American Institute of Physics. He defends nuclear power against its detractors, arguing that fears about worst case scenarios have caused many to overlook the relative safety of nuclear power compared to other industries. Early chapters cover the hopes and fears surrounding radium during the first decades of the twentieth century but can only devote enough space for the most attention grabbing headlines. Images of radium as an alchemical elixir or as bottled sunlight appear but do not receive the specific attention they deserve. This dissertation looks at these symbols, as well as key events such as the rise and fall of Bailey and Radithor, with more detail and specificity. Weart's points can sometimes be general and speculative. By looking more closely at these events, the dissertation examines how the press spread specific ideas about radium and how patent medicine companies exploited the public's expectations by crafting a funhouse mirror version of radium that foregrounded the element's promise and minimized its potential to do harm.

By the 1990's historians began paying more attention to the cultural impact of radiation and its effects on the bodies and imaginations of Americans. Bettyann Holtzmann Kevles folded cultural analysis into the story of x-rays in *Naked to the Bone: Medical Imaging in the Twentieth Century* (1997). Kevles analyzes the ways in which x-rays provided a new means of seeing "the living body beneath the skin." For the first time mankind could look inside the body while it was still alive. This new vantage point reoriented how people saw themselves and their relationship to the outside world. This change in worldview is particularly stressed in Kevles's chapter on "X-Rays in the

Imagination,” which discusses the influence x-ray technology had on the Avant-Garde, specifically surrealism. Fiction writers latched on to the plot innovations inherent in making the body transparent while visual artists “found the X-ray a formidable tool for shattering the cultural restraints that the guardians of society were trying desperately to maintain on manners and morals.”⁵ While Holtzmann focuses on diagnosis and visual perception, my own work examines how radiation interacts with the body and, more important, how ideas about those interactions shaped attitudes and drove a commercial radium medicine industry.

Catherine Caufield also gives some attention to radium as the back story to her analysis of the bomb and its aftermath in *Multiple Exposures: Chronicles of the Radiation Age* (1989). In her discussion of “radiomania” and radium patent medicines, Caufield seems to revel in the oddity of the popularity of the element without looking closely at what was going on. “Charlatans” that appeared in the wake of the element’s discovery are treated not as historical actors worthy of serious attention but as comical sideshows that can look quaint now in the light of hindsight. She devotes a chapter to the plight of the Radium Girls and the efforts of men like Lauritsen Taylor and Robley Evans to establish radium standards, but Claudia Clark’s account of these efforts is the definitive one.

One event in the history of radium has received attention not only from historians but from poets, playwrights, and filmmakers: the saga of the Radium Girls. The most complete historical account of their illnesses and struggles to gain recognition and

⁵ Bettyann Holtzmann Kevles, *Naked to the Bone: Medical Imaging in the Twentieth Century* (New Brunswick, NJ: Rutgers University Press, 1997), 124.

compensation is Claudia Clark's *Radium Girls: Women and Industrial Health Reform, 1910-1935* (1997). Clark describes the commercial apparatus that sprouted up around radium in the wake of Curie's discovery. Outside of medicine, one of the primary uses of radium was in luminous paints for everything from watch and airplane instrument dials to glow-in-the-dark crucifixes. The U.S. Radium Corporation, based in Orange, New Jersey, was one of the largest radium companies. At their Orange plant, the dial painters, mostly female, were encouraged to maintain sharp points on their brushes by licking the bristles. By the 1920's several of the women began to manifest mysterious symptoms. The company denied allegations that radium was the cause. However, gathering medical evidence pointed to "radium poisoning" in these cases. The plight of the Radium Girls became a national news story as the women struggled for recognition with the help of advocates like Dr. Alice Hamilton of the Consumers' League. Though the women did receive some legal recognition and financial compensation, Clark argues that the situation remained far from perfect. While singling out the Consumers' League as a dedicated fighter on behalf of industrial workers, she claims that government and business interests continued to drag their feet when it came to ensuring industrial workplace health even in the aftermath of the Radium Girls' tragic story.

Carolyn de la Peña's *The Body Electric: How Strange Machines Built the Modern American* (2003) connects radium to its prehistory in electricity and the health devices that proliferated in the nineteenth century. In her fifth chapter she examines radium as the culmination of decades of preoccupation with energy and its centrality to good health. Dating back to Mesmer and George Beard, Americans had worried that

their bodies needed external power sources to keep them functioning. Electricity, and an assortment of “strange machines” seemed to provide a solution in the nineteenth century. Yet in the twentieth, radium forced new ideas about the relationship between energy and the body on the American people. Because it created force far in excess of what had been imagined possible, radium would pick up where electricity had left off in powering Americans into the future. Several of the themes that run through this dissertation also run through de la Peña’s chapter in condensed form: the “radiomania” created by the press during the first decades of the century; the tension between radium as nature and radium as science; the conflation of radioactivity and electricity; the demise of radium products after the Radithor scandal. My dissertation builds on de la Peña’s work and goes beyond it by concentrating not only on the energy aspect of radium, but on its broader relationship to health. While many products promises a vague sense of energy, many others made specific therapeutic promises that reflected both the exaggerated press reports on radium and the work being done in orthodox radium medicine. By zooming in on the medical aspect of radium, this dissertation explores more facets of the health fantasies nurtured by radium.

British scholar David I. Harvie’s recent *Deadly Sunshine: The History and Fatal Legacy of Radium* (2005), by virtue of being a book-length examination of radium, is this dissertation’s closest analog. However, my work deviates from Harvie’s in ways that make this dissertation a unique contribution to the scholarship. Harvie does acknowledge the role of the press in creating excitement for radium and its early medical applications, but he does not trace ideas to their basic level. My own exploration of the rich variety of

ideas circulating around radium, gathered from the newspapers themselves, adds depth and nuance to the more general idea of a “radium craze” that existed around the turn of the 20th century. Harvie’s focus throughout is the discovery and production of radium in the pre-WW2 period, and the problem of its disposal that continues to linger in sites across the United States and Europe. Writing from the British perspective, Harvie pays particular attention to the radium scene in England. Refuse from a processing plant in Cornwall is, according to Harvie, responsible in part for radium’s “fatal legacy.”

Ultimately, Harvie’s is an international story that attempts a history of the element itself, in all its variety. My own project in contrast is more focused, concentrating largely on how ideas about radium and its effect on the body interacted with broader currents in American cultural life. Harvie sees radium mostly as a dangerous, concrete substance with its attendant problems for today. I see it as a largely a symbol, a way of penetrating deep-seated ideas and fantasies that permeated the American public during the first half of the twentieth century.

The literature on patent medicine is rather small, and much of the writing on the subject treats it as comical and quaint, an embarrassing but ultimately harmless aspect of a bygone era. Stewart Holbrook’s *The Golden Age of Quackery* (1959), for example, gives the impression that patent medicines were stopped dead in their tracks by the 1906 Pure Food and Drug Act. Holbrook’s “Golden Age” is one of barnside nostrum advertisements and Lydia Pinkham’s comforting visage. He describes some of the 19th centuries big-sellers including Pinkham, Wine of Cardui, and Peruna. Magnetic and electrical “cures,” the symbolic forefathers of radium products also receive some

attention. Holbrook discusses a handful of allegedly radioactive patent medicines, including Radol and the California Waters of Life, both indicated for cancer, but his periodization keeps him from looking at the bulk of radium products that appeared well after the Pure Food and Drug Act passed. Although Holbrook makes perceptive points about patent medicines—their focus on chronic and sexual problems, their reliance on the press, their opposition to the medical establishment—his characterization of the pre-1906 period as the Golden Age is a bit short-sighted. In reality, the patent medicine field continued to flourish for decades, as James Harvey Young as shown. Holbrook’s heroes are muckrakers like Samuel Hopkins Adams, US Department of Agriculture chemist Harvey Wiley, and AMA propaganda chief Arthur Cramp, and he lauds their achievements helping get the Act passed. However, patent medicine was only a fragment of what the government hoped to regulate. The new regulatory apparatus was not even sufficient to slow, let alone turn, the tide of patent medicines.

The definitive work on patent medicine is that of James Harvey Young. His twin volumes, *The Toadstool Millionaires: A Social History of Patent Medicine in America Before Federal Regulation* (1961) and *The Medical Messiahs: A Social History of Health Quackery in Twentieth-Century America* (1967) continue to be the definitive accounts of irregular medicine in America. Unlike Holbrook, Young argues that “quackery” never went away despite the efforts of government and medical organizations to fight it. In fact, it continued to expand and flourish, becoming a multi-billion dollar industry. However, the value in Young’s books is not in their realistic view of the present, but in their rich analysis of the past.

Young establishes key themes that run throughout this dissertation, including the tendency of patent medicine companies to exploit new developments in science. Rather than destroying “quackery,” scientific breakthroughs often inspire and support it. Such was the case with electricity, the germ theory of disease, and radium. My work looks more closely at this phenomenon than Young is able to do. Like Holbrook, Young’s heroes are anti-quackery crusaders, and he writes about patent medicine as essentially a struggle between good and evil. This dissertation is more interested in the murky territory between good and evil, legitimacy and quackery, science and nature, fact and fiction. By tracing ideas about one scientific breakthrough, it explores and takes seriously the complex ways in which new ideas are received, understood, and acted upon by doctors, commercial interests, and ordinary people.

Chapter One: Radium Enters the American Imagination

Henry Adams, like thousands of others, first confronted radium face-to-face at the Paris Exposition of 1900. As Adams “haunted” the Expo, he marveled at the “new application[s] of force” he encountered everywhere he looked. The dynamo, as Adams understood it, was “a symbol of infinity” that evoked feelings akin to what the first Christians must have felt in the presence of the Cross.¹ It was less a piece of machinery than an occult, otherworldly object. Radium, however, represented something even more disorienting to Adams: it was “wholly new.”² Though it looked like little more than a bit of innocuous powder, radium heralded for Adams a moment of profound rupture in human history.

Nothing in Adams’s famed “Education” prepared him for the metaphysical reorientation that radium would force on him. Only a few years earlier, x-rays and atoms had had no place in his consciousness, but by 1898 his world was turned on its head when “Mme. Curie threw on his desk the metaphysical bomb called radium.”³ The discoveries on display at the Expo brought him into a “supersensual world” in which nothing could be measured according to old notions of scale. The dislocation represented by the dynamo and by radium left his “historical neck broken by the sudden irruption of forces totally new.” Adams, always the historian, thought of comparable fractures in history, of shifts in worldview brought about by the lives of Copernicus, Galileo, and Columbus. But even those events failed to evoke the powers Adams sensed. Only Constantine

¹ Henry Adams, *The Education of Henry Adams* (New York: Penguin Books USA Inc., 1995), 361.

² *Ibid.*, 362.

³ *Ibid.*, 428.

setting up the Cross in 310 could match the sense of “mysterious energy” and “divine substance” of the things he saw in Paris in 1900.⁴ That year marked for Adams the moment at which the continuity of history “snapped.” He quoted his acquaintance, the English philosopher Arthur Balfour, who announced that until the turn of the century the human race had “lived and died in a world of illusion.” Children of the new century “would be born into a new world which would not be a unity but a multiple. For Adams the cohesion of the very universe had unraveled, leaving a “multiverse” in its place.⁵

Yet for all the profundity Adams attached to radium’s power, even he could not grasp the totality of radium’s importance. Adams like many others was primarily impressed by its great energy. The element “wakened men to the fact, long since evident, that force was inexhaustible.”⁶ But the story of radium was not one of abstract forces. It was one of interaction between the external physical reality of the universe and the bodies and imaginations of those who encountered it, whether physically or in the media. While some fantasized about radium’s potential to power ships and move mountains, it was radium’s complex relationship with the body that was perhaps the most enthralling aspect of all. Radium had the power both to cure and to kill. Its mysterious power could nurture hope and cause fear. Radium may have been, as Adams believed, wholly new, but it also evoked ancient mysteries about health, sickness, and the unseen forces that could bring both. During the first half of the twentieth century, hundreds of thousands of people turned to radium as a cure for countless illnesses. Some received radium treatment in

⁴ Adams, “The Dynamo and the Virgin” chapter.

⁵ Ibid. 433.

⁶ Ibid, 466.

hospitals while others sought the unorthodox channels of dangerous patent medicines and purportedly radioactive contraptions. Though the motivations for pursuing radium cures were as numerous as the patients themselves, the fact that so many people in the United States and abroad took radium medicines cannot be understood without looking at the complex history of Americans' confrontation with the unprecedented new substance.

Although radioactivity was a force unlike anything humans had encountered, it had a handful of predecessors that helped lay critical groundwork for the response to radium. Humans had long struggled to understand their universe and frequently appealed to the influence of unseen energies to do so. American responses to radium were conditioned by a series of previous rays and forces that seemed to multiply in the century leading up to the element's discovery. One could look to any number of starting points for the prehistory of radium, but it was during the late 18th century, in the Curies' own Paris, that the ideas of one man helped establish several of the patterns that radium would follow more than one hundred years later. Paris at that time already was experiencing a vogue for mysterious forces including gravity and electricity. Franz Anton Mesmer's timing could not have been better. He arrived in Paris to find people who were ready to be convinced that their bodies were intimately linked with unseen forces and that those forces held the secret of life.

Mesmer was an Austria native, but he made his name in the salons of Paris. At the time of his arrival, Parisians were already obsessed with science. They struggled to understand the world around them and eagerly latched onto new theories that seemed promising. Often these ideas blended science with spiritualism since the separation

between the real and the fantastic was not always finely drawn. Mesmer offered a worldview that combined scientific explanations with more occult notions.⁷ He claimed that forces hitherto undetected by scientists permeated all things and needed only to be harnessed properly to achieve perfectly balanced health. “Animal magnetism” was Mesmer’s term for the medium through which forces including light, heat, magnetism, and electricity passed from one object to another. Mesmeric séances attempted to control and control animal magnetism to cure a host of physical, mental, and emotional ills. Participants were often whipped into frenzies, reaching states akin to what would later be called hypnotism. Mesmerism appealed to deep mystical, often sexual, impulses that usually remained hidden from society.⁸

Though his ideas were discredited by a scientific commission including Guillotine (inventor and namesake of the execution device), Lavoisier (chemist and future Guillotine victim), and Benjamin Franklin, Mesmer continued to influence healers and patients on both sides of the Atlantic. Charles Poyen brought Mesmerism to the United States in 1836 and found that it fit in well with scientific attempts to create a utopian order that others were pursuing at the time. Later, a handful of Americans like Mary Baker Eddy would adapt aspects of Mesmer’s idea to the American context and create an assortment of movements that combined scientific notions with spiritual ones. Yet Mesmer’s influence extended beyond the mere transmission of his ideas. Public attitudes toward Mesmerism dating back to its early days in Paris helped establish a pattern that

⁷ Robert Darnton, *Mesmerism and the End of the Enlightenment in France* (Cambridge, MA: Harvard University Press, 1968).

⁸ Robert C. Fuller, *Mesmerism and American Cure of Souls* (Philadelphia: University of Pennsylvania Press, 1982).

radium would follow over one hundred years later. Like Mesmerism, radium appeared at a time in which scientific discoveries were coming at a dizzying clip. How could an uneducated public decide what was true and what was not? Inevitably, in such a climate of discovery, it became easier for the public to accept the idea that virtually anything was possible. The invisibility of these phenomena only managed to compound the extent to which people's imaginations could run wild. The bounds of credulity became as limitless as the forces were intangible.

American interest in otherworldly forces spiked again in the 1850's when the works of German scientist Baron Karl Ludwig von Reichenbach were first translated into English. Reichenbach posited the existence of an "odic force" that permeated the Earth. The odic force seemed similar, if not identical to, the magnetic forces described by Mesmer. Reichenbach's investigations led him to believe that the odic force extended beyond humans, that the entire planet was odic and that proper alignment with the earth's polarity could cure illnesses. Though discredited by much of the scientific community as part of the broader fraud that included mesmerism, mind-reading, and the existence of psychic energy, Reichenbach's theories had staying power, influencing a number of Americans including Thomas Edison.⁹

Edison himself helped to popularize the force that most captured the American imagination during the 19th century: electricity. Though the details of how it acted were beyond the understanding of the layman, the idea that it was a powerful force that interacted with the body in important ways was widely known. "The average citizen had

⁹ Linda Simon, *Dark Light: Electricity and Anxiety from the Telegraph to the X-ray* (New York: Harcourt Inc., 2004), 130.

a slender practical understanding of electricity,” noted historian David E. Nye, “and grasped it only in the general sense as a mysterious new energy source that would make everything better.”¹⁰

One of the things that electricity promised to make better was human health. Electrotherapy was in many respects the direct ancestor of radium medicine. Like radium, electricity was a mysterious force that had legitimate medical uses but was also ripe for exploitation by commercial interests. Public enthusiasm created a huge market for electrical contraptions of varying degrees of medical value. Even founding father and pioneer in research into the nature of electricity, Benjamin Franklin, conducted research in electric medicine in addition to his more well-known kite-flying experiment. Soon patent medicine companies were spreading the idea that the body was charged with electrical fluids that could be boosted and adjusted in order to create perfect health. In the decades leading up to the discovery of radium, electrical cures were all the rage. Thomas Edison marketed an electrical cure called the Polyform. In the 1880’s U.S. congressmen had a room in the basement of the Capitol set up with an electrical medicine apparatus. According to the *Electrical Review*, “The members [said] it [was] splendid after they [had] exhausted their brain power by speechmaking or listening. A great many members take electricity.”¹¹

Electricity came to be seen as a vital fluid, the secret of life itself. A host of illnesses were interpreted as disorders of the body’s electrical system. Genius and

¹⁰ David E. Nye, *Electrifying America: Social Meanings of New Technology, 1880-1940* (Cambridge, MA: MIT Press, 1990).

¹¹ Nye, 153.

madness, impotence and virility, sickness and health were all said to be controlled by electricity. Some even hoped that electricity could tear down the barriers between life and death, allowing communication with the dead. Edison and others marketed electrical contraptions alleged to allow customers to contact their deceased loved ones. Electricity seemed to be the culmination of what science could achieve, the secret of matter and of life itself.

The American who best harnessed the idea of electricity as a vital force was George Beard. Beard, who coined the term “neurasthenia” to describe a bundle of disorders related to nervous exhaustion, believed that electricity both drained the body and built it back up. He claimed that life in the post-Civil War United States was overwhelming Americans’ bodies, depleting their energy and leading to illness. Electricity was partially to blame, according to Beard, who pointed to the parallel rise in electric wattage and neurasthenia.¹² Beard devised a number of electrical treatments that would reverse the problems of energy imbalance. By the 1880s his system had caught on around the country, and the idea that electricity and the functioning of the human body were intimately connected was widespread.

Though some disputed the scientific legitimacy of Beard’s work, it laid important groundwork on which mainstream scientists could build. Regardless of the mechanics of its operation, electricity did seem to show promise, for example, in alleviating pain or treating some diseases. Danish scientist Niels Finsen expanded on this idea by adding light to the equation. Using electricity to produce visible and ultraviolet light, Finsen

¹² Carolyn Thomas de la Peña, *The Body Electric: How Strange Machines Built the Modern American* (New York: New York University Press, 2003), 102.

treated skin diseases including lupus and psoriasis. Phototherapy, as the practice came to be called, earned Finsen a Nobel Prize in Physiology or Medicine in 1903, the same year that Becquerel and the Curies won theirs in physics. Finsen's work helped legitimize the notion of the healing ray that would be so central to the rhetoric surrounding radium. Indeed, many articles discussed the two treatments along side each other, as if they were part of one broader field of ray medicine.

As electricity was becoming a natural part of life for many Americans, scientists struggled with the notion that they were running out of new things to unearth. In 1871, James Clerk Maxwell warned against the prevailing idea that scientists in the future would have nothing to do beyond calculating known constants out to further decimal places. Maxwell was speaking in response to a growing sense in the scientific community that mankind had discovered everything it was going to discover. That sense received a major blow in 1895 when a relatively unknown German physicist stumbled upon something that would rock both the scientific world and the daily lives of millions.

Wilhelm Conrad Roentgen was the chair in physics at the University of Würzburg. In November of 1895, he was studying the properties of cathode rays, particularly their tendency to escape their tube and illuminate a fluorescent screen a few inches away. Having wrapped the tube in cardboard to cut down on excess light, he noticed a glow coming from a screen lying several feet away. The screen was coated in the fluorescent substance barium platinocyanide and was well beyond the reach of any known phenomena. When asked later what he had thought in that moment, Roentgen

replied, “I didn’t think, I investigated.”¹³ Further experiments seemed to show that some unknown ray was coming from the tube. For weeks he conducted experiments, reluctant to publish or even tell anyone about what he was working on for fear that he had made a mistake, that the mysterious new ray did not really exist.

He found that the rays could penetrate some opaque objects while leaving “shadows” of others, like lead, on a fluorescent screen. Eventually, like many scientists before and after him, Roentgen decided to experiment on himself. He held his hand in front of the cathode ray tube and created the first x-ray photograph of human bones. A few days later he took the famous x-ray of his wife’s hand, complete with wedding ring. Convinced he had discovered a new type of ray, Roentgen christened them “x-rays” to capture their mysterious nature. He decided that the time had come to tell the world about them.

The public response to x-rays was enormous. Newspaper reports spread, and soon “x-ray fever” was catching around the world. In 1896 alone, 49 books and 1,044 papers were published on the subject. Public lectures drew big crowds, and stores set up x-ray machines to attract customers. But enthusiasm was often mixed with mild fear and misunderstanding. There were even ads for x-ray-proof underwear.¹⁴ “I hear they’ll gaze/Through cloak and gown—and even stays/Those naughty, naughty Röntgen rays,” went one rhyme.¹⁵ X-rays offered a fundamental challenge to traditional ways of seeing

¹³ Quoted in Bettyann Holtzmann Kevles, *Naked to the Bone: Medical Imaging in the Twentieth Century* (New Brunswick, NJ: Rutgers University Press, 1997), 19. The account of Roentgen’s discovery comes mostly from Kevles, Chapter 1.

¹⁴ Kevles, 27

¹⁵ Diane Preston, *Before the Fallout: From Marie Curie to Hiroshima* (New York: Berkeley Books, 2005).

the world and the body. Suddenly people could peer inside the living body for the first time. Victorian ideals of privacy and modesty seemed to some to be under attack.

However, misgivings aside, x-rays were here to stay. Their application in medicine was immediately apparent as they were used to locate bullets and photograph broken bones.

As it turned out, the discovery of x-rays, though a major breakthrough, was only the beginning. Natural forces that were even more amazing and bewildering were still waiting offstage. The next scientist to find one was French physicist Henri Becquerel. Becquerel, like many of the scientists of the day, was fascinated but puzzled by x-rays. He wondered if there might be other sources besides the cathode ray tube. Becquerel came from a line of scientists, and he followed in his father's footsteps by studying fluorescence and phosphorescence. By wrapping glowing substances in black paper and placing them on photographic plates, he looked for one with the penetrating power of x-rays. None worked until he tried uranium. Uranium, made luminous by sunlight, left smudges on the plates. It seemed to give off rays like the ones discovered by Roentgen.

One day he wrapped some uranium up with a photographic plate but put it away in a drawer because the weather was too cloudy to supply the light needed to make substances fluoresce. A few days later he developed the plate anyway and found that it had been exposed, complete with the shadow of a metal cross he had placed between the uranium and the plate. The uranium had given off rays without having been exposed to light. Becquerel had been looking for x-rays, but he found something different: radioactivity, the first new property of matter to be discovered since Newton's time. Interestingly, there was little public reaction to Becquerel's discovery. X-ray fever

continued to rage, but radioactivity was little more than a blip in the public consciousness. There were no poems, no cartoons, scant attention of any kind outside of a small group of scientists. However, one who did take notice was Marie Curie. Her investigations into radioactivity would soon upset the established order like few discoveries before or since.

The story of Marie Curie has been told countless times. The romantic tale of the poor girl from Poland toiling to become a scientist in faraway Paris has been enshrined in everything from poetry to pop culture. Children's books hold up Curie as an example of what a person can achieve through hard work, while the Hollywood film *Madame Curie* highlights her working relationship with her husband, the French scientist Pierre Curie. As is the case with most well-told stories, the popular version is a mixture of fact and myth. However, no one can doubt the scientific and social impact of Curie's discoveries.

Curie was born Maria Skłodowska in 1867 in Poland, which was then a part of the Russian Empire. The Empire enforced Russian culture strictly in Poland, down to prohibiting the use of the Polish language in school. Many Poles chafed under Russian control, and several unsuccessful uprisings during the nineteenth century only served to further alienate Poles from the Russians. Curie's father dealt with these problems daily as an educator. He was particularly fond of science, a passion he would pass on to his youngest daughter. Life in the Curie home was highly regimented and even games were geared toward education.¹⁶ Marie's schooling consisted of a "double schedule": one composed of government-required subjects in case of inspection, the other of Polish

¹⁶ Susan Quinn, *Marie Curie: A Life* (New York: Simon & Schuster, 1995), 27.

language, history and culture.¹⁷ At fifteen, she finished “gymnasium” at the top of her class. Her formal schooling seemingly at an end, Marie worked to educate herself, becoming especially interested in the positivism of Auguste Comte, which stressed the importance of observable fact over abstract metaphysics. During this period of self-education, Marie decided that her true calling was in science. As a woman Marie was unable to pursue higher education in Poland, so she made an arrangement with her sister Bronia. Marie would work as a governess in Poland and give some of what she made to help her newly married sister through medical school. Then, Marie would join her sister and brother-in-law, and they would help her pay for university in France. Marie arrived in Paris in 1891 and enrolled at the Sorbonne.

It is in Paris that the romantic story of Marie slaving away toward her goal begins in earnest. Marie, after moving out of her sister’s home, took a small apartment in the Latin Quarter. She lived a Spartan existence there, piling all of her clothes on herself to stay warm at night and subsisting on little more than tea and bread. However, Curie biographer Rosalynd Pflaum points out that Marie could have remained in the comfort of her sister’s home. She chose to move into her own apartment for peace and quiet.¹⁸ Marie lived the life of a monomaniac, throwing herself entirely into her studies, even reading while she ate, when she remembered to eat at all.

Marie excelled in her studies at the Sorbonne. She placed first in her physics and math classes. By 1894 Marie was in search of laboratory space to study the magnetic properties of various steels. A mutual acquaintance introduced her to Pierre Curie, who

¹⁷ Quinn, 44.

¹⁸ Rosalynd Pflaum, *Grand Obsession: Madame Curie and Her World* (New York: Doubleday, 1989), 28.

would become her husband and scientific partner until his death. Their mutual love of science helped cement their relationship, and they married in 1895.

Meanwhile, Marie was looking for a topic for her doctoral thesis. She decided to turn her attention to Becquerel's rays, which continued to be overlooked by most scientists in favor of x-rays. Using an electrometer designed by Pierre and his brother, Marie measured the air around uranium. Radioactivity caused air to conduct electricity: the greater the conductivity, the greater the radioactivity. She believed that radioactivity was a property that originated within the atom itself, a revolutionary idea in its time. Many scientists, including her husband Pierre, believed that uranium could have the ability to capture some as yet unknown external form of energy. Such an idea fit better with the consensus among most scientists that the atom was indivisible and irreducible. However, discoveries by Curie and other scientists were beginning to weaken the notion of the atom's irreducibility. At around the same time, J.J. Thomson claimed that cathode rays were composed of subatomic particles he called "corpuscles," now known as electrons. Curie, pondering the oddity of uranium, wondered whether other elements had the same subatomic properties. She found that thorium, discovered years earlier, also gave off Becquerel rays. The search was on for more radioactive elements.

Curie, now working with the help of her husband, encountered strange results in some uranium ores. They seemed to be more radioactive than pure uranium. She wondered if this could be due to the presence of a new, unidentified element. Here, the romanticized story of Marie's work comes to the fore again. Books and movies depict tiny Marie stirring cauldrons of sludge for hours at a time to separate undesirable

substances out of the ore. The ore, donated by the Austrian government, arrived in Paris mixed with pine needles from the forest where it was extracted. The labor of boiling away tons of ore to leave the radioactive material behind was backbreaking, but eventually the evidence was overwhelming that there was another radioactive element present. They named it “polonium” after Marie’s home country. Soon after, they announced the existence of another even more highly radioactive element, radium. It took over three years for Marie to isolate a measurable quantity of pure radium chloride. In 1903, along with her husband and Henri Becquerel, Marie was awarded the Nobel Prize for Physics.

Yet Becquerel and the Curies also encountered an unanticipated side effect of their work with radioactivity. They discovered that, along with accolades, their work brought them serious physiological side effects. Perhaps the first story of radium’s effect on the body concerned a vial of the element that Becquerel carried in a vest pocket for several hours. He found that days later a painful sore emerged next to where he had carried this specimen. Soon the Curies began experiencing serious burn-like lesions on their hands. Pierre notably remarked that he “would not care to trust himself in a room with a kilo of pure radium, as it would burn all the skin off his body, destroy his eyesight, and probably kill him.”¹⁹ However, it was radium’s negative effects on the body that first alerted early experimenters to the possibilities that its rays could be harnessed for good.

¹⁹ William Hammer, “Radium and Other Radioactive Substances,” *Transactions of the American Institute of Electrical Engineers*. XX. No. 5. (1903): 567. William Hammer Collection (WJH), Series 2, Box 64, Folder 2: Pamphlets.

Before long its dangers were all but forgotten and its miracles were on front pages across America.

“Radiomania is the disease of the hour,” announced several American newspapers in the wake of the Curie’s achievement, and, indeed, mania was an appropriate word for the global response to radium.²⁰ Every day newspapers reported on its remarkable properties, which seemed to multiply at an exponential rate. In the flurry of information printed on the subject, it became very difficult to separate fact from fiction. Statements by mainstream scientists mingled with those of dilettantes, all of which were filtered through a press that was often of a distinctly yellow stripe. The San Francisco *Argonaut* described the process:

a minor hypothesis about radium, timidly advanced by a learned English physicist, is speedily transmuted into a full-fledged theory by the reporter to whom he communicates it, into a fact by the editorial commentators, enormously magnified by the journalist who cables it to America, used as a basis for a thousand speculations by the merely mildly wise American daily press, and, finally, exploited in a wild, extravagant, chaotic debacle of words and pictures by the Sunday ‘Magazine Supplements’ of the yellow journals.²¹

It was in these early days of Radiomania that durable fantasies about radium were born and nurtured. People became willing to believe just about anything about the element, which would eventually open the door for patent medicine companies to capitalize on the hopes and fears that surrounded radium and radioactivity.

²⁰ San Francisco *Argonaut*, 28 December 1903; St. Paul *Pioneer Press*, 3 January 1904. Unless otherwise noted, all newspapers cited are from scrapbooks of clippings devoted to radium in the William J. Hammer Collection (WJH), housed at the Smithsonian Institution.

²¹ *Argonaut*, 28 December 1903.

Every day, it seemed, articles appeared boasting some new unfathomable quality of radium. Scientists focused on some of the element's properties, unseen in any other known substances. It gave off its own heat and light, seemingly without reduction in its mass.²² It caused the air around it to conduct electricity. Most importantly, it seemed to be part of a chain of elements that spontaneously transmuted from one to another.

Radium is one of a chain of unstable radioactive elements that spontaneously evolve from uranium to non-radioactive lead. During this transformation a handful of isotopes are born, some with half-lives of millennia, others existing for only a fraction of a second. Radium's "rays" are actually composed of three discrete types of radiation. Alpha rays, the largest, are helium nuclei. Beta rays are electrons. Gamma rays are a form of electromagnetic radiation, on the high energy end of the spectrum that includes infra-red, visible light, and x rays. As part of its transmutation, radium also decays into radon, a radioactive gas. It took scientists years to understand the complex nature of radiation given off by radium as it slowly transforms from one element to another.

In looking for familiar points of reference for the unprecedented properties of radium, many commentators turned to the ancient art of alchemy. After all, radioactivity entailed the transformation of one element into another that alchemists had sought for centuries. When Frederick Soddy called thorium's spontaneous creation of helium "transmutation," his partner Ernest Rutherford declared, "For Mike's sake Soddy, don't call it transmutation. They'll have our heads as alchemists."²³ William Ramsay also admitted a connection with alchemy but warned that the similarities should not be taken

²² Years later, scientists would realize that radium did indeed lose mass as it gave off heat and light energy.

²³ Frederick Soddy, "Radioactivity and Atomic Theory," *Journal of Chemical Society* (1902), 840.

too seriously. Calling alchemy a “fraud and an error,” he assured the public that medieval alchemists had no knowledge of radium’s properties and that the changes seen in radioactive elements had nothing to do with turning base metals like lead into gold. Still, some in the press worried. “Puts gold in peril,” wrote one newspaper.²⁴

For better or worse, the press made much of the fact that radium had been discovered by a woman. Some described Marie Curie in saintly terms, “Our Lady of Radium.” To them, she represented a new type of woman, one who was capable of the same achievements men were. However, even as they praised her, many saw Curie’s work through the lens of the gender attitudes of the day. She was viewed as something of a Pandora, a woman who had tampered with things she did not understand and upset the proper balance of things in the process. “How like a woman,” wrote Israel Zangwill, the writer whose play, “The Melting Pot,” gave us that phrase. “The first time she comes into man’s world she upsets the apple-cart, and he must begin all over again.”²⁵

The press was also absorbed by the personal lives of the famed husband and wife team. Many seemed shocked that a woman could have played a pivotal role in a scientific endeavor and treated Marie as a person of secondary interest. A Pittsburgh *Dispatch* reporter who went to Paris to interview the Curies began his story with Pierre’s account of his long struggle as a student. Unlike the studious Marie, Pierre admitted to being “a verifiable duffer in school—the worst scholar that ever lived—according to [his] teachers.” Then, in the middle of the interview, “the door opened and Marie Curie, who was unaware of [the] correspondent’s presence,” entered with daughter Irene in tow. The

²⁴ New York *American* 28 November, 1903

²⁵ “Without Prejudice,” Israel Zangwill. *Reader’s Magazine*.

reporter described Curie as a “devoted housewife and mother...pretty and vivacious,” despite the fact that Marie was an active teacher and researcher like her husband. He also took at face value Marie’s modest insistence that she and Pierre were equal partners in the discovery of radium. The image was of a bashful woman, for whom science was a sideline, not the all-consuming obsession that it was in reality.²⁶

The enthusiasm and confusion of the public was understandable. In fewer than ten years, the discoveries of x-rays and radium had redefined how people understood the world around them. Coupled with a flurry of technological advances including electrification, automobiles, and airplanes, these breakthroughs created a climate of discovery in which anything seemed possible. “Isn’t this an age of marvels?” asked the fictional Miss Flutterly in *Leslie’s Magazine*. “I really don’t know what will be discovered next—do you? Really, it would take a strictly scientific person to tell, because just as you think it’s going to be an airship it turns out to be radium or something else just as wonderful.”²⁷

One person Americans turned to for answers was Thomas Edison. A famous inventor, tinkerer, and businessman, Edison was often one of the first people newspapers went to for responses and sound bites in the wake of scientific and technological advances. Though not a trained scientist, he would have been the public face of science for many Americans. Edison had been crucial to the popularization of electricity and x-rays in the United States. Like many scientists Edison tried to explain radium’s apparent ability to give off energy without measurable reduction to itself. Marie and others argued

²⁶ Reprinted in Albany *Argus*, 7 February 1904.

²⁷ Conneaut [Ohio] *Post-Herald*, 2 February 1904.

that the source of radium's energy was within the atom itself. Edison disagreed with that idea, which seemed to contradict the laws of nature. Edison put forward the idea that radium, rather than creating its own energy, had the ability to "reflect" energy from an unknown source, some sort of "ether vibration which is undoubtedly all pervading, but has yet been isolated or measured and which may have some extra planetary origin. To accept any other theory is to declare one's belief in perpetual motion, in getting something for nothing."²⁸

As for experimenting with radium, Edison was not interested, primarily because he could "see no commercial value in it." That Edison, ever the savvy business man, did not envision a potential for profit was understandable. His lab had conducted a number of experiments with x-rays, many under the supervision of his assistant Clarence Dally. Dally's exposure to high doses of x-rays eventually led to a series of amputations and eventually his death. When Radiomania seized Americans, Edison refused to have anything to do with it aside from offering warnings about its potential to cause "grave dangers."²⁹

Despite Edison's lack of excitement, public displays of the new element brought huge crowds both at home and abroad. When the New York Museum of Natural History displayed a small vial of powdered radium, policemen were needed to keep the throngs of people moving, and an attendant was hired to answer questions from the eager crowd.³⁰ Reactions to the display were mixed, and for some the high expectations created by the

²⁸ Paterson [NJ] *Press*, 17 November 1903.

²⁹ *New York World*, 25 August 1903.

³⁰ Undated clipping from the Minder [CT] *Morning Record*. WJH, Box 62, Folder 1.

media frenzy proved impossible to meet. “It looks like a small pinch of gray stuff in a glass vial. It is a marvelous power, of course, but as it lies in the carefully guarded case it does not look as if it had even a sneeze in it. It is the most disappointing thing that ever had itself announced to draw a crowd,” said one editorial. Still the high turnout showed that radium had real drawing power. Some tried to parlay public enthusiasm for radium for their own benefit. The Regal Shoe Company of Milwaukee, for example, announced that it would be showing radium in its shop window to attract customers.³¹ Radium’s scarcity and high cost would have made it unlikely that Regal had any actual radium, but the fact that a little bit of innocent-looking powder could draw a crowd demonstrates the extent to which the press had helped create a self-perpetuating hype machine around the element.

The press had fun with the outlandish claims being made for radium. Satirical articles and comics about it were common features in newspapers around the country. The Denver *Globe* featured a piece about a “Prof. Dreemer,” who declared that radium would transform ordinary rain into effervescent soda water. The professor, speaking “while interrupted in his x-ray bath,” stated that the work of weather forecasters would now be complicated by the fact that they would not only have to predict the rain but what type of “superior quality of mineral water” would fall that day, whether it would be Vichy or “pink circus pop.”³² That same week the Indianapolis *Journal* printed a short story called “Cooney Jessap’s Overdose of Radium,” in which the title character, a “swallower” of items from nails to kerosene, dreamed of joining the circus and meeting

³¹ Unknown Milwaukee newspaper, 22 February 1904.

³² Denver *Globe*, 18 February 1904.

girls but to no avail. Then, a professor came to Cooney's home town of Dozeville to give a lecture on radium. This Professor Puddlowitz wowed the crowd by explaining the deadly power of radium, that even the small amount he carried would be enough to kill many men. Cooney, seeing his chance for fame, swallowed the radium, becoming "a human electric lantern." He then attempted to use his new inner light to woo the girls of Dozeville, but when his kisses peeled the skin off of his would-be sweetheart's lips, he hopped on a boxcar for the city. Soon he was working in a dime museum, where he met his perfect mate, the Salamander Lady. The salamander was an important symbol in alchemy due to its apparent ability to survive fire. Thanks to her unique physiology, the Salamander Lady was not harmed by his radioactive kisses, and she and Cooney married and had two children. However, Cooney ended up alone in the end, earning the story its subtitle of "The Pathetic Love Affair of a Human Lantern."³³

Comic strips also lampooned the fanfare surrounding radium and radioactivity. Some poked fun at the high price of the element. Others focused on radium's amazing physical properties. "The Wonder of Radium—Practically Applied" depicted radium as a great energizer of body and mind. It showed a "tired messenger" whizzing away, powered by a radioactive gratuity. Several panels showcased radium as a mental stimulant. A young boy becomes a prodigy by holding radium up to his head, while an after-dinner speaker slays his audience with the same method. Even the mentally ill, according to one panel, could be cured with a little radioactivity (see Illustration 1.1). Images like these cannot be explained by any factor beyond the idea that everything was

³³ *Indianapolis Journal*, 21 February 1904.

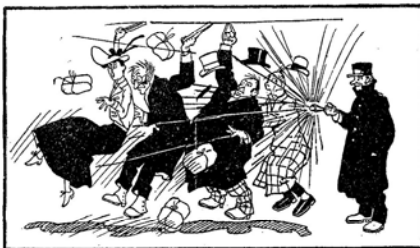
The WONDERS OF RADIUM
PRACTICALLY APPLIED
 BY ALBERT LEVERING



What a touch of it will accomplish with the tired messenger.



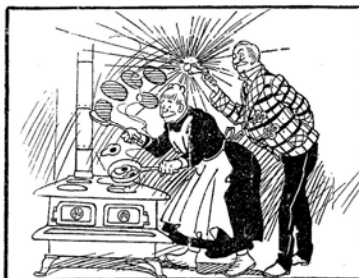
Your "young hopeful" will stand by you at the critical moment with a really bright remark.



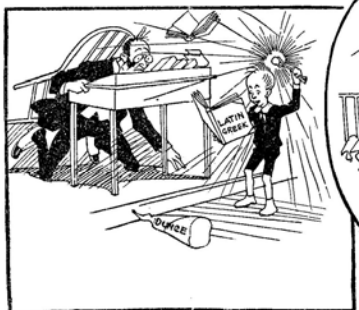
A boon for street-car conductors—"Move up forward!"



With the assistance of the waiter and a little radium the after-dinner speaker may become a success.



To accelerate cooking.



Its value in education will be incalculable.



An instant solution of the problems of the day.



And it will preserve a creditor forever.

Illustration 1.1. Comic strip. *Harper's Weekly*, 6 February 1904. William J. Hammer Collection, Smithsonian Institution

possible when it came to radium. As this stage no scientific work had been done on radium's ability to energize the body or the mind. The logic ran that people lacked energy, radium emitted energy, therefore radium's energy could be transmitted to people. The same logic, however faulty, would help foster a heyday for radioactive medicines promising vigor and vitality that peaked in the 1920's. Radium medicine could not have taken off the way it did if the press had not cleared the lane for it with every article, story, and comic it printed.

Newspapers even printed poems celebrating radium's magnificent power. "The Song of Radioactivity" celebrated the life and death of "atom's uranious/Or rarious, actinious or thorious." The poem, credited only to "W.R.," describes atoms shedding tears on the grave of John Dalton, founder of modern atomic theory, "on their path to celestial spheres." Another poem, "Radium" by John Hall Ingham, captured a similar sense of the element's supernatural aura. "The All-Master sealed a symbol of his might/Within a stone and to a woman's eye/Revealed the Wonder. Lo, infinity/..."³⁴

Politics too became charged with radioactive imagery. Theodore Roosevelt, often lauded for his seemingly boundless vigor, offered a particularly apt personification of radium's inexhaustible energy. The cover of a 1904 issue of *Just Fun* magazine showed a face resembling Uncle Sam peering into a test tube at a crouching Roosevelt. The image's caption read "Republican Radium."³⁵ Meanwhile, the Boston Sunday *Post* called Roosevelt "Human Radium." An illustration showed him riding a horse with a look of determination on his face. Lines radiating from his head and body list the

³⁴ John Ingham, "Radium." *Lippincott's Magazine* 73 (May 1904). WJH, Series 3, Box 63, Folder 2.

³⁵ *Just Fun* magazine II, No. 10. March 1904. WJH, Series 3, Box 59, Folder 2.

president's many talents, including "single sticks," wrestler, cow-puncher, societyman, yachtsman, author, police commissioner, horseman, and boxer. An accompanying poem, "The President," concluded

Whether to hunt the grizzly bear,
To ride the broncho's back,
Or tour the land from sea to sea
As swift as lightning's track;
In all he does with strength unflagged
He strikes amazement dumb—
A pillared flame by night and day,
This Man of Radium

The planets, science tells us,
May burn up any day;
The stars, too, shining in the skies
Are subject to decay,
But still, whatever happens,
We've cause to feel less glum,
He'll hold us together for a while,
This Man of Radium³⁶

The element also began to show up in fiction. One of the first entries into the field was a children's book, *The Radium Book* by William G. Rose. Rose's tale was deeply indebted to L. Frank Baum and Lewis Carroll. The book told the story of Dorothy, a young girl who, after becoming bored with her old books and toys, was transported to the magical land of Noo. Noo was lit by radium light, the only reference to radium in the book. In the topsy-turvy world of Noo, Dorothy encounters a host of wacky characters including the Judge, the Doctor, and the Puzzler. The Ace (in an echo of Carroll's Queen of Hearts) presided over the whole menagerie. While Rose's story

³⁶ Boston *Sunday Post*. 26 July 1903.

was essentially plagiarized from its predecessors, one thing set *The Radium Book* apart: it boasted illustrations that glowed in the dark thanks to radium.³⁷

One of the most common topics in the press was radium's high cost and great scarcity. Dozens of articles dubbed radium the most expensive substance in the world, its value dwarfing that of any precious metal. Comic strips, such as one called "Some Reflections on the Future of the Priceless New Metals, Uranium, Radium, and Polonium," showed an assortment of stereotypes, from top-hatted fat cats to Jewish moneylenders, marveling at radium's worth.³⁸ Another strip, "When Radium Puts Money Out of Business," reflected similar ideas. One panel shows a masked bank robber telling his partner, "Never mind de money and joolry, look for radium!" (See Illustration 1.2)³⁹ Radium's high cost was the result of its amazing properties and its great rarity. At this point the only supply of radium was the Curies themselves, who were still personally processing tons of ore to yield just a few grams of radium salts. The only known source of radium-bearing ore was in what is now the Czech Republic, where miners had already extracted most of the uranium, which was used for dying glass. The Curies got whatever was left over.

In response to radium's scarcity, American newspapers appealed to the individualist spirit of their readers, encouraging them to go out and find more. The *Baltimore American* wrote, "Radium May Be Everywhere—You Should Therefore Be On the Lookout For It." Other papers followed suit, and articles frequently appeared

³⁷ Theodore Gray, element collector and columnist for *Popular Science* obtained a copy of the book and found it to contain no radioactivity: <http://periodictable.com/Elements/088/index.html>. The glowing illustrations were presumably the result of some other phosphorescent material.

³⁸ Unlabeled clipping, WJH, Box 60, Folder 3.

³⁹ Unlabeled clipping, WJH, Box 62, Folder 1. See Illustration

[Connecticut]?” asked the *New York World*.⁴⁰ The *World* posited radium as the cause of a host of “curious things” that had happened recently in Connecticut, including bursting shells at an ordinance company and a mysterious illness in a school.

Americans who searched for lodes of radium in their backyards were likely to come up empty-handed. However, that did not stop scientists and lay people around the world from being on the lookout for the next radium. In the wake of the Curies’ announcement, a spate of “false” rays and radioactive elements appeared. The most well-known of the imitation rays was the N-ray of Henri Blondlot. Like the Curies, Blondlot was a respected French scientist. He hit upon N-rays (named after his home city of Nancy), which he described as a new energy that could be added to the rapidly growing list, while trying to detect the polarization of x-rays. In 1903 he began publishing his findings. N-rays, according to Blondlot, could render an electric spark or a flame more luminous. They could also be imparted to other objects, such as sheets of metal, and render them “active.”

It was not until Augustin Chapentier hooked up with Blondlot, however, that the more attention-grabbing aspects of N-rays started to come to light. Chapentier was a biophysics professor who had done work with the effects of electricity on the muscles and nerves of frogs. He successfully reproduced Blondlot’s experiments but also found that N-rays came from an unlikely source: living tissue. Chapentier hoped that someday N-rays could be used to improve on the image-making capabilities of x-rays. X-rays offered clear pictures of bones, but N-rays would provide images of the internal organs

⁴⁰ *New York World*, 22 November 1903.

themselves. The scientific community seemed on the verge of another breakthrough in medical imaging technology.

Yet Chapentier and Blondlot were not finished. The most remarkable announcements of all were yet to come. As the miraculous properties of N-rays seemed to multiply, as those of radium had before, the American press began to take notice. While in 1903 *Electrical World and Engineer* bemoaned the fact that “it would be hard to mention an important scientific discovery which has attracted less public attention than Blondlot’s beautiful researches on [N-rays],”⁴¹ the *New York Journal* was running illustrated articles on N-rays by the summer of 1904, thanks to the announcement that N-rays allowed one to “see the brain at work.” Blondlot and Chapentier had found that N-ray emanation from the body increased with thought. The parapsychological implications were obvious. Scientists had struggled in vain to find outward manifestations of human thought. A handful of photographers had even hoped to capture the presence of spiritual energy on film.⁴² Nothing had proven conclusive. Now, respected scientists, countrymen of the Curies, seemed to have found the evidence people were searching for. The *Journal* described the simple process by which the brain’s N-rays were detected. A piece of pasteboard the size of a playing card was coated with a phosphorescent material and applied to a man’s head in a darkened room. The man was instructed to talk as the pasteboard was moved until a certain location caused its luminosity to increase. Blondlot surmised that this must have been the brain’s speech

⁴¹ *Electrical World and Engineer*, 26 December 1903.

⁴² See Clément Chéroux et al., *The Perfect Medium: Photography and the Occult* (New Haven: Yale University Press, 2005).

center giving off increased N-rays while it was in action. The reporter noted that Blondlot's work could offer a scientific basis for Reichenbach's of the previous century. Perhaps Reichenbach's aura and odic forces were the manifestations of N-rays, not the "hallucinations" that many had suspected.⁴³

France was particularly susceptible to N-ray fever. Historian Walter Gratzer has argued that the French intellectual climate, in the wake of the Curies' finds, was uniquely receptive to the idea of a new French radiation with physiological effects.⁴⁴ Hundreds of articles on N-rays appeared, mostly in French journals.⁴⁵ However, not everyone was ready to crown Blondlot and Chapentier the heirs to the Curies' glory. Paul Langevin, a respected scientist who years later would have a scandalous affair with the widowed Marie Curie, failed to reproduce Blondlot's experiments. Lord Rayleigh, Lord Kelvin, and William Crookes also found N-rays elusive.⁴⁶ The jury was out on the legitimacy of N-rays, and the stage was set for a high-profile test that would settle the issue once and for all.

Nature magazine sent American physicist Robert W. Wood to France to investigate Blondlot's rays. In his report Wood admitted that he came into the project with a "doubting frame of mind." He left it feeling a far more emphatic "conviction that the few experimenters who have obtained positive results have been in some way deluded." Wood participated in five experiments, none of which convinced him of anything other than the non-existence of N-rays. N-ray science was dealt a severe blow

⁴³ New York *Journal*, 13 June 1904.

⁴⁴ W.B. Gratzer, *The Undergrowth of Science: Delusion, Deception and Human Frailty* (New York: Oxford University Press, 2000), 11.

⁴⁵ *Ibid*, 22.

⁴⁶ *Ibid*, 12.

upon the publication of Wood's *Nature* piece. Although some French scientists continued to believe in their reality, N-rays came up short in their bid to become the next great breakthrough in the science of rays and radiation.⁴⁷

Meanwhile in America, a homegrown Blondlot was making a similar discovery. Arthur W. Goodspeed, a professor of physics at the University of Pennsylvania, had discovered that human beings seemed to give off their own radiation. Like Roentgen, Goodspeed had stumbled upon this discovery while experimenting with a cathode ray tube. He found that photographic plates and fluorescent materials responded differently with his hand in front of them than when no body part was present. Goodspeed announced his discovery in a paper given at the American Philosophical Society, and his findings were met with immediate enthusiasm about the potential uses of such rays. Physico-radiographs of individuals would reveal the physical state of the subject, and even thoughts could potentially be photographed, although scientists largely frowned on this idea. The rays were also seen as a potential cause of hypnotism, hearkening back to the mysterious forces described by Mesmer and Reichenbach.

The question remained what the nature of these emanations was, if they indeed existed. Did humans give off the rays themselves, or did they act as a conduit for the rays coming from the Crookes tube? Either way, the implications of the interaction between invisible energy and the human body were potentially far-reaching.

The human body gives out the rays or waves of this energy with comparative freedom and force. It is to be presumed that the character of the human rays varies in an infinitesimal degree with the person, and that

⁴⁷ Malcolm Ashmore, "The Theatre of the Blind: Starring a Promethean Prankster, a Phoney Phenomenon, a Prism, a Pocket, and a Piece of Wood," *Social Studies of Science*, Vol. 23 (1993), 67-106.

each man, woman, and child gives forth not merely that characteristic human light, but a light that is absolutely unique and identifying.⁴⁸

Rays, as much as fingerprints or personality, could be used to define a person's identity and individuality.

Scientists did not meet Goodspeed's findings with universal enthusiasm. Within weeks reports came back that others were having difficulties reproducing Goodspeed's results. French scientists Gustave Le Bon and Colonel de Rochas obtained results similar to Goodspeed's using a glove filled with warm sand instead of a human hand. They attributed whatever effects were observable to the influence of mere heat. His "human light" soon went the way of N-rays.

Goodspeed was not the only American deceived by his desire to follow in the Curies' illustrious footsteps. A Montclair, NJ, man happened upon what would come to be called brillium quite by accident. The man had thrown ashes and dirt on the fire in his furnace to put it out, only to find a fire raging there moments later. He called Harold P. Brown, physicist, engineer, and inventor to investigate. Brown found that there was an unknown substance present that gave off tremendous amounts of energy, even managing to give energy back to fireless ash. "It all seemed like a miracle," declared a Washington *Post* reporter. Indeed, the article claimed that brillium, "a dynamic dirt," possessed the heat energy of radium, but that it could be found in great abundance. Coal would be a thing of the past, as factories were already employing brillium to great effect. Such claims were typical of a period in which anything seemed possible. That "brillium" is an

⁴⁸ Boston *Post*, 20 May 1903.

unknown substance today speaks to the ability of the turn-of-the-century press to run with an idea that promised to draw readers only to drop it when it did not pan out.⁴⁹

The flash-in-the-pan of brillium seems to have been an honest mistake, but not all discoverers of alleged new elements would be so scrupulous. In 1903 news came from Paris of a new element called “solium” that had properties even more spectacular than those of radium. The name of the new element played on the symbolic connection between radium and the sun that had been established early on in the press and would persist for decades. The first red flag concerning solium may have been the unwillingness of the discoverers to spare even an atom of the new substance for other researchers to examine. Dr. George F. Kunz, gem expert for Tiffany’s and radium experimenter, went to France to have a look at solium for himself. What he found confirmed his suspicion that the existence of solium had been a hoax all along. The perpetrators, when confronted, admitted that they had taken advantage of public enthusiasm for radium to “perpetrate a joke on the world at large.”⁵⁰

No one managed to find a new substance that could rival radium’s wonders. Fortunately for the press, radium supplied fodder for more than enough headlines. Many of the claims surrounding radium can seem overblown or outlandish to present-day readers. The sense that mankind had violated the boundary between known and unknown led to some impressive speculations. An article called “More About Radium” in the *Butte Inter Mountain* extrapolated well beyond the discovery at hand, declaring

⁴⁹ *Washington Post*, 4 October 1903.

⁵⁰ *New York Herald*, 27 December 1903.

The turning of night into day will be a marvelous achievement; but the leading to the production of gold out of base metals, the solving of the aurora borealis, the uncovering of the secret of electricity, the opening up of communication between planet and planet and determining how the world will ultimately be destroyed—these are achievements so vastly more marvelous than human reason, with the hand upon the curtain of this inmost cabinet of nature’s mysteries, trembles and almost fears to draw it aside and enter.⁵¹

As testaments to the power of radium piled up in the press, superlatives began to be overused to the point of platitude. Cleveland Moffett wrote a high-profile article for *McClure’s* called “Wonders of Radium” that helped solidify this pattern.⁵² Many newspapers followed suit. Moffett, who visited Paris to interview the Curies personally, said little that could not be found in countless newspaper reports. However, *McClure’s* considerable readership ensured that a common cluster of ideas about radium’s “wonders” would circulate through a large portion of the population and trickle down to even more. Soon smaller papers were printing articles called “Radium Wonders.” There were many variations, like the New York *Sun’s* “The Wonders and Dangers of Radium” or the Paterson [New Jersey] *Call’s* “Radium and its Many Wonders.”⁵³ The specifics of each discovery about the element’s properties became less important than the general notion that, when it came to radium, the public’s propensity for belief seemed unlimited.

For example, radium would change the way Americans ate. One expert recommended feeding radium to hens in order to boost egg production. A pleasant side effect of such a scheme was that the “radio-eggs” would have the capacity to boil themselves. The only problem was that the radioactive eggs might “scare the cook in the

⁵¹ Butte *Inter Mountain*, 23 September 1903.

⁵² Cleveland Moffett, “Wonders of Radium,” *McClure’s Magazine* XXII, No. 1 November 1903.

⁵³ New York *Sun*, 13 September 1903; Paterson *Call*, 19 November 1903.

dark” and might “burn the hands if she didn’t wear mittens.”⁵⁴ Others proposed radium as a food preservative. Cans and bottles would be washed with radioactive water in order to kill germs.⁵⁵

Even the federal government allegedly planned to investigate the possibility of radioactive food. The New York *Sun* announced that the Department of Agriculture planned to farm with radium as a fertilizer. Its experimental station, known around Washington as the “Garden of Freaks,” was to be transformed into “Radium Farm.” Government scientists had already found that the Garden of Freaks, built from soil from the Potomac, already contained trace amounts of radium, which they thought accounted for the overgrown “monstrosities” that grew there. Fantasies of “a field of corn like an undersized forest...watermelons as big as barrels, cucumbers as big as watermelons, peas the size of apples, and potatoes like bushel baskets” swirled. From there it was easy to hope that one day radium “might be used to stimulate all forms of life, to lengthen the span of human existence indefinitely, to make mankind a race of physical and mental giants, to banish disease and make unhappiness impossible, to bring about perpetual peace between the nations of the world.”⁵⁶

While radium was sure to transform life on Earth, some saw radium as a reflection of the heavens. The notion that radium was “liquid sunshine” was ubiquitous from the beginning and would continue to shape how Americans understood radium for decades. The term, whether used to discuss medicine, fertilizer or some other use of the

⁵⁴ New York *Commercial Advertiser*, 16 December 1903.

⁵⁵ New York *Herald*, 15 May 1904.

⁵⁶ New York *Sun*, 7 February 1904.

element, gave radium a cosmic significance. It was an otherworldly substance that could only have come from some astral source. Some wondered whether the sun itself drew its seemingly inexhaustible power from radioactivity, a plausible answer to a debate that had raged in scientific circles for decades. Articles appeared with titles like “Is the Sun Made of Radium?”⁵⁷

Radium’s seemingly otherworldly properties led many to look beyond the earthly realm for explanations and associations. Christians in particular latched onto the new element, seeing it as a manifestation of God’s creative powers. As scientists probed the invisible world of rays and energies, clarifying man’s notion of the world around him, religious commentators drew different conclusions. The discovery of radium offered insight into God’s creation, not a clockwork universe of lifeless matter and energy. An editorial in the *New York Observer* argued that “human mastery of the forces stored in the world has been carried to a degree which to a Cotton Mather or a Washington would have seemed sheer necromancy.” Modern science was beginning to take on the appearance of sorcery. The article continued

The Christian thinker, however, will never rest content with any conception of the world of nature, which makes it out to be a mere storehouse of blind, purposeless energies. To him the marvelous activities of the Marconi currents, of the x-rays, and of the rays emitted by radium, are forms in which the forethought of the great Creator is coming to clearer expression, as the minds of men who are made in the image of God, come more and more, with the devout Kepler, to think God’s thoughts after him.⁵⁸

⁵⁷ *Milwaukee Sentinel*, 15 November 1903.

⁵⁸ *New York Observer*, 3 September 1903.

Such sentiments were echoed in a piece from the Pointa Loma, California *New Century Oath* that posited radium as “one of the channels through which divine energy is rushing into the phenomenal world from a limitless fount.”⁵⁹

Radium did not only describe God; it described religious men and women as well. “Radium Christians,” according to one article, resembled the element. “How beautifully suggestive is this radium of the normal spiritual condition of the Christian,” wrote an editorialist for the *Boston Star*. Christians, like radium, radiated energy that seemed to come from a plane beyond the earthly one. Inexhaustible and ineffable, devotion to God seemed to many to be just as energizing and inspiring as Curie’s discovery.⁶⁰

Others, like Frenchman Gustave Le Bon, considered radium’s potential as a weapon. Le Bon was one of the greatest of the radium sensationalists, and his warnings mixed hope with fear. On one hand, radium could be used to explode the world’s arsenals remotely, putting an end to all wars. However, the same explosions had the potential to blow up the entire planet along with the weapons. Also possible were radioactive guns.⁶¹ The *Indianapolis Star* wrote that Marie Curie, considering Le Bon’s ideas, agreed that a radium weapon could be highly effective. “Its potentiality is wonderful, and I can even conceive a radium cannon projecting electric shocks great distances with deadly effect.”⁶² Whether or not Curie ever made such a claim, many readers must have been impressed.

⁵⁹ *New Century Oath*, 22 November 1903.

⁶⁰ *Boston Star*, 4 February 1904.

⁶¹ Salt Lake City *Herald*, 27 December 1903.

⁶² *Indianapolis Star*, 29 December 1903.

Some worried that these discoveries were coming too fast, and that the transformations they wrought would be too great. One satirical editorial in the *Commercial Advertiser* admitted that scientific discoveries were like sauerkraut: nice in small doses. Too much discovering would make people lose interest in future discoveries, and perhaps in everything altogether. “When instead of having sickness and trouble and war to make the world interesting and unhappy, life will be reduced simply to a sort of chemical formula where a good appetite for dinner will mean an irradiating pellet, and joy of living the symbol R2M.” Such a dystopian view of scientific advance was in the clear minority during the early twentieth century, but it reflected the real sense of disjointedness that accompanied the rapid pace of societal change. A Prof. Dedder, quoted in the piece, represented the extreme edge of this notion when he claimed, “We have reached a point where regulation to suppress discoveries in radium should be passed. All professors or scientists or ambitious gentlemen with long hair who will not stop discovering new things about this material should be imprisoned.” Learning too much about the world was taking all the fun and mystery out of it, or as “Prof. Yunion of the Miner’s Theatre” put it, “what’s the good of bein’ well, if you can’t be sick.”⁶³

In a sense radium acted as a sort of Rorschach test. People tended to see what they wanted to see. To some it was a gift from God, to others an overrated byproduct of a sensationalist media. While claims that radium would revolutionize virtually every aspect of American life circulated wildly in this period, perhaps the most lasting notion was that radium would have a profound effect on the human body. Dating back to

⁶³ New York *Commercial Advertiser*, 29 January 1904.

Mesmer and even beyond, the idea that invisible forces interacted with our bodies in important ways had long been current, if not always conscious. Due to radium's expense and rarity, its use as a medicine was still relatively limited. However, beyond its promise as a medical treatment, radium was coming to be seen as an embodiment of life itself, a profound substance that held deep secrets about life.

Reports on radium's impact on the body often blended scientific discovery and media sensationalism. Like a game of telephone, scientists' original messages often ended up distorted beyond recognition by the time they reached the public. For example, one scientist found that larvae, when exposed to radium, failed to develop through their normal stages to become moths. The causes and consequences of this phenomenon were incompletely understood, and one could have drawn any number of conclusions about its meaning. One easily could have deemed radium a substance inimical to the development of life. Most press reports, however, took the opposite stance. "Old Age May Be Stayed By Radium," declared the Salt Lake City *Telegram*, echoing many other stories on radium's retarding effect on larva growth. Though the experiments involved no human beings and included no investigation of old age, reporters knew that the public would latch on to the idea that radium could prevent one of the fundamental, profound truths of human life, aging. "What may be the result of the scientific application of this mysterious power when man comes to understand it better is beyond the most active imagination to conceive. Old age and its changes may be unknown by then." While the

ramifications of radium's discovery were indeed difficult to foresee, such a pronouncement was a long way from a group of undeveloped insect larvae.⁶⁴

Another headline that was widely printed at the time and frequently mentioned by historians ever since was "Secret of Sex Found in Radium." Appearing in the *New York Evening Journal* and elsewhere, the ideas of Russian scientist Prince Tarkhanov were perfect fodder for America's yellower newspapers. In addition to his theories on radium and sex, Tarkhanov also discussed radium's potential in war and claimed that the element would help prevent rabies in dogs. The headline, usually mentioned without comment as an example of the wild enthusiasm surrounding radium, could have various meanings if taken out of context. While Tarkhanov believed that radium could help predetermine the gender of a child, one could also interpret the headline as a declaration about sexual intercourse. Such a reading might have helped fuel the idea that radium was an aphrodisiac, a notion that patent medicine companies would begin exploiting on a huge scale by the 1920's.⁶⁵

Perhaps the story that most raised public expectations of radium as sort of condensed life source came out of Cambridge University in England. There, J. Butler Burke was conducting laboratory experiments with radium. Burke placed the element, encased in a small glass tube, in a medium of bouillon (extracted from meat), salt, pepsin diluted in water, and gelatin. Then, he broke the tube, putting the radium in contact with the medium. After a few days, Burke observed a "culture resembling bacterial growth" in the tube. At the two week mark, Burke examined the culture under a microscope and

⁶⁴ Salt Lake City *Telegram*, 6 November 1903.

⁶⁵ New York *Evening Journal*, 28 January 1904.

found small bodies of various sizes, the largest showing distinct nuclei and eventually subdividing spontaneously. Burke concluded that he had discovered a new form of life, christening the creatures “radiobes.”

Burke extrapolated from his findings, wondering if perhaps “all bodies are radioactive, more or less,” even the Earth itself. Though Burke showed a scientist’s reticence about bold conclusions that could be drawn from his work, he did posit the possibility that radioactivity had provided the initial spark of life eons ago. The press ran with the idea, printing numerous stories, with varying degrees of hyperbole. The *New York Journal* published an in-depth account of Burke’s work under the headline “Burke Tells How He Made Life Awake in Radium Test.” Though the headline was enthusiastically positive, the *Journal* did mention the fact that many scientists were dubious of Burke’s claims, quoting “electro-therapist” Dr. Sinclair K. Boyle as calling Burke’s announcement “frenzied therapeutics.” Boyle and others tended to assume that Burke’s “radiobes” were merely bacteria that had been in the culture from the beginning. However, in spite of the skepticism, the overall impression of the article was largely accepting. In addition to the headline, a box set off near the top of the article read, “What Burke’s Discovery does...It opens the way for unending discussion among theologians [sic], higher critics, and scientists.” To any casual reader, the apparent profundity of Burke’s work would have been difficult to miss.⁶⁶

William Hammer, engineer and early radium enthusiast, offered Burke high profile support in the press. Other papers, including the *Herald* and the *Evening World*,

⁶⁶ *New York Journal*, 21 June 1905.

reprinted Hammer's thoughts on radiobes and the climate of discovery surrounding radium. "I am ready to believe almost any claim that may be made for radium by a respectable authority," he said. "My own investigations have convinced me that we are only just beginning to realize its wonderful qualities. Men of eminence in the scientific world who were at the outset incredulous of the claims made for radium have been converted and are now firm in their belief in its wonderful possibilities." Hammer here summed up what many Americans must have thought about radium. With new revelations about the element coming at an astonishing clip, it became easy to believe virtually anything about it. Only those who "[sought] the impossible" would fail to have their expectations met. Yet, with the miracles piling up, Burke's work was qualitatively different from what had come before because Burke had managed to create life itself. Others had found radium to have promise as a fertilizer, not as a creator.⁶⁷ Burke's findings helped fuel an idea that radium was fundamentally different from any other substance known to mankind. Many substances existed that could help or hinder life, but nothing seemed as inextricable from the force of life itself as radium.

The reaction to Burke's work calls attention to the fact that for all the fascination with radium's miraculous abstract powers, it would ultimately be the element's effect on the body that people cared about most. Scientists already knew that radium mixed the tendency to destroy with the capability to heal. These two seemingly contradictory properties would continue to define radium in the American imagination for the next fifty

⁶⁷ New York *Herald*, 21 June 1905.

years. As Marie Curie herself put it, “It is quite difficult to predict the future of radium, but I believe its great field will be the domain of medicine.”⁶⁸

⁶⁸ *New York World*, 27 December 1903.

Chapter Two: Early Radium Medicine in the Popular Press

In 1903 journalist Cleveland Moffett traveled to France to get to the bottom of the furor over radium. He planned to spend several weeks learning about the element, interviewing the Curies and their staff, and watching them work. The result was two articles that helped encapsulate the craze for radium that had seized the American press and the public it served. The articles, though written by the same reporter, based on the same trip to France, were quite different in content and tenor. Taken together they show just how confused radium had left America's fourth estate. Beginning around 1903, thousands of articles on radium appeared in the nation's newspapers and magazines. They exhausted every possible facet of the element's behavior as well as every metaphor that might capture its marvels. The images they introduced to their readership continued to drive radium in the American imagination for the next fifty years.

Moffett's first article, published in *McClure's* in November of 1903, was entitled, "The Wonders of Radium." Despite this eye-catching title, the article was more than just a hagiography of radium. His report captured both the excitement surrounding the element and the limitations inherent in it. The world's enthusiasm was made all the more impressive considering, as Pierre Curie told Moffett, the total supply of the element could be held in a tablespoon. Moffett presented many of the standard attributes of radium, including its seemingly ceaseless ability to produce light and heat and its tendency both to help and to harm the body. In light of the painful forearm burns Pierre Curie had shown him, Moffett reported with caution that radium seemed to have a uniquely stimulating effect on the optic nerve and that a Dr. Danlos had achieved several cures of

lupus at the St. Louis Hospital in Paris. More excitingly, a scientist at the Sorbonne had produced “monster” tadpoles and even caused the growth of unfertilized eggs, seemingly creating new life. Clearly, as Moffett wrote, radium seemed to show that mankind was “entering upon a domain of new, strange knowledge and drawing near to some of nature’s most hallowed secrets.”¹ Though Moffett’s reporting was more responsible than much of what appeared in the newspaper, the *McClure’s* article still pointed to the profound implications of what could be done with radium.

Five months later Moffett wrote another article, this time for *Success* magazine. By now, Moffett had come to bemoan the inaccuracies of radium reporting. People were too swept up in its glow to pay attention to the reality of the situation. The press did not bother to investigate or fact-check before publication. Moffett complained of “inaccuracies and exaggerations” in the press caused by “widespread credulity...as to any kind of miracles” and “a tendency which is quite American to confuse what may be with what is.” Moffett urged caution in believing every story about radium as a surefire cure for cancer and tuberculosis. He warned readers that radium was in danger of following in the footsteps of other bygone wonders that had failed to make good on the unreasonable promises that the press had made for them. Reporters, Moffett argued, were not solely to blame. “No doubt newspapers are partly responsible for this, yet we are responsible for the newspapers.”²

The American press reported the discovery of radium with great fanfare. Radium emerged in the American consciousness at a time when new scientific discoveries seemed

¹ Cleveland Moffett, “The Wonders of Radium,” *McClure’s* XXII, No. 1 (November 1903).

² Cleveland Moffett, “The Sense and the Nonsense about Radium,” *Success*. VII, No. 119 (April 1904).

to arrive every day. Electricity was illuminating a growing number of streets and homes. X-rays offered the ability to peer inside the living body. Automobiles and airplanes promised to transform the way people moved from place to place. Yet radium captured imaginations in a unique way. Here was a substance that seemed capable of anything. It threatened to overturn the immutable laws of physics and to realize the ancient alchemical quest for transmutation of the elements. The radioactive energy of radium helped scientists attack fundamental questions about the universe including the age of the Earth and the source of the Sun's energy.

Still, the aspect of radium that caused the most excitement was its potential as a medicine. Americans read articles boasting that radium would cure everything from cancer to wife-beating. Newspapers, which were available to the masses more cheaply and readily than ever before, reported any information on radium they could get their hands on. Articles appeared every day declaring the wondrous properties of the exotic new element. The images surrounding radium during this early period established a handful of tropes that would continue to define how radium was understood for the next fifty years. Radium medicine became the domain of orthodox practitioners, dangerous frauds, and many others in between. Yet all purveyors of radium treatment were linked by the powerful and persistent images of radium that were born in the first decade of the twentieth century.

The discovery of radium's physiological effects was mostly an accident. Becquerel and others concluded that if radium could cause injury, perhaps it also could have benefits. Some scientific breakthroughs are heralded as medical marvels only to

have dangerous effects discovered too late. Radium's trajectory was the opposite. It was dangerous first, then beneficial. This tension between radium as a healer and as a destroyer would remain at the heart of the story. Experimenters in Europe and the United States found that the same substance that could cure cancer could cause it. The same rays that could save lives could end them.

The early period of radium medicine, as reported in the press after the turn of the 20th century, was characterized by an empirical, trial-and-error approach. Scientists who were able to get their hands on the rare and costly substance aimed its rays at just about any disease without a known cure. There was no philosophy to work from, so it was difficult to predict what might or might not work. An aura of murkiness developed around exactly what radium was capable of. Early newspaper stories illuminated not only specific medical knowledge about radium but also the broader fantasies Americans had about sickness, health, and the power of radioactivity.

Not surprisingly, radium elicited every conceivable reaction. It took a few years for radium to make it from Europe's scientific community to the front pages of American newspapers. By the time it did, radium had already been linked to fantasies about alchemy and the philosopher's stone thanks to Frederick Soddy's characterization of radioactive decay as a form of transmutation. Though scientists could not control the evolution of one element into another, the name stuck. People hoped that the discovery of radioactivity would allow the manipulation of matter at its most fundamental level. Included in these fantasies was the hope that radium would prove to be the panacea long

sought by medieval alchemists. The facts and fictions surrounding it revealed both what it was and what Americans wanted it to be.

The first radium appeared in the United States around 1900, with the supply of American radium concentrated in the hands of a small group of experimenters. Many of the associations that would continue to stick to radium for the next half-century were introduced to the American public in articles describing the work of just one man: William J. Morton. Morton was the son of William Thomas Green Morton, the dentist who first demonstrated anesthesia in 1846 at Massachusetts General Hospital. A professor of “electro-therapeutics and diseases of the mind” at the New York Post Graduate Medical School and Hospital, the younger William was a respected physician in his own right, and among the first high-profile specialists in medical radium. Many Americans would have read about him in articles describing the annual meeting of the MIT Technology Club of New York in 1903. The New York *Herald* and New York *American* reported on the meeting alongside illustrations of the luminous dancing skeletons that had entertained the meeting’s guests. Morton showed, however, that radium was more than a curiosity, and his work established a handful of persistent symbolic tropes.

The first was the notion of radium as “liquid sunshine. Morton proposed that disease could be cured by having a patient imbibe a fluorescent substance, which would then be illuminated by radium rays trained on the patient’s body. Quinine, for instance, when exposed to radium rays, glowed blue. The *American* declared that the artificial “sunlight” created by Morton’s methods would have the same health benefits as summer

sunshine. The *Herald* described a more indirect aid to good health that radium would engender: it would allow men to play golf all night thanks to glow-in-the-dark golf balls.³ Some, like a reporter for the New York *Commercial Advertiser*, were even more enthusiastic, “For, behold! Liquid Sunshine has been discovered, and will be presently on tap for the multitude—solving or simplifying almost all the problems of life.”⁴

Others were quick to imitate both Morton’s methods and his terminology, which Morton had taken from a poet friend. Dr. Gustav Gehring of Philadelphia offered a more fleshed-out origin story linking radioactivity and the sun.

Scientists assert that millions of years ago, when the earth was in a gaseous or molten state, certain mineral matters absorbed the intense actinic rays of the sun, and when these matters cooled in the course of time still held their actinic rays locked up. These matters were iron, lead, chalk, silica, oils, salts, mineral waters, pitch blende [sic], and uranium. Or course, these minerals must be eliminated for they exist in combination with radium.⁵

In other words, there was radioactivity lurking inside many common substances, and it only remained for scientists to unlock the energy within. There were clear echoes of the alchemical desire to transmute base metals into higher ones. The imaginative link between radium and the sun would live on well after the specifics of Morton’s radium treatment had receded into the forgotten past.

Morton’s work, and his conflation of radioactivity and solar energy, helped define radium as simultaneously a natural substance and a product of modern science. Radium did, after all, come straight from the earth, and commentators understandably linked it to

³ New York *American*, 6 February 1904; New York *Herald*, 6 February 1904. Unless otherwise noted, all newspapers are from William J. Hammer Collection (WJH), Smithsonian Institution.

⁴ New York *Commercial Advertiser*, 14 January 1904.

⁵ Philadelphia *Inquirer*, 5 February 1904.

other currents in natural medicine. Many radium investigators had noticed similarities between the health value of the new element and those of ancient mineral waters. Morton proposed that the ether vibrations of radium were potentially similar to the ether vibrations of the violet and ultraviolet light of the sun, and that those who had drunk at the mineral springs had been consuming his liquid sunshine all along. Though it was discovered by physicists in a laboratory, radium remained a natural cure, one that existed in the ground beneath our feet. According to Morton, radium treatment merely did what nature was supposed to do anyway. “It was meant that the blood should have sunlight, and my method follows the law of nature. It was meant that you should have sunlight inside you.”⁶ In an article called “Nature’s Panacea” in the *Chicago Inter-Ocean*, a journalist explained, “Since the days of Acteon, who received new strength every time he touched Mother Earth, the healing powers of the soil and the various minerals and liquids which come from the earth’s interior have been recognized... Radium may be said to be the only substance in nature which cures at a distance.”⁷ Nevertheless, not everyone agreed with the idea that “liquid sunshine” was so natural. One editorial pointed out that “[s]o far there is no evidence that nature has needed illumination...[s]he might perhaps resent the intrusion.”⁸ Whether or not nature intended for man’s insides to be lit by the sun, Morton’s stress of the natural aspect of radium established an image that would remain in place throughout the era of radium medicine.

⁶ New York *World*, 15 January 1904.

⁷ Chicago *Inter-Ocean*, 22 February 1904.

⁸ New York *Herald*, 15 January 1904.

The second crucial theme that stories about Morton helped popularize was the notion that radium could cure cancer and other diseases. At the Technology Club, he announced that so far he had cured three cancer cases, with two more already under way. He also reported positive results in cases of malaria and other bacterial diseases.⁹ When told by a dermatologist friend that ten thousand skin disease cases had been treated without cure, Morton argued that every one could have been cured by radium or X-rays.¹⁰ One editorial discussed Morton's claim that tuberculosis too was treatable through his novel techniques, stressing the growing tendency among some doctors to look for purely physical treatments for diseases. "There is less interest now in the studies of the bacteriologist," the reporter argued, asserting that external forces like electricity, x rays, and radium were already taking his place.¹¹ Such an assertion is impressive when one considers the fact that the germ theory of disease had been the great breakthrough of medical science in the second half of the nineteenth century. Radium was so wholly new that it threatened to tear down the gains of the previous century and replace them with a philosophy of treatment rooted in the manipulation of physical forces, not living microbes.

Morton also helped introduce the popular idea that radium had a stimulating effect on the body, another central theme. "Both radium and the X-rays, so far as their curative qualities are concerned, are precisely what a kick is to a lazy man. They act as a stimulus. By reaction they stir sluggish nature to recuperative work, to the work of

⁹ New York *Herald*, 14 January 1904.

¹⁰ Unknown newspaper clipping, WJH.

¹¹ Brooklyn *Times* 14 January 1904.

making new and normal tissues.”¹² That radium would energize the body was easy to imagine since one of the properties that made the element so shocking was its ability to give off enormous amounts of energy for its size, dwarfing the output of traditional sources like coal. Exactly how the power of radium would be conveyed to the body remained unanswered. Readers were left to connect the dots for themselves, as they would be decades later when patent medicines made virtually identical claims of invigoration.

It was not all wild excitement when it came to radium medicine. Many doctors were reluctant to accept the bold claims being made for this new element. A Brooklyn physician acknowledged the definite value of radium in some cases, but regarding Morton was rather sober, saying, “It is an interesting theory and until we have more definite data given us it will be of chief interest to practitioners merely as a theory.”¹³ A New York *Herald* editorial cautioned that the claims being made for radium were “very much exaggerated.”¹⁴

Morton claimed to be bashful about the amount of attention his “liquid sunshine” received in the press. “All this notoriety is very unpleasant...the papers are displaying me on their front pages as a curer of cancer by the use of radium. I don’t want to be known as a cancer doctor. I am no quack, and have no special interest in cancer. This limelight which is now being thrown on me does not appeal to me in the least.” That said, Morton did not appear shy about talking to the press or having his picture taken.

¹² New York *American*, 15 January 1904.

¹³ Brooklyn *Eagle*, 14 January 1904.

¹⁴ New York *Herald*, undated clipping, WJH.

Regardless, the fact that the press latched on to the cancer cure aspect of his story is not surprising. Whenever an innovation in medicine arrived, cancer was naturally one of its primary targets. Cancer's mysterious onset, intractability, and deadliness combined to make it a "dread disease" and the focus of a great deal of medical effort. When news of a potential cancer cure appears in any form, the press tends to make much of it, and, as in the case of Morton, not always with due caution.

The press struggled to find analogs for radium. Its closest scientific relative was x-rays, which experienced a comparable vogue only a few years early. However, radium and x-rays had important differences. The craze for x-rays was driven in part by the fact that they were so easy to produce; anyone with a cathode ray tube could do so. Radium, by contrast, was rare and expensive. In the first years of the century, there was no successful large-scale commercial radium production for medical or industrial purposes. The radium that was available came from the Curies themselves, and American experimenters were fortunate to get their hands on just a few grains of radium salts. By weight it was thousands of times more valuable than gold. If a doctor in a given city were able to obtain any amount of the exciting new element, it was sure to make it into the newspaper.

Because radium and x-ray were linked both physically and in people's minds, they were often used together in treatment. Morton himself used x-rays in conjunction with his radium treatments, and had achieved an early version of his "liquid sunshine" treatment with x-rays before he had obtained any radium.

Tellingly, Morton did not use the term “liquid sunshine” until he began employing radium. X-rays, though exciting and powerful, did not carry the same associations. X-rays lacked the mystery of radium and did not seem to inspire metaphorical description in the same way. The Trenton *True American* reported that Morton had been beaming x-rays at patients who had swallowed his quinine mixture. Morton claimed that this method had been more beneficial in cancer cases than x-rays alone, thanks to the action of violet rays.¹⁵ Here x-rays were linked to a previous vogue in medicine, Niels Finsen’s ultraviolet or cold light, for which he had won a Nobel prize for his treatments of lupus. When radium came along, Morton was quick to employ it, and “liquid sunshine” was born. In Morton’s work one can see the progressive links between ultraviolet light, x-rays, and radium discussed in the previous chapter.

The relative merits of each type of ray were debated in the medical literature and in the press. The x-ray, the great revealer, offered better images of the interior of the body. Radium proved more versatile and controllable as a therapy. More importantly, there seemed to be a difference in the way in which people imagined radium. Though x-rays and the gamma rays of radium were similar, people reacted very differently to them. X-rays, though they could illuminate fluorescent substances in the body, were never linked to the power of the sun in the way radium was. Presumably this has something to do with the notion that radium seemed to give something for nothing in terms of energy. The

¹⁵ Trenton *True American*, July 18, 1903.

energy in x-rays could only be obtained by putting electricity into a cathode ray tube. The source of the energy was clear. Radium, on the other hand, gave out its rays without input from the outside. The sun was similar. It burned, seemingly eternally, some unknown fuel that was mysterious and apparently inexhaustible.

When x-rays proved insufficient to capture the wonders of radium, journalists were left grasping for ways to explain it to the public. It begged for metaphors and literary illusions. One journalist wrote, “Far famed Aladdin’s lamp was not more wonderful than the simple little glass vial of radium salts with which the physicians of the future will go forth to make his rounds among the sick and suffering.” Aladdin’s lamp was in many ways a fitting image of radium’s promise. It was a small, innocent-looking thing that contained more than met the eye; it was bigger and more impressive on the inside than it looked from the outside. The genie’s lamp also conjured up images of magic and the ability to grant any imaginable wish that echoed the hyperbolic reports on radium that Americans read in the press. Radium, like a magical genie, seemed capable of anything.¹⁶

Another article connected radium to the achievements of Swift’s Laputans. When Gulliver visited the Laputan’s Academy of Sciences,

he found an inventor absorbed in a process of extracting sunbeams from cucumbers, with a view toward bottling them in summer for use in the winter. The scheme seemed ridiculous to the sailor’s unimaginative mind, but it was clearly based on sound principles, although the projector may have gone a little astray in the details.

¹⁶ New York *American*, 15 January 1904.

It is a testament to the baffling nature of radium that the best analog the reporter could come up with was the extraction of sunbeams from vegetables by inhabitants of a flying island described in a two hundred year old satire.¹⁷

Though Morton's work probably received the most attention in the press, a handful of other physicians also made headlines with their radium work. Radium, still expensive and scarce, did trickle into the United States, and more and more doctors were able to get their hands on small but useful amounts. Another high profile experimenter in New York was Dr. Samuel G. Tracy, a physician at the New York Skin and Cancer Hospital. His method shared similarities with Morton's, but did not have the poetic appeal of "liquid sunshine." Tracy employed a saline solution impregnated with radium in the treatment of a host of illnesses. His work provided some of the first steps toward defining the therapeutic parameters of radium medicine. One of his focuses was the eradication of germ diseases. He believed radium had the potential to revolutionize the treatment of tuberculosis, diphtheria, typhoid, malaria, and scarlet fever. "Radio-Activity is His New Panacea," declared one newspaper.¹⁸ The same article was reprinted in a St. Louis paper, showing that radium medicine was not merely a local curiosity.¹⁹

Tracy got the idea of imparting radioactivity to a liquid solution from a statement of Pierre Curie's. Curie claimed that he was sometimes unable to go

¹⁷ New York *Evening World*, 15 January 1904.

¹⁸ New York *Herald*, 9 January 1904.

¹⁹ St. Louis *Republic*. 9 January 1904.

near his sensitive measuring equipment for hours after handling radium because his clothes had been contaminated by radioactivity. The potential medical benefits of induced radioactivity jumped out at Tracy, and he found that a simple salt solution was an excellent medium. He simply suspended two tubes of radium in the saline solution for twenty-four hours and found that radioactivity was still present when he removed the radium. The radioactivity in the solution was sufficient to expose a photographic plate in twenty-four hours.

In addition to his work as a physician, Tracy was an important early popularizer of radium medicine, writing both for the popular press and the medical establishment. Articles such as “Some Wonders of Radium” in New York’s *Christian Herald* betrayed his enthusiasm for the subject. He combined a brief history of radioactive elements and their marvelous effects on the body but admitted that the rays also had the power to destroy. If the dangers could be minimized and radioactivity harnessed for good, Tracy argued, radium would revolutionize the treatment of everything from cancer to blindness. The article, published in late December 1903, may well have been the first detailed account of radium that some read.²⁰ Through Tracy’s concise summary, much of the future history of radium medicine could already be found. Here was a powerful substance, the product both of nature and modern science, that had properties never heretofore witnessed. It had the power both to heal and destroy, but it was scarce and enormously expensive. “Radium is almost as rare in pitchblende, as

²⁰ New York *Christian Herald*. 30 December 1903.

gold is in sea-water,” wrote Tracy, in an analogy that still defies imagination.

Readers must have wondered, “how could anything so tiny be so powerful?”

One early experimenter took issue with Tracy’s announcement of his work with radium. William Hammer, a former Edison employee now working independently as an electrical engineer in New York, declared that he had been the first American to experiment with the medical uses of radioactive solutions. Hammer claimed that he had shown a number of scientists, including Tracy, his experiments but was reluctant to make his work public before his results were sufficiently convincing. Tracy, argued Hammer, had taken his idea and presented it to the public as his own. Tracy denied Hammer’s charges, retorting that Hammer had not originated his methods either, that they had already been used by several European doctors.²¹

Hammer had sharp elbows when it came to protecting his primacy as the discoverer of radium treatments. Tracy was not his only target. In a scrapbook of clippings related to radium, an article about Morton’s liquid sunshine is captioned by a handwritten note reading “more stolen thunder...?” Hammer also carried on a correspondence with his lawyer about the supposed theft of his ideas by George Kunz. Kunz was a gem expert for Tiffany’s who managed to position himself as an expert on radium during this period. Kunz had patented several radium solutions that Hammer believed he had created first.²² Kunz explained, rather weakly, that he ground his radium

²¹ New York *Herald*, 10 January 1904.

²² Hammer to W.S. Andrews, September 20, 1905. WJH, Series 1, Box 3, Folder 4.

mixture more finely.²³ Eventually, presumably much to his chagrin, Hammer let the matter rest.

He had indeed been among the first Americans to obtain a sample of radium. In fact some have argued that Hammer was the first American to do so.²⁴ He obtained his from Pierre Curie himself during a trip to Paris in October 1902, and it was probably Curie who told Hammer that radioactivity could be imparted to other substances. Hammer devised three methods of treating disease with radium. He developed radioactive solutions by submerging tubes of radium in water. He also produced pills, liquids, and other ingestible medicines. Finally, he devised a system of cataphoresis, in which electric currents would push radioactivity through the system to the blood and tissues.²⁵ All of Hammer's treatments would serve as models for the purportedly radioactive patent medicines that began to appear soon after and boomed through the 1920's.

Though Hammer's lab work with radium brought him some attention, it was as a popularizer that he made his name. Hammer introduced thousands of Americans to the wonders of radium through a series of well-attended public lectures. A Pittsburgh *Times* article called his lecture "the most notable...of the season for the Academy of Art" and said it packed Pittsburgh's Carnegie Hall "from pit to dome."²⁶ Hammer was also the

²³ Thomas J. Johnston to Hammer, July 25, 1907. WJH, Series 1, Box 3, Folder 4.

²⁴ Luis Campos, "The Birth of Living Radium," *Representations* 97 (Winter 2007), 12. The issue of which American brought radium to the United States first is debatable. Lawrence Badash, in *Radioactivity in America: Growth and Decay of a Science* (Baltimore: Johns Hopkins University Press, 1979) claims that George Barker exhibited radium in Philadelphia in late 1899, but admits that the origins of Barker's radium is unknown, 12.

²⁵ New York *Herald*, 15 January 1904.

²⁶ Pittsburgh *Times*, 23 October 1903.

first American to publish a book on radium, *Radium and other Radioactive Substances* (1903). Although he was not a trained physicist, he was a well-respected engineer who did his homework when it came to radium. For some he would have been the public face for radium, and he was often quoted on the subject. When asked about an ailing Kaiser Wilhelm II, Hammer replied, “If I were the Kaiser’s physician, I would gargle his throat with radium.”²⁷

Hammer was so linked to radium in the press that a photograph used by several newspapers showed him with rays emanating out from his head. An article he wrote for *The World Magazine* both summed up his work with radium and demonstrated the context of scientific flux in which radium was discovered. “Heat (Radium), Light (Violet Rays), and Cold (Liquid Air) Now Being Used to Check the Increasing Ravages of Cancer,” the headline declared. The article offers a useful summary of what was going on in scientific and medical research at the time. New scientific weapons against disease seemed to be appearing all the time, and many hoped illnesses that had long plagued humanity would finally be cured. As was often the case, cancer and tuberculosis received the most attention. They were “the two great ogres whom the healers of the world are struggling against in vain.” But there was hope: “Of the two, cancer is just now receiving the more attention, because, first, it is gaining more rapidly; and, second, it shows signs of subsidence, if not complete collapse, before the combined attacking forces

²⁷ Marion, [OH] *Star*, 26 December 1903.

of Light, Heat, and Cold.” Here radium is just one of several potential cancer treatments, but in the article it receives most of Hammer’s attention.²⁸

Most of these early “experts” in radium therapy experienced only fleeting fame as radium experts. Even Morton, whose influence on radium imagery was so profound, played a brief role. Only one physician that emerged in these years remained at the forefront of radium work for the next several decades: Robert Abbe. Twenty years later, Abbe would be called “the eminent surgeon and first scientist in American to work successfully with radium.”²⁹ Though some, notably Hammer, would have disagreed with the notion that Abbe was the first to use radium successfully, Abbe did help shepherd American radiology from its early days of experimentation and speculation to a more organized profession. When Marie Curie came to the United States in 1927 to receive a gift of radium from the women of America, Abbe was given the honor of speaking. He presided over the professionalization of radium treatment in the United States in the first decades of the twentieth century. However, those following radium in the press could not have known that Abbe, more than the others, would become the true authority on the matter.

Articles describing Abbe’s work appeared around the same time as those of Morton, Tracy, and Hammer. Several articles show a bit more caution on Abbe’s part. When radium was inevitably compared to x-rays, Abbe at first preferred the latter. Radium, he claimed, was not as quick or effective as x-rays.³⁰ He also urged readers to

²⁸ *The World Magazine*, 17 January 1904.

²⁹ *New York Herald Tribune*, 27 November 1927.

³⁰ *New York Times*, 6 January 1904.

keep in mind that early press reports on radium were exaggerated and misleading. Reporters, he argued, were “audacious and inhuman” in making unfounded claims about radium. He assured the public that scientists were giving their all to keep up with high expectations.³¹ Reporters knew that sensational headlines would help them sell papers. This sometimes led to headlines that barely reflected the content of their corresponding articles. A *Newark Advertiser* article spent two columns describing a public lecture by Abbe in which he characteristically warned against overblown expectations of radium. The final paragraph, just one sentence, mentioned the opinion of a Princeton professor that radium offered the “possibility of the revision of the laws of the whole scientific world.” The headline read “Radium May Cause Revision of Laws of Scientific World.”³² Anyone reading the headline could easily have come away with an impression of radium that was the opposite of the one Abbe intended.

Despite warnings from physicians, the press continued to make bold claims for radium. Newspapers declared that radium would cure a huge array of illnesses. A *New York American* article listed cancer, consumption, malaria, Hodgkin’s, lupus, diphtheria, liver complaints, all bacterial and parasitic diseases, and all malignant affections.³³ Another malady supposedly susceptible to radium rays was blindness. Presumably blindness received attention from early radium experimenters due to the fact that the element gave off its own light. Radium’s luminescence, coupled with the idea that it was a stimulating source of energy, led to a number of high profile investigations of radium as

³¹ *Newark News*, 6 January 1904.

³² *Newark Advertiser*, 6 January 1904.

³³ *New York American*, 15 January 1904.

a remedy for blindness. In France, Cleveland Moffett had learned that radium rays could excite the optic nerve and cause a sensation of light even when one's eyes were closed.³⁴

Samuel Tracy was one of the first to put such theories into practice. The *New York American* told of a twenty-eight year old tailor whose sight had gradually diminished over the course of a year until he was blind. Tracy held radium over each eyeball for twenty minutes a day with notable improvement. Although the change was neither quick nor steady, the paper reported that the tailor had recently won sixty cents at poker, "clear evidence of good sight."³⁵

Another case that received a great deal of attention nation-wide was that of little Tillie Spitznadel. A *New York American* article declared "She That Was in Darkness Tells How By Radium She Saw the Light." Tillie received treatment from William Hammer and Dr. Amon Jenkins of the Marine Hospital Service. Tillie, an eleven year old girl from New York, had been blind since the age of three, but after radium treatment she emerged from the doctor's office able to see again. "I only know that it has been night all the time. After I went to the strange place with the doctor I saw lights. They moved past me as we came home. The doctor said they were street cars," Tillie told reporters. Jenkins received scores of letters from others afflicted with blindness. Although he cautioned that Tillie would probably not gain back fully normal vision, he did declare her case proof of the stimulating effects of radium.

To some, Tillie's story must have seemed too good to be true. A *New York Herald* editorial lamented the unreal expectations that her widely publicized case was

³⁴ Moffett, "Wonders of Radium."

³⁵ *New York American*, 20 February 1904.

sure to elicit. Thousands would be given false hope as a result of Tillie's case, which in reality did not prove that radium would revive the optic nerve in the long term. The editorial proved prescient, as reports quickly appeared declaring that Tillie's sight had not in fact been restored. Tillie's mother made a statement a few days after the treatment confirming that the cure had not succeeded. As a possible explanation of her daughter's statements about her returned sight, Anna Spitznadel claimed that "possibly Tillie may have said she thought she saw light when returning from Dr. Jenkins' laboratory in the hope that this would cheer us up a little, as she knows we are greatly worried over her condition."³⁶ Tillie restored sight, it seemed, was simply a little white lie offered to make her parents happy.

Though the possibility of a blindness cure was romantic, the most exciting prospects for radium were in the treatment of Hammer's "two great ogres": cancer and tuberculosis. Surface cancers were among the first diseases to be treated by radium. After Henri Becquerel discovered radium's ability to burn the skin, the logical next step was to see if radium's destructive power could be harnessed for good. Though these early cases were highly experimental, they paved the way for the cancer treatment that would follow. The element was used to burn off growths and surface cancers with some success. This work, which began in Europe, eventually influenced American physicians who were just beginning to obtain small amounts of radium. Radium became another in a long line of potential cancer cures, most of which had fallen by the wayside long ago.

³⁶ Unlabeled newspaper clipping in WJH, Box 62, Folder 1.

One pamphlet listed some attempted cancer cures of the past: electricity, wood sorrel, olive oil, arsenic, red clover, hemlock, pressure, wild tea (poulticing the grounds), carbonate of lime from calcined oyster shells, methyl violet (coal tar derivative), zinc ions, hot dry air.³⁷ If history was any indicator, radium would soon join the list of substances that had fallen short as a cancer cure.³⁸

Radium did, however, show some promise against cancers, and the press was predictably excited. The aforementioned work of Morton, Tracy, Hammer, and Abbe received a great deal of attention. “Cancer is no Longer Incurable,” declared a representative headline. Most of these articles described cancers that could be reached externally. The next challenge was to find a way to treat internal cancer. Professor W.C. Fuchs claimed he could cure some internal cancers through the use of a cystoscope, a tube that could be inserted through the mouth to treat stomach cancers. The “liquid sunshine” treatment of having patients drink irradiated solutions also aimed toward curing internal cancers. However, these methods were somewhat crude, and it would be years before the treatment of internal cancers with radium would become more effective. Famous inventor Alexander Graham Bell managed to prophesize the future of radium medicine in a *Scientific American* article in 1903. He proposed inserting a glass tube containing radium into the “very heart of the cancer.” This would eventually become the method of choice, but not until years later. Meanwhile the press concentrated on the earlier, more haphazard attempts at a cancer cure.

³⁷ Untitled Pamphlet. Smithsonian Institution, Eilers Collection, Box 280.

³⁸ The most in-depth examination of the history of cancer is James T. Patterson, *The Dread Disease: Cancer and Modern American Culture* (Cambridge, MA: Harvard University Press, 1987).

Susan Sontag has argued that cancer's position as the dread disease of the twentieth century paralleled consumption's position in the nineteenth.³⁹ Since radium was discovered at a time in which both loomed large in the American imagination, it comes as little surprise that radium was heralded as a tuberculosis treatment as well. Radium appeared at a time when the germ theory of disease was taking hold. The prospect, therefore, of a universal germicide was highly anticipated. Radium's great power made it a likely candidate, and, indeed, many early reports on radium stressed its ability to kill germs. Doctors and reporters trumpeted radium as a cure for the great epidemic diseases such as diphtheria and malaria. They also claimed that radium would destroy the germ that caused tuberculosis. On its face the conclusion made sense. Radium seemed to kill germs. Robert Koch had discovered a tuberculosis bacillus twenty years earlier. Therefore, radium might cure tuberculosis. The logic was attractive; Frederick Soddy recommended breathing radium emanation (radon) to treat tuberculosis.⁴⁰ Others, including Tracy and Hammer, proposed using one of radium's sister elements, thorium.⁴¹ However, radium's promise as a germicidal agent quickly died out, and its promise as a tuberculosis cure went with it. Subsequent experiments showed that in most cases, the costs of exposure to radiation outweighed the benefits. As internal radium therapy lost popularity and physicians focused on external therapy, cancer became virtually the only condition for which the element's medical value exceeded its potential side effects.⁴² It would require a concerted public health effort to

³⁹ Susan Sontag, *Illness as Metaphor* (New York: Farrar, Straus, and Giroux, 1978).

⁴⁰ New York *Commercial Advertiser*, 29 August 1903.

⁴¹ Tracy in New York *Journal*, 23 January 1903; Hammer in New York *Journal*, 23 January 1904.

⁴² See Chapter Four.

conquer tuberculosis, leaving cancer still standing as the dread disease of the twentieth century. As cancer became the quintessential modern disease, radium became its thoroughly modern cure.

As if curing intractable deadly diseases were not enough, radium also offered the possibility of improving one's appearance. Thanks to its inexhaustible energy, radium seemed to be a sort of fountain of youth. As one reporter put it,

For we are now advised that it not only cures many forms of disease, but, most marvelous of all, arrests development and gives promise of stopping the ravages of time. We are seriously assured that it may yet prove effective in the same degree on human beings' that a young woman of twenty-three may, by a proper dose, retain forever the appearance of that age. Crowsfeet and wrinkles and protruding neck bones will no longer be the curse of womanhood.⁴³

Such claims were invariably geared toward women, upon whom pressure to remain looking youthful was stronger. Radium could burn off dangerous skin cancers, but it could also help remove conditions that were more unsightly than dangerous. Doctors aimed radium rays at port wine stains, keloids, birthmarks, and other disfiguring skin problems. Such conditions were the object of grave concern. "How frequently one turns in pity from a girl, otherwise pretty, who has what is familiarly known [sic] as a 'port wine stain' on her face. These birthmarks...make the victim hopelessly unattractive."⁴⁴ However, a combination of x-rays and radium offered physicians the first means of removing these embarrassing marks, leaving the face "uniformly white."

This bleaching effect of radium was put to much more questionable use on African-Americans. A physician who offered to remove port wine stains from white

⁴³ "Radium's Promise to Women," *Indianapolis Star*, 21 November 1903.

⁴⁴ Unlabeled newspaper clipping, WJH, Box 59, Folder 3.

women, Dr. Thomas R. Eldridge, offered to bleach the skin of African-Americans with a combination of radium and x-rays. Newspaper reports on Eldridge's work quoted the book of Jeremiah, "Can the Ethiopian Change his Skin, or the Leopard His Spots?" Although the answer to the second question remained "no," radium seemed to show that the answer to the first was "yes." Another article called the procedure a "long step toward the solution of the race problem."⁴⁵ Such a statement shows the contemporary faith in the ability of science to solve life's problems. Rather than deal with racial discrimination in America, it would be easier to simply turn everyone white. Not everyone acknowledged the value of Eldridge's work. Professor Henry K. Pancoast, also at the University of Pennsylvania, argued that such treatments would be too long and painful.⁴⁶ Pancoast was the first doctor linked to the process of whitening African-Americans, but as Carolyn de la Peña has shown, Pancoast never conducted such experiments.⁴⁷ The whitening he observed was a side effect of more traditional radium treatments for skin ailments. Physicians like Eldridge heard about the accidental whitening effect and applied it intentionally. Eldridge maintained that the experiments had occurred, but not to the satisfaction of himself or his patients. He claimed that his equipment had been destroyed, leaving his patients in a state of "dermatological suspense." When asked about the situation, Eldridge replied that "all [I] know is that there are a half dozen unhappy negroes in Philadelphia."⁴⁸

⁴⁵ New York *Public Opinion*, 21 January 1904.

⁴⁶ Philadelphia *North American*, 10 January 1904.

⁴⁷ For an in-depth examination of these experiments see Carolyn de la Peña, "Bleaching the Ethiopian: Desegregating Race and Technology through Early X-ray Experiments" *Technology and Culture*. 47.1 (2006) 27-55.

⁴⁸ New York *Sun*, 25 April 1904.

Because radium produced such remarkable effects, disbelief could be easy to suspend. If radium could realize age old alchemical dreams, who is to say what it was incapable of? Consequently, newspapers had a difficult time knowing what to print and who to believe. Claims that now seem difficult to digest were the result. Self-proclaimed radium expert, E.M. Eisenbeiss, was just one of the early pundits whose claims stretched the bounds of credulity. Eisenbeiss claims that radium would cure disease over the telephone. His medical theory also borrowed heavily from phrenology. A patient needed only to hold the receiver to the part of the brain which controlled the afflicted body part, and the healing rays of radium would be beamed across the wire. Eisenbeiss called the process “cerebral localization” in a self-penned article that also featured a phrenological map of the brain showing “the parts that control the various senses [sic].”⁴⁹ Not surprisingly, Eisenbeiss’s status as a radium expert was brief.

Other articles made far-fetched claims of problems that radium could cure. A prime example was the 1904 story of a man prone to bouts of sleepwalking during which he would abuse his wife. The man came to Dr. A. Darier, a Paris eye doctor, after his wife left him. Darier treated him with radium for twelve days and reported that the man and his wife were eventually reunited happily. Darier also claimed that homeopathic amounts of radium aided in cases of other nervous disorders, including epilepsy, photophobia, and neurasthenia. Darier admitted to being baffled by the cures and acknowledged the possible role of the power of suggestion. Regardless of the doctor’s ignorance of the mechanism of the cures, readers would doubtless have been impressed

⁴⁹ Indianapolis *Sentinel Sunday Supplement*, 5 June 1904.

by them. Not only could radium treat physical problems, but mental and emotional ones as well. Radium worked so mysteriously on the body that it was difficult to draw a line between what was possible and what was not.⁵⁰

Radium offered the more yellow of the papers fodder for tantalizing headlines and exaggerated stories. Hearst's *New York American*, for example, sometimes ran daily stories on the element. "Cancer Cured with Radium!" declared a January 14, 1904 edition describing William Morton's work.⁵¹ Although Morton himself would never have claimed that he had found a cancer cure, the *American* held up the promise of a successful treatment as an accomplished fact. The article also showed an illustration of physicians peering over a patient whose abdomen radiated light upon their faces. The next day another article on Morton's work appeared announcing, "Treatment is Putting Sunshine in the Blood! Skin Diseases Cured by It!" This article picked up where the previous one left off with subheadings including "Bottling the Sun's Rays" and "Gives Off Wonderful Rays." Other doctors weighed in as well, with a Dr. Shradly stating that radium was leaving the world of science behind and entering the realm of romance.⁵² This romantic phenomenon was thanks in no small part to the reporting of papers like the *American*, which raised the bar the next day with a story that was bound to earn the sympathy of its readers: the healing of a sick child. "Radium Saves Child From Diphtheria," blared the headline describing William Harvey King's treatment of the daughter of a wealthy businessman.⁵³

⁵⁰ *Springfield Union*, 21 February 1904.

⁵¹ *New York American*, 14 January 1904.

⁵² *New York American*, 15 January 1904.

⁵³ *New York American*, 16 January 1904.

On January 17, 1904, the *American* ran a radium story for the fourth day in a row. This one declared, “Radium’s Marvelous Cures Astonish the Medical Faculty.” The article rehashed reports that radium would cure blindness and diphtheria. An illustration showed a doctor holding a cuplike radium applicator to the face of an agonized man. Two women looked on with concern. Hearst was no fool and would not have continued to print stories if he did not sense that people wanted to read them. Throughout 1903 and 1904 newspapers continued to published stories on radium’s challenges to the laws of physics and its promise as a medicine. Some editors were swept up in the craze for radium and printed headlines that distorted the reality of what radium could do. These yellow journalists accentuated the positive, creating an image of radium that the element could not possibly live up to. They also stretched the limits of believability, and it was not long before a backlash against radium began in the press.

Radium experts were among those cautioning the public that all was not perfect when it came to radium. William Hammer warned in a lecture that “radium endangers life” and that a small piece would kill a sleeping man within hours. It is likely that Hammer got this image from Pierre Curie, who famously stated that he himself would not remain in a room with even a small sample of radium. Hammer went beyond the superficial dangers of radium in his descriptions as well, declaring that “it paralyze[d] the brain.”⁵⁴ What exactly this paralysis meant in practice was not made clear, but any reader would have gotten the message that radium had the potential to cause unique harm to the body if misused. A *Washington Times* reporter put it in terms that the average

⁵⁴ Philadelphia *North American*, 17 October 1903.

American Christian could understand when he wrote, “radium is so deadly a substance that anybody who handles it is likely to be afflicted as Job was.”⁵⁵

Others followed Moffett in trying to find balance among radium’s promises, disappointments, and dangers. An article in *Thresher World* magazine alluded to experienced radium experts “who [were] alive to the dangers of the remedy and not over-sanguine of its success.” The article appeared in November 1903, fairly early in the press craze for radium that would peak over the next couple of years. The magazine proved prescient when it predicted that “it may be only a question of time when this novel scientific toy will enter on the cure-all period of its history.” Indeed, over the next two years and even beyond, radium would have seemed more like a cure-all than a mere scientific toy to many American newspaper readers.

The *Thresher World* article also introduced an idea that was a common thread in many warnings about radium during this early period. A number of researchers, most famously Thomas Edison, claimed that radium, like X-rays, had a tendency “to destroy that element in the human body which rebuilds and heals after an injury.” In other words radium was selectively damaging to the growth and rebuilding process. This idea would later be corroborated by genetic research, which seemed to indicate that radium had a powerful effect on cell development.⁵⁶

Edison was the most famous of the radium skeptics. He claimed that he did not experiment with radium due to its potential dangers and poor commercial prospects.⁵⁷

⁵⁵ *Washington Times*, 16 December 1903

⁵⁶ *Thresher World*. Chicago. November, 1903.

⁵⁷ *New York World* 25 August 1903.

Yet he did acknowledge that it had potential as an effective therapy. When Daniel Webster Whitney, a wealthy Baltimore grocer, developed oral cancer, Edison recommended radium treatment.⁵⁸ Regardless of his opinion about radium's practical use, Edison clearly acknowledged its value as a scientific discovery. When asked by a newspaper editor, "what is the most wonderful development of the year [1903]?", Edison answered with a single word: radium.⁵⁹

Though the press was eager to report tales of success, stories of failures also became popular. Some expressed disappointment while others warned of the dangers of radium. Another group merely expressed skepticism until all the facts were in. Ambrose Bierce, journalist and author of classic short stories such as "An Occurrence at Owl Creek Bridge," wrote that "in the meantime, by the way, there is no reason to suppose that radium ever cured anything."⁶⁰

By 1904 it seems clear that the press was already itching to announce radium's fall. The fanfare for radium had not subsided, but negative news about radium could prove to be even more shocking than the positive claims. One story that began the radium backlash originated in England. Reports trickled into the United States that British doctors had achieved disappointing results with their radium trials at the London Hospital. As *Human Life* reported, "announcement of the marvelous curative powers of radium was premature. Recent experiment and practical tests have proven its efficacy to be *nil* and its much-exploited reputation was purely theoretical." Radium was dismissed

⁵⁸ Ansonia, [CT] *Sentinel*, 24 December 1903.

⁵⁹ Pittsburgh *Dispatch*, 31 December 1903.

⁶⁰ New York *Visor* May 1904.

as nothing but sensationalism with little notice paid to the fact that the very papers that now seemed to relish the failure of radium had been the ones to ignite the craze in the first place.⁶¹

The *Detroit News* was even more emphatic in its turn against radium. Under a headline that read “The Radium Craze is Over,” a reporter remarked, “When one runs back a few months and collects all the fervid and impossible wisdom that has been unloaded upon a trusting public concerning radium, the investigator must be appalled at his own credulity...At present enthusiasm over radium is waning.” Radium, said the article, had “failed miserably in all its promised undertakings except the production of laboratory phenomena.”⁶² What is striking is the speed and vehemence with which some members of the press turned against radium. There was rarely middle ground in its reporting. Radium was either a marvelous product and miracle cure or a tremendous flop and sign of mankind’s gullibility.

At this early period in radium’s history, doctors were still learning what the element could and could not do, and there was no commercial radium medicine industry to speak of. Yet the patterns that would define the orthodox and unorthodox medical uses of radium were already being established. On the orthodox side, a handful of scientists and physicians aimed radium’s rays at just about everything and observed what happened. Their hopes and expectations no doubt distorted what they saw. In the earliest press reports, one can find purported authorities claiming radium cures for virtually every disease. This was largely due to press exaggeration, as rumors and hopes became

⁶¹ *Human Life*, New York City, June 1904.

⁶² *Detroit News*, 16 April 1904.

imbedded in print as hard facts. Some, like Moffett and Abbe, bemoaned this phenomenon, but newspaper publishers were all too happy to cater to the excitement of the public.

One of the most important and persistent trends one can trace through these early reports on radium is the increasing importance of science and technology in medicine. In orthodox circles, radium's status as a natural treatment took a back seat to its status as the product of cutting edge science. In radium one found laboratory science taking a more prominent role in medical practice. The uneasy relationship between science and medicine became strengthened during the twentieth century.

On the commercial side of the story, radium was far too expensive to be used in any products during this early period. The next chapter will examine a number of fraudulent radium concerns that sold products that claimed to contain radium but in reality did not. As is the case with orthodox medicine, one can find key themes that would come to define commercial radium medicine decades later. Radium patent medicines tended to play on two images that emerged around radium in these early years: first was the image of radium as the paragon of scientific achievement. Commercial radium medicine purveyors could claim that their products were the fruits of the labor of the world's greatest scientists. After all, radium really was an unprecedented substance known to have real and exceptional power. By harnessing this power, a radium product could provide the best of what modern science had to offer.

On the other hand, radium was also a natural medicine. The fact that it was an element that existed in nature allowed commercial interests to claim that radium could

allow a person the perfect health that Mother Nature intended. By playing this angle, companies could set themselves against the medical establishment toward which many Americans were wary. For them access to health care was uneven or nonexistent. Radium medicines, available at stores and through the mail, would give all Americans access to the exciting new cure that had previously been the monopoly of urban doctors. In addition to being costly and difficult to come by, orthodox medicine could also be painful. The heroic treatments of the past left lasting scars that many hoped to avoid. With radium, those reluctant to go to doctors for help could harness the power of nature in convenient pills and elixirs. Patent medicine sellers could pick and choose the best that science and nature had to offer in creating products that appealed to people on intellectual and instinctual levels.

In these early press reports on radium, one can see the American imagination of the element in a period of formation. Newspapers distorted scientific and technological advances in the dual quest to convey information and sell papers. As a result there was a gulf between what was actually going on in laboratories and what ordinary people thought was going on. A newspaper-reading American in 1905 easily could have believed that radium could cure problems like blindness and tuberculosis. Yet medical literature of the time showed limited success against a relatively small group of diseases. This murky gap between fantasy and reality provided commercial radium peddlers with enormous opportunity. Radium became a symbol of the potential of medical science, a paragon of perfect health toward which any American could grasp. This made it ripe for exploitation.

Chapter Three: The First Commercial Radium Medicines

As the craze for all things radium swept the nation, Dr. Abbott E. Kay was working as the director of the National Association Hospital in Illinois. Kay's imagination, like those of many Americans, was fired by the new element, and he was soon advertising his services as a specialist dealing in radium and radium instruments. His business card boasted of his expertise in "diseases and conditions of an obstinate nature."¹ Kay, a graduate of the University of Illinois College of Medicine, was licensed to practice medicine in that state. By all appearances he was a legitimate physician employing the latest in cutting-edge science to treat illnesses that other doctors had failed to cure. Yet by the 1920's he was being denounced as a quack in the pages of the *Journal of the American Medical Association* and forced out of business by the Federal Trade Commission. In a medical field that worked assiduously to establish boundaries between orthodox and unorthodox medicine, how does one explain someone like Kay who operated in the hazy region between the two? His career arc challenged neat categories like "legitimate" and "quack" and exemplified the cloudy medical context in which radium first appeared. The climate of confusion surrounding the new element allowed a handful of commercial interests to exploit it for profit. The success of these companies challenged the medical establishment and the government to confront the complexities and ambiguities that lay at the intersection of science, health, and the market.

¹ Undated letter, Arthur Cramp to Boston Medical and Surgical Journal in American Medical Association Collection of Historical Health Fraud (AMA), Box 410, Folder: "Kay, Abbott E. 1910-1921."

The American medical establishment at the turn of the 20th century tended to see the world in stark terms. On one side was orthodox medicine; on the other, a vast sea of illegitimacy. The truth was far murkier. Many medical schools were little more than degree mills that churned out MD's who often were barely literate. Millions of Americans feared going to the doctor due to a legacy of heroic treatment consisting of bleedings, painful surgeries, and the ubiquitous calomel, a mercury solution that was the foundation of many physicians' armamentariums. In the nineteenth century a new breed of doctors, influenced by the self-limiting nature of most disease, frustrated their patients by seeming to do nothing at all. Patients wanted their doctors to be active, but they did not want their treatments to be painful.

The inadequacies of regular doctors provided patent medicine makers with one of their primary points of entry. Patent medicines were a major threat to the dominance that the medical establishment sought. They offered what orthodox medicine could not: easy cures that were inexpensive and available to all. In the nineteenth century the patent medicine industry exploded. By 1905, one drug journal listed over 28,000 patent medicines. Another witness estimated the number at closer to 50,000.² One might expect modern advances in scientific knowledge and technological innovation to have stamped out patent medicines that reeked of the superstitions of the past, but that did not happen. In fact, as historian James Harvey Young has shown, the medical establishment and the patent medicine industry have tended to grow in parallel. This does not necessarily represent a contradiction. Commercial interests often piggybacked on

² James Harvey Young, *The Medical Messiahs: A Social History of Health Quackery in Twentieth-Century America* (Princeton, NJ; Princeton University Press, 1967), 23.

advances in legitimate science in order to boost sales. The discovery of the germ theory of disease, for example, prompted a huge influx of products billing themselves as germicides or blood purifiers. Many purchasers would have been impressed by these products' superficial connections to advanced science without recognizing their flimsiness.

When it came to radium, the boundaries between legitimate and illegitimate use were particularly difficult to discern. Newspapers had trumpeted Curie's miraculous new element as the cure for just about everything.³ These claims came not from crackpot hucksters but from respected scientists in the United States and abroad. Radium had so stretched the limits of human understanding that it became impossible to know what to believe. If its energy were truly inexhaustible, if it truly gave off its own heat and light, its possibilities seemed limitless.

The flurry of high expectations and lack of firm knowledge made radium the perfect fodder for patent medicine men. There was only one problem: supply. Only a few grams of radium had been processed at this point. In fact, it was the most expensive substance mankind had ever known, worth thousands of times more than any jewel. This was good news to those who feared that radium would inevitably fall into the wrong hands. A 1904 article in the *Birmingham Ledger* rejoiced that "the price [of radium] is so high that quacks cannot get hold of it, and the world is saved from that calamity."⁴ Little did such commentators know that unscrupulous patent medicine men did not need radium to exploit the enthusiasm for it in the market.

³ See Chapter 2.

⁴ *Birmingham Ledger*, 1 February 1904.

The experiences of the nineteenth century showed that it was all but inevitable that commercial interests would use the latest developments in science and technology for their own profit. Magnetism, electricity, ultraviolet, and x-rays had all proven conducive to exploitation by patent medicine companies eager to cash in on the latest advances. Radioactivity, the newest and most powerful force of all, would have followed the same pattern were it not for its scarcity and high cost. Because radium was largely unavailable, commercial interests had to improvise. They evoked the word “radium,” and the mysterious power associated with it, and hoped that no one would catch on to the fact that their products were radioactive in name only.

The first, and most notorious, example of the early purportedly radioactive products was Radol. Though there were a handful of such products on the market, the story of Radol exemplified the early days of commercial radium medicines. Radol billed itself as a “radiotized” or “radium impregnated” fluid, and, if advertisements were to be believed, could cure a variety of illnesses including cancer and tuberculosis.⁵ To play up the product’s supposedly radioactive characteristics, ads boasted of Radol’s bluish glow. This would have impressed the Americans who had read about radium’s self-luminescent quality in the newspaper. Directions called for one tablespoon of Radol in a wineglass of water to be taken before each meal and at bedtime.

Radol was the creation of Dennis Dupuis, a man whose life before and after Radol remains shrouded in mystery. However, the public would not have known Dupuis’s

⁵ Ads and labels in AMA, Box 903, Folder “Wells, Rupert (Radol Cancer Cure), 1909-1933.”

name despite the fact that his face often featured prominently in advertisements. Dupuis operated his business under the name Rupert Wells, no doubt chosen to evoke the wellness that was sure to follow a course of his treatment. A close look at the self-styled Dr. Wells revealed the extent to which patent medicine men followed the news and used it to their advantage. The fictional Wells billed himself as the Chair of Radiotherapy at the Post-Graduate College of Electrotherapeutics of St. Louis. This title was taken word for word from that of William Morton, the legitimate physician who shortly before had introduced the public to the notion of radium as “liquid sunshine.” By riding Morton’s coattails, Dupuis was able to create a character that seemed to have the stamp of legitimacy. One advertisement boasted of Wells’s “high scientific standing.” He produced Radol, it explained, at his “splendidly equipped laboratory” where he conducted “the most elaborate experiments ever made.”⁶

Like many men in his field, Wells stressed the low cost of Radol compared to other treatments. A month’s supply of Radol cost \$15⁷. In case customers wondered how Wells managed to sell a product containing the world’s most valuable substance for such a relatively modest sum, the good doctor explained that his private means allowed him to offer such low prices. Wells also stressed the personal attention that he offered his customers. He did not allow druggists to sell Radol, so all of his “patients” had to deal directly through him via mail. Wells’s ads invited readers to write to him describing their maladies. He would then design a personalized regimen that naturally included Radol.

⁶ *New York Herald* June 5, 1905.

⁷ At over \$300/ month in 2010 dollars, Radol still would have been too expensive for many Americans.

Wells backed up his rhetoric about personal attention. He corresponded personally with everyone who wrote to him. Predictably, there were few that wrote in without receiving a reply suggesting Radol. In fact, Wells's first reply often came as a form letter with "cancer of the _____" filled in with a location like "temple."⁸ When Wells succeeded in convincing people that they needed his treatment, he followed their cases, or at least their orders, closely. His letters became increasingly urgent when customers stopped refilling their medicine. When he did not hear back from one, he wrote, "Surely if you knew absolutely that with another three or four weeks you would be cured you would never think of stopping or running the risk of getting out of the medicine...How can you think of quitting?"⁹ Two weeks later he wrote again, "I have such great faith in Radol that I fully believe that it should cure this disease...and I should be greatly disappointed if you should be late in sending in your next order."¹⁰ Wells sometimes lowered prices for customers who were reluctant to keep up their payments.¹¹ After playing the salesman, Wells also played the doctor: "Where one suffers with such a serious trouble as yours it takes a long time for the systemic changes to take place...I must urge you to keep right at it just as faithfully until you are well."¹² In none of these letters does Wells mention any specifics of a given case. Presumably, he had a few form

⁸ Samuel Hopkins Adams, *The Great American Fraud: Articles on the Nostrum Evil and Quacks*, Reprinted from *Collier's Weekly* 4th edition (Chicago: Press of the American Medical Association, 1907), 90.

⁹ Dupuis to unnamed customer, January 17, 1908. AMA, Box 903, Folder: "Wells, Rupert (Radol Cancer Cure) 1909-1933.

¹⁰ Dupuis to same customer as above, January 30, 1908. Same folder as above.

¹¹ American Medical Association, *Nostrums and Quackery: Articles on the Nostrum Evil and Quackery Reprinted, with Additions and Modifications, from the Journal of the American Medical Association*, vol. 1, 2nd edition (Chicago: American Medical Association Press, 1912), 71.

¹² Dupuis to same customer as above, January 30, 1908, AMA, Box 903, Folder: "Wells, Rupert (Radol Cancer Cure) 1909-1933.

letters that he tweaked only slightly from customer to customer. Regardless, the message of desperation came through. Wells, like many of his kind, used fear and doubt to his advantage.

Radol advertisements were an amalgam of common knowledge truths about radium's physical properties coupled with declarations of the product's versatility and potency. Wells had clearly read press accounts of the new element and parroted their descriptions of inexhaustible heat and "sparking light rays." He continued in a less scientific vein: "Many suppose it to be a direct manifestation of the supernatural, and it's actions on disease make it seem so."¹³ Another ad declared, "I have discovered a new and seemingly unailing remedy for the deadly cancer. I have made some most astonishing cures."¹⁴

Wells got word of his product out in several ways, all of which were standard operating procedure for hundreds of patent medicine concerns. First, he published advertisements, designed to look like articles, in mainstream publications like the *New York Herald* (See Illustration 3.1). He hoped to convince readers that Radol was "news" rather than just another product. Church publications were another popular venue for Radol ads. As muckraking journalist Samuel Hopkins Adams wrote, "Rupert Wells, M.D., is very religious—in his advertisements."¹⁵ Religious weeklies were perfect for Wells because, unlike larger publications like *Collier's* and *Ladies Home Journal*, they

¹³ *New York Herald* June 5, 1905.

¹⁴ Radol advertisement, AMA. Box, 903. Folder: "Wells, Rupert (Radol Cancer Cure), 1909-1933.

¹⁵ Adams, 90.

Wonderful Life-Giving Radium

Cures Cancer, Consumption and All Bacterial Diseases

*N. M. Herald
June 5-'08*



RUPERT WELLS, M. D.
Professor Therapeutics, Post-Graduate College of Electro-Therapeutics,
St. Louis, Mo.

Radium is the most notable chemical discovery of the beginning of the world. It is a metal found in small quantities in Europe. Its peculiar and mysterious properties puzzle the scientists and amaze the people. It glows with a bright light night and day; it is always hotter than the surrounding air; it constantly and continuously gives off a stream of sparkling light rays which will penetrate a foot of solid iron, but in spite of which it never wastes away, but always remains the same. Any supposition to be a direct manifestation of the supernatural, and its action on disease makes it seem so.

This remarkable substance is absolute and quick death to the germs of cancer, tumor, consumption, malaria, blood poison, ulcers and all forms of existing disease. When it enters the system every vestige of disease is driven out, as no germ can live in its presence. Radium is very scarce and hard to obtain, but Dr. Rupert Wells, professor of Therapeutics in the Post-Graduate College of Electro-Medical Therapeutics, St. Louis, Mo., by virtue of his high scientific standing, has been able to secure a large quantity, with which he has conducted in a splendidly equipped laboratory in St. Louis the most elaborate experiments ever made, and has succeeded in perfecting several preparations of Radium for use in the treatment of disease.

"I have devoted my entire life," says Dr. Wells, "to the helping and healing of the sick and suffering, and have seen, as you know, unusually successful results. I consider the results of my experiments with Radium, which have resulted in the production of the marvelous radiated fluid 'Radol,' the greatest work of my life. There is no disease that cannot be cured with this substance. You observe I say no disease, and I mean exactly that. Cancer, consumption, blood poison, etc., and all the formerly so-called incurable diseases are now cured as easily as measles, and at a less cost. If you could know and see disease, misery and suffering as I have seen, if you would understand what it means to a man like me to be able to say at last that I have in my hands a means to put an end to it all; to say that I have an absolutely certain cure for that terrible disease, cancer; to say that consumption, that dread-

ful scourge, will become a thing of the past, and that the thousands of lesser diseases can be cured almost in a night, it is a wonderful thing, and my heart glows with pride and gratitude as I think of it. With my marvellous 'Radol' it will also be possible to treat sick people at a very low cost, for the rapidity of the cure is startling, and my private means enable me to furnish the necessary preparations at a very low price. My offices are crowded daily, but I manage to see each case personally. Every letter is answered by me, and every case by constant supervision. For this reason, I may say, I will never allow my Radium preparations to be sold by druggists, for I wish to know every patient and his condition, that I may give him the best results. It takes a great deal of work, but I have a perfect system that enables me to do it, and where the sick and suffering are concerned no work is too great. The gratitude of thousands of cured patients is in itself sufficient reward."

Dr. Rupert Wells is a man of the highest scientific attainments, and he has received much honor both at home and abroad for his original investigations. His work with Radium places him in the very highest rank. The efficiency of "Radol" in all forms of disease is so remarkable as to be scarcely believable if it were not for the thousands who testify to its value and his skill. Therefore, no matter what your disease or affliction may be, do not hesitate to write Dr. Wells at once and tell him what you wish to be cured of, as delay may be dangerous. Your letter will be cheerfully, carefully and personally answered and your case accurately diagnosed free of charge.

Dr. Wells has written an interesting book on "Radium in the Cure of Disease." It is the only book written on the subject, and should be in the hands of every sick person. It explains how Radium is used by him in the treatment of disease, and contains detailed reports of cases treated, as well as testimonials from people who have been cured by its use. Write to Dr. Wells to-day and give him a full and complete description of your disease. The book and information as to how your own disease will be treated will be sent free on request. Address Dr. Rupert Wells, 150 Granite Bldg., St. Louis, Mo.

Illustration 3.1. A New York *Herald* advertisement for Radol designed to look like an article. William J. Hammer Collection, Smithsonian Institution

did not have scruples about selling ad space to patent medicines. Readers of church papers may also have been especially ready to have their prayers for good health answered in the form of a miraculous new medicine

Wells also published a house journal, the *Radol Bulletin*. The *Bulletin* was filled with fantastic testimonials for all the wonderful cures achieved with Radol. “Said He Could Not Live—Now Rapidly Recovering,” “Four Hundred Per Cent Better,” “People Surprised—Eyesight Saved by Radol” read just a few of the headlines from one representative issue. Testimonials had long been in use among advertisers, but patent medicines peddlers perfected the technique. They offered a personal touch and connected the reader with other people who had taken the plunge before them and benefited. Muckrakers like Adams had cast serious doubt on the value of testimonials in their exposés. In his *Collier’s* series on patent medicine, *The Great American Fraud*, Adams showed copies of testimonials alongside the obituaries of the people who had given them. Wells addressed skepticism toward testimonials in his *Bulletin*, “You can see for yourself that these letters are the plain, truthful unsolicited statements of those who wrote them.” That Wells offers no evidence of the validity of these testimonials beyond his word begs his claim that “any person with a fair mind who will read the following letters MUST believe them.”¹⁶

Like many patent medicine men, Wells praised and criticized mainstream medicine alternately depending on which approach was more conducive to sales. On one hand his title and evocation of the germ theory of disease indicated the importance of the

¹⁶ *Radol Bulletin*, AMA, Box 903, Folder: Wells, Rupert (Radol Cancer Cure) 1909-1933.

appearance of medical knowledge. Wells, after all, was supposed to be a well-regarded physician. However, he criticized the shortcomings of orthodox medicine in ways he thought his readers would agree with. He contrasted his easy treatment with the agonizing surgeries offered by the establishment. “I can cure cancer,” declared a Radol ad, “At home without pain, plaster or operation and I tell you how free.” This was just what many customers would have wanted to hear.

Radol was a success, and it made Wells a wealthy man. The Department of Agriculture estimated that Radol earned him \$70,000 (over \$1.5 million in 2010 dollars) in 1908 alone. Wells received about seventy letters a day from curious “patients” and sent out about 7800 treatments in 1908, 1000 of which were free. And by the time the Department of Agriculture began its investigation of Wells, he already had been in operation for several years. Clearly, there were a lot of people willing to believe that the wonders they had read about radium could be had with Radol.¹⁷

But things did not remain rosy for long. Radol appeared as the medical establishment, the government, and the media were working to rid the market of anything that looked like quackery as part of the broader progressive effort to protect consumers and mitigate the worst excesses of modern industrial life. This three-pronged attack hoped to rid the market of so-called “nostrums” that intoxicated and drugged some unwitting Americans and allowed others to die by doing nothing at all. The campaign against patent medicines was part of a larger consolidation movement within the orthodox medical community. Around the turn of the 20th century, the American Medical

¹⁷ *Nostrums and Quackery*, Vol. 1, 75.

Association got serious about setting itself up as the most powerful and influential medical organization in the United States and worked to raise standards by closing medical degree mills and establishing guidelines for licensing. In 1906 the AMA had surveyed 160 medical schools and fully approved only 82. Thirty-two schools were considered beyond salvaging. The Association invited the Carnegie Foundation for Advancement of Teaching to conduct a further investigation. Abraham Flexner, who headed this endeavor, released his landmark report in 1910. He concluded that the bulk of medical schools in existence should be abolished, the oversupply of poorly trained doctors cut off. By 1915, the number of medical schools dropped from 131 to 95, down from an all-time high of 162. Though the consolidation did not go as far as Flexner had wished, his Report was a crucial step toward cleaning up the medical field.¹⁸

Patent medicines were another target, one that deserved no place in society as far as the AMA was concerned. It lobbied the government to enact regulatory laws that would keep illegitimate products off the shelves. At the helm of the AMA's crusade against patent medicines was Arthur Cramp, head of the Association's Propaganda Department. Cramp, who joined the AMA in 1906, brought a sense of mission to the cause. Years earlier his sick daughter had died at the hands of a quack. After realizing that his calling was not in medical practice, Cramp joined the AMA, where he led its campaign against irregular medicine for decades. Cramp's denunciations were characterized by vehemence, outrage, and a sharp sense of humor. He kept a copy of *Alice in Wonderland* on his desk and read a chapter each day before writing his reports in

¹⁸ Paul Starr, *The Social Transformation of American Medicine: The Rise of a Sovereign Profession and the Making of a Vast Industry* (New York: Basic Books, 1982), 118.

order to get himself into the right frame of mind.¹⁹ Wells, in the AMA's eyes, was a "stupendous fake" whose business was "viciously cruel."²⁰

Working in parallel and often in conjunction with the AMA were the muckraking journalists who helped bring the dangers of patent medicines to the public. Muckrakers helped put pressure on the government by exposing the worst abuses of business and industry. Books like Upton Sinclair's *The Jungle* alerted the public to the necessity of reining in the excesses of big business. Patent medicine offered muckrakers a perfect target. Here were companies exploiting the sicknesses and fears of an American public that did not always have the time, money, or knowledge to seek orthodox medical help. In fact, in the tangled web of turn-of-the-century medicine, it was difficult even to differentiate a well-trained doctor from a poorly-trained one. A medical degree could indicate years of training at the best schools in America and Europe, or perhaps that someone had scraped together enough money to "earn" a degree from a fly-by-night degree mill. Without good doctors to consult, people often turned to the patent medicines whose advertisements best spoke to them.

The most famous exposure of the dangers posed by the patent medicine industry was the series "The Great American Fraud," which debuted in 1905 in *Collier's Weekly*, one of the most popular magazines in the United States. Written by freelance journalist Samuel Hopkins Adams, the articles introduced hundreds of thousands of readers to the worst abuses of patent medicines. The series, later reprinted as a book by the American Medical Association, revealed how hundreds of patent medicines were costing

¹⁹ Young, *Medical Messiahs*, 133.

²⁰ *Nostrums and Quackery*, 74 and 529.

Americans their money and their health. No humbug escaped Adams's eye, and the series became a muckraking classic. He began:

Gullible America will spend this year some seventy-five millions of dollars in the purchase of patent medicines. In consideration of this sum it will swallow huge quantities of alcohol, an appalling amount of opiates and narcotics, a wide assortment of varied drugs ranging from powerful and dangerous heart depressants to insidious liver stimulants; and, far in excess of all other ingredients, undiluted fraud²¹

For Adams there was no gray area; patent medicines represented a dangerous deceit that endangered and impoverished Americans.

Thanks in part to pressure from doctors and from the press, the federal government became involved in limiting the activities of patent medicine companies. The first agency that had had regulatory powers was the Post Office, which could deny fraudulent concerns the use of the mails. But the Post Office did not have the resources to adequately combat the menace of patent medicine. As problems continued, it became clear that the government would have to step up its regulatory efforts if it were going to put a dent into the abuses of food and drug companies.

A growing coalition of interests pushed for federal regulation of those industries. The efforts of the AMA, the press, and the public came to fruition in 1906, when the Pure Food and Drug Act passed, establishing the first laws specifically regulating the patent medicine trade. The Act empowered the Secretary of Agriculture to fine and imprison sellers of adulterated or misbranded products.²² Patent medicines were not the primary focus of the Act, but the federal government did gain unprecedented power to regulate

²¹ Adams, 3.

²² Michael McGerr, *A Fierce Discontent: The Rise and Fall of the Progressive Movement in America, 1870-1920* (New York: Free Press, 2003), 163.

the industry. Though the law had serious weakness that took decades to redress, it was an important first step, one that could not have been taken without the lobbying of the AMA and the public education efforts of reporters like Adams.

Rupert Wells was hit on all three sides by progressive reformers. First, the press and the medical industry worked in tandem to reveal the fraudulence of Wells's operation. Tests by the Lederle Laboratories revealed that Radol was nothing more than quinine sulfate in water and alcohol. The bluish glow that supposedly indicated the presence of radium was actually caused by the fluorescence of the quinine, a trick no doubt borrowed from Morton. More damning was the fact that Radol contained no radium whatsoever. As Adams memorably put it, "Radol contains exactly as much radium as dishwater does, and is about as efficacious for cancer or consumption."²³ Wells represented all that was evil to Adams. "He is a home-and-fireside cuddler, is Rupert. He is also a ground-and-lofty liar of the most complete and soul-satisfying description. You can read whole pages of his literature and not come upon one single statement tainted with truth."²⁴

Wells did not take Adams's accusations lightly. He saw the article as part of a larger conspiracy against commercial medicine. *Colliers*, he alleged, was being subsidized by the American Medical Association as part of an effort to destroy any doctors who advertised. This was the standard response of many patent medicine men, who never tired of denouncing organized medicine as a cabal, fearful of any competition. Wells also attempted to refute Adams's charges of dishonesty. He defended both his

²³ Adams, 90.

²⁴ *Ibid*, 90.

medical credentials and the authenticity of his testimonials. In his correspondence, Wells portrayed himself as the little guy, fighting against the monolithic medical and publishing industries. Though he hoped to charge *Colliers* with slander, he feared that the necessary legal fees would “[bankrupt] a man of ordinary means.” Such an admission beggared his earlier claims that his private means allowed him to sell radium at a loss. Wells, while skilled at manipulating his image according to his needs, could not climb out of the hole dug by Adams. His defenses were weak at best. Declaring that “the treatment is prepared from Radium according to the most approved manner” did not make it so.²⁵

Thanks in large part to Adams’s work, Radol soon came under the scrutiny of the federal government. First, a Post Office fraud order denied Wells the use of the mails, without which his business model was dead. But his trouble with the government was not over yet. Radol also came to the attention of the Department of Agriculture, the body in charge of enforcing the new Pure Food and Drug Act. Of the thousands of judgments made under the Act, Radol was number 184. The Department deemed Radol fraudulent because it contained no radioactivity and because “Dr. Wells” was a fictitious person. The label also failed to state Radol’s alcohol content. Over time patent medicine peddlers would find gaping loopholes in the Pure Food and Drug Act that would subsequently force the government to strengthen its regulatory powers. But the 1906 Act, which was in essence a labeling law, was more than enough to convict Dennis Dupuis. The Department deemed Radol misbranded and fined him \$150. Dupuis paid and receded into anonymity.

²⁵ Wells to B.L. Selleck, September 9, 1906. AMA, Box 903, Folder: Wells, Rupert (Radol Cancer Cure) 1909-1933.

Yet even after Radol was banished from the market, it remained a notorious product. *Nostrums and Quackery*, the AMA's compendium of articles on patent medicine, featured Radol as the quintessential humbug and called Wells "heartless." But Wells was not solely to blame.

Equally guilty are the editors and proprietors of those journals—religious and lay—which have accepted their share in the toll of pain and death by giving publicity to Rupert Wells and his 'cure.' Printers ink is the very life blood of quackery; take away the support and moral influence afforded by the press through its advertising pages and Rupert Wells and others of his kind would seek more reputable, albeit less profitable, fields of operation.

Here was the dilemma faced by opponents of patent medicine. The same press that, in the hands of Adams, had helped bring Radol down also helped keep thousands of other products alive. The consumer was also complicit. The AMA pointed to the success of Radol as "a sad commentary on the gullibility and ignorance of the public in medical matters."²⁶ If the public would only realize the worthlessness of such products, patent medicines would wither on the vine. But what could one say about the people who really believed in the efficacy of products like Radol? The AMA pointed to the "psychic value" of evocations of radium and descriptions of Radol's blue, seemingly radioactive glow, but the fact remained that patent medicines were popular with huge segments of the population. The dilemma would continue to plague Progressive reformers as new radium patent medicines entered the market.

Wells was a perfect target for progressive critics. He had a high profile and the fraudulence of his operation was fairly easy to discern. Not all cases were so black and

²⁶ *Nostrums and Quackery*, 74.

white. In this period before radium was readily available, many worked in the gray area between legitimate and illegitimate practice. Dr. Abbott E. Kay was a prime example. His career in some ways encapsulated the gradual expansion of the gap separating mainstream medicine's use of radium from that of patent medicine. He himself seemed to undergo a journey from the former to the latter. By the end of his decades-long career in the radium business, he had strayed far from the apparent sincerity of his earlier endeavors into classic quack territory.

Unlike Rupert Wells, Kay was a real person with legitimate medical credentials. Born in 1873, he graduated from the University of Illinois College of Medicine in the late 1890's, and, by the time radium was discovered, was in charge of a hospital in Illinois. He was not, however, a member of the Chicago Medical Society or the AMA. Like many doctors of his era, he had received enough medical training to practice legally but not necessarily much more. He billed himself as a radium expert and specialist in cases that had proven resistant to the treatment of other doctors.

To the untrained eye, Kay looked like a legitimate radium dealer. While men like Wells were operating in the questionable wing of commercial radium, there were also legitimate concerns sprouting up in America's cities. As mainstream physicians explored the possibilities of radium, they needed instruments to apply it and equipment to transport it.²⁷ Kay offered these services. He advertised the sale of radium salts, tubes, applicators, and apparatus and offered rentals, examinations and treatments. While Wells had disguised his run-of-the-mill nostrum with a veneer of medical legitimacy, Kay

²⁷ These will be discussed in the next chapter.

seemed, to all appearances, to be a mainstream doctor who happened to use radium in his practice. However, it is unclear to what extent he had the training or resources necessary to operate such a business.

By the late 1910's, Kay began having run-ins with the AMA. Though he had attended medical school, he, like many physicians, was not a member of the Association and often wrote angry letters to *JAMA* and Propaganda Department head Arthur Cramp. Kay's principal complaint concerned what he saw as collusion between the AMA and the bigger and older radium production companies. He argued that *JAMA* discriminated in its advertisements, favoring big companies while smaller operations like Kay's were ignored. Furthermore, Kay was unable to get the United States Bureau of Standards, which tested radium samples to certify their radioactivity levels, to analyze his radium and give it the government's stamp of authenticity. Large-scale radium producers like Radium Chemical Company would advertise in *JAMA* the fact that their radium had been certified by the Bureau. Without such a certification, Kay could not hope to compete with the larger radium companies. "I make this direct charge, as under oath, that the statements indicating that the US Bureau of Standards determines the amount of radium element in tubes or incorporations...are false and fraudulent," he wrote in a letter to the *Journal*.²⁸

The general impression one gets of Kay is that of a scorned lover. Kay and his radium were probably either ignored or found to be useless by the Bureau, and Kay in response vented his spleen and concocted conspiracy theories. Once Kay had been

²⁸ Kay to the editor of *JAMA*, November 29, 1919. AMA, Box 410, Folder 12: Kay, Abbott E., 1910-1921.

spurned by the establishment of which he had been a part, he turned against it, and his career devolved into crackpot territory. A letter Kay wrote to Cramp in 1921, over a decade after Kay began his radium enterprise, shows that Kay's ideas about radium's properties and therapeutic promise were at best distorted and at worst downright fraudulent. In response to the allegation that his samples contained very little radioactivity, Kay declared that he had access to stronger samples but felt no reason to use them due to their correspondingly higher price. Kay continued to set himself against the medical establishment: "If, doctor, you have as much as a small fraction of the brain power your advocates think, you can see that we must have been selling the genuine substance, since every sale we make, means one sale our competitors do not make." Kay even claimed to have "an unlimited supply of radium" that could do the work of many physicians in a short amount of time. Any doctor, and many lay persons that had followed radium in the press, would have known that it was impossible to obtain, let alone afford, an unlimited supply of radium.²⁹

Over time Kay's dubious business adventures continued to snowball. One of his most egregious forays into commercial radium was his association with a product called, alternately, Audiophone or Radium Ear. Hearium was a fictitious radioactive substance that Kay marketed along with Audiophone's inventor, Charles Fensky. Kay wrote ad copy for Audiophone that touted Hearium as a "mineral substance radiating radio active and electrical rays" that could help cure deafness. Not surprisingly, Audiophone was attacked by the AMA in its *Nostrums and Quackery* series, which pointed out that it was

²⁹ Kay to Cramp, September 30, 1921. AMA, Box 410, Folder 12

“put out by an individual who dealt in fake radium!” Kay had been under the AMA’s scrutiny for well over a decade at this point, and not one of his products had been shown to contain any substantial amount of radium. Radium Ear, for example, “had no more value as a cure for deafness than the luminous figures on the dial of a dollar watch.”³⁰

In addition to coming under the eye of the AMA, Kay also had trouble with the government. The Federal Trade Commission issued one of his concerns, the Aaban Radium Company, a cease and desist order for unfair methods of competition in commerce. The order pointed out that Kay’s declarations that he produced radium in his home could not have been true because radium production required a large plant. Consequently, the radium claims in Kay’s advertisements were false and fraudulent. Interestingly, Arthur Cramp, who had filed the suit with the FTC, was unable to produce a single dissatisfied customer.³¹ Here was the classic rub of the patent medicine industry. Even products that were known by authorities to contain no ingredients of medicinal value had their steadfast adherents. For Cramp it was a sign of the public’s never-ending gullibility when it came to sickness and health. “It is a curious thing,” he wrote, “that the average person who would not buy a diamond or a gold ring from a concern with no business standing will purchase alleged radio-active material for therapeutic use from any ignorant faker or blatant swindler that comes along.”³²

Kay, no doubt, would have seen the lack of unsatisfied customers as evidence of the efficacy of his products. What is more likely is that Kay’s satisfied customers’

³⁰ Arthur J. Cramp, *Nostrums and Quackery and Pseudo-Medicine*, vol. III (Chicago: Press of the American Medical Association, 1936), 40.

³¹ Cramp to *JAMA* January 30, 1926. AMA, Box 410, Folder: Kay, Abbott E., 1922-1926.

³² Cramp to F.N. Leonard, July 15, 1924. AMA, Box 410, Folder: Kay, Abbott E., 1922-1926.

illnesses cured themselves of their own accord or were helped along by the power of suggestion. Others may have been reluctant to speak out against Kay because they were even more opposed to orthodox medicine, which many saw as heartless and inadequate. Kay, himself trained as a doctor, increasingly made opposition to organized medicine the centerpiece of his medical philosophy. Finally, many of the patients that might have expressed the strongest dissatisfaction, may simply have died.

Kay's troubled personal life may help shed light on his paranoia and questionable medical practice. In 1910 newspaper accounts appeared detailing Kay's strange relationship with one Elinor Knapp Kay. While Knapp claimed to be Kay's wife, Kay denied it, saying that the signature on their marriage license was not his own. He denied that their relationship went beyond being "chummy." Knapp had moved in with Kay to nurse his father and continued living there after the rest of his family left Chicago for California. Knapp alleged that Kay slept with a hunting knife, revolver, and shears and that she often feared for her life. He countered that it was she who had chased him with a revolver. Eventually the couple was granted a divorce, but the image of Kay that appears in the extant biographical information is one of instability and violence.³³

Arthur Cramp's dealings with Kay had convinced him too that there was something wrong with the man. He admitted to one correspondent that he was "unable to determine just exactly what's Kay's scheme is."³⁴ Over the years Cramp became convinced that Kay was psychotic and had his suspicions confirmed in 1933, when a

³³ Stories on Kay's personal life appeared in Chicago *Examiner*, 20 August 1910 and 24 February 1911 and Chicago *Inter-Ocean*, 21 August 1910. AMA Box 410, Folder 12.

³⁴ Cramp to Stratton, March 10, 1921. AMA, Box 410, Folder 12.

letter arrived from Dr. Charles Read of the Elgin State Hospital, where Kay had been institutionalized. Read wrote that Kay's was

probably a case of paranoid state with schizophrenic features of many years standing. He knows little about radium, nothing of its source or how it is derived but states that it can be obtained from most any clay or rock in the state of Illinois and he is able to tell its presence in stone by its action upon his heart. He has vague paranoid ideas that his work has been interfered with by large corporations as the AMA and government inspectors. He is making a good institutional adjustment.³⁵

Kay's later years were characterized by repeated institutionalizations. Though he had reportedly made a fortune in the radium business, by 1939 he could not be released from a mental institution because he had no friends or family to care for him. He was "a shadow of his former self."³⁶

Spencer Weart has shown that schizophrenics are sometimes driven by the idea that "divine 'rays,'" with which radium could easily be conflated, are acting all around them.³⁷ Kay saw in radium something uniquely powerful and, unlike an obviously self-interested quack like Wells, seems to have been genuinely compelled to use the element's unique power to aid humanity. When his attempts met with failure, he saw a vast conspiracy aligned against him. Huge, impersonal institutions were making it impossible to save the people who needed saving. Like Cramp, we cannot know what exactly Kay was up to, but his career shows that the border between regular and irregular medicine was not well delineated, but the gap between the two was widening. His story shares a number of similarities with other early exploiters of the radium craze, but Kay himself

³⁵ Read to Cramp, May 6, 1933. AMA, Box 411, Folder 2: Kay, Abbott E., 1931-1939.

³⁶ Teschner to AMA, June 28, 1939. AMA, Box 411, Folder 2.

³⁷ Weart, 62.

seems to have been as deluded as any Radol customer. When Wells railed against the medical establishment, he seemed to protest too much. Kay, on the other hand, may have believed he was acting for the good of humanity, not just tilting at windmills.

The story of early radium therapy was complex. On one side was the medical establishment, which was making halting progress in the field.³⁸ Radiology did not yet exist as a codified branch of medicine, but experimenters were working to establish the parameters of the new element's usefulness. Operating parallel to orthodox physicians were men like Wells and Kay, who exploited the imagery surrounding radioactivity. The third side of the story, that of patients and customers, took place between these two poles. Americans were confronted with a barrage of claims about radium, of which only a fraction were true. The financial success of products like Radol showed the extent to which patent medicine companies played on Americans' fantasies about sickness, health, radioactivity, and science as a whole.

For the customer surveying the landscape of radioactive patent medicines, there was a hodgepodge of claims both old and new to be found. Some peddlers looked back to the nineteenth century for their precedents, and their products differed little from ones that came before. Old stand-bys like arthritis were the focus of their appeals. Others, however, offered paeans to the newness of radium and its marvelous properties that had been trumpeted in the press. Most patent medicine salesmen were expedient above all

³⁸ This is the subject of the next chapter

and borrowed freely from the past and present, presenting a tangled image of what the element was and what it was capable of.

Looking backward, radium's most important medical ancestor was electricity. Though known about for centuries, it had been little understood until the nineteenth century and was a relative newcomer in the lives of many Americans. Nineteenth-century companies offered myriad belts and solutions that claimed to harness its power. After radium was discovered, people immediately began to link the two scientifically and in their imaginations. Both represented new and unprecedented sources of energy that offered visions of cheaply illuminated cities and easily cured diseases. Newspapers printed articles that gave credence to the connection. Professor Edgar Larkin told readers of one paper that "all matter can be resolved into electricity and electricity is radium."³⁹ While easy to dismiss today as scientifically incorrect, contemporary readers would have had more difficulty. The notion that these new invisible forces would revolutionize medical treatment appealed to Americans on a gut level and was quickly translated into commercial appeals.⁴⁰

Several of the earliest radium patent medicines made explicit links between radioactivity and electricity. J. Bernard King's Ray-Cura, for example, claimed to be "no more a medicine than electricity is a medicine."⁴¹ By making such a statement, King treaded carefully on the uneven ground between science and the medical establishment. On the one hand he evoked scientific progress, claiming for his product one of the most

³⁹ Unknown Los Angeles newspaper, 6 October 1903. WJH.

⁴⁰ Historian Carolyn de la Peña has argued that manufacturers of radium products "borrowed electricity's cultural cachet" in pushing their wares on the public. *The Body Electric*, 19.

⁴¹ Ray-Cura pamphlet, 1919. AMA, Box 401, Folder 7: International Radium Company, 1918-1937.

powerful natural forces that mankind had harnessed. On the other, he set himself against the medical establishment by downplaying Ray-Cura's status as a medicine. Ray-Cura offered the best of both worlds to its customers

Advertisements, like those for the rheumatism cure Radium Radia, also established visual links between electricity and radium. Samuel Hopkins Adams exposed Radium Radia in his *Great American Fraud* series, arguing that it traded on "public superstition regarding supposed wonderful qualities of the little understood element."⁴² In fact it did even more. It also played on the mystery surrounding electricity that preceded radium. The R's in Radium Radia both show dozens of jagged lines emanating out, clearly meant to evoke sparks or lightning bolts (See Illustration 3.2). Though the scientific connections between electricity and radioactivity were not made clear, the ad encouraged readers to conflate the two.

That Radium Radia claimed to cure rheumatism was no coincidence. The nineteenth century was rife with electrical contraptions claiming to ease the pain of arthritis and other ailments. In fact, rheumatism and arthritis represented one of the three major categories of therapeutic promises made by radium products. The stubborn pains of rheumatism had long caused Americans to flock to patent medicines due to the chronic nature of the disease. Many went from doctor to doctor, product to product, trying to find one that finally worked. Radium's newness no doubt offered a glimmer of hope to many long-suffering arthritics. It is unclear from looking at Radium Radia's advertising material exactly what it offered that orthodox practitioners and other patent medicines did

⁴² Adams, 90.

MISCELLANEOUS ADVERTISEMENTS. MISCELLANEOUS ADVERTISEMENTS. MISCELLANEOUS ADVERTISEMENTS.

Radium Radia

Continues to Make AMAZING CURES of

RHEUMATISM

In All Its Forms. *N. J. Herald*
May 21, '05

And is drawing the attention of eminent physicians to its wonderful merits, many of whom have put it to a practical test by using it in the most stubborn cases of years' standing, and resulting in cures being made in every case. They are now recommending it to all their patients.

It is unquestionably the only reliable and sure cure for Rheumatism, and all other bodily pains.

The knowledge that Radium Radia is a sure cure for

APPENDICITIS

must be welcome news to all who suffer thus, as there need be no further dread of the knife and operations.

-- ONE STRONG TESTIMONIAL --

"165 East 85th Street, N. Y. City, April 11, 1905.

"RADIUM RADIA COMPANY, 13 West 26th St., New York City:—

"GENTLEMEN—Count me among those who have been cured of Rheumatism by the use of 'Radium Radia' and put me down as one of the strongest indorseers of your wonderful remedy, and also add my wife to the list, as she, too, is loud in her praises of the cure effected by its use. For several years my wife and I suffered agony from Rheumatism of the legs and arms and only found partial relief in the usual prescriptions. Your 'Radium Radia' was called to our attention, and after less than half a dozen rubbings with it we were entirely relieved of the pain, and we have not suffered a return of the Rheumatism since, and to 'Radium Radia' entire credit is due for the cure. I cannot too strongly recommend it as a positive cure to all who suffer from Rheumatism of however long standing."

Very truly yours, J. J. O'CONNOR.

APPLIED EXTERNALLY.

Mailed to any address in the United States upon receipt of **ONE DOLLAR.**

We will gladly send booklet and many more testimonials **ON REQUEST.**

SOLD AT ALL DRUG STORES AND
13 WEST 26TH STREET.

PRICE ONE DOLLAR

Illustration 3.2. A New York *Herald* advertisement for Radium Radia. William J. Hammer Collection, Smithsonian Institution

not when it came to curing rheumatism. Apparently, just the word “radium” itself was enough to make the necessary connection. The word had taken such symbolic and imaginative power that it could be evoked as a sort of scientific magic whose power and links to other forces of nature went without saying. Adding a testimonial gave the ad a personal touch and completed the connection between abstract promises and real cures.⁴³

The popularity of ancient health spas provided another imaginative link between radium and rheumatism. The famous springs of places like Bath, England, and Baden Baden, Germany, had already been popular with rheumatics for centuries when the element was discovered. Scientists conjectured that the healing power of the springs was linked to radioactivity, and indeed some natural springs did contain more radium than ordinary water.⁴⁴ Suddenly, these ancient natural springs began trumpeting the radioactivity of their waters. In the U.S. as well, radium springs sprouted up in places like Hot Springs, Arkansas, and Claremore, Oklahoma. The mysterious soothing properties of the springs seemed to be explained. It was radium, some claimed, not the relaxing settings or warm waters, that brought relief to arthritis sufferers. Again, one sees radium straddling the line between the past and the present.

The newly ascendant germ theory of disease helped create a second category of radium patent medicines that promised to cure all germ diseases. Like most advances in mainstream science, the discovery of the tuberculosis bacillus was followed by a bevy of products that boasted of germicidal powers. One of the most famous was Radam

⁴³ Advertisement in New York *Herald*, 21 May 1905.

⁴⁴ Handbill in College of Physicians of Philadelphia, Medical Ephemera Collection, Box: Queen to Ralston. Folder: Radium Limited, USA 1. Illustrated handbills advertising apparatus for making radium emanation water. Ca 1915.

Microbe Killer, a product that convinced many Americans that all diseases were caused by germs even before many physicians were convinced of the theory.⁴⁵ This excitement for products like Radam linked perfectly with news about radium, which the press frequently billed as a germ-killer.

The Dr. Warner Remedy Company's Radium Rings and Radiozone, demonstrated the gossamer connections between radium and the treatment of germ diseases. It claimed to be "a positive cure for all germ disease" that acted by flooding "germs and decayed tissues" with "emanation from the radio-active [sic] compound."⁴⁶ Here one finds a grouping of scientific buzzwords but no sense of how they fit together. The mechanism through which radioactive emanation reversed the problems of germs and decay was less important than the vague evocation of radium's general and well-known effect on the body. The products' advertisements offered just enough details to set them apart from their competitors without the scientific details that could be disputed by physicians or misunderstood by lay people.

As he often did, Samuel Hopkins Adams smelled trouble when he received a circular from the Dr. Warner Remedy Company of Chicago. Visiting their offices, he found no Dr. Warner but rather a man named Bird Collins, who had received a degree from a "fraudulent nostrum school." The transcript of the interview reads like something between *Dagnet* and Abbott and Costello. When questioned by Adams, Collins admitted that his products contained no radium and that Radium Rings and Radiozone were merely "trade names." After determining that there was in fact no Dr. Warner,

⁴⁵ Young, *Medical Messiahs*, 26.

⁴⁶ Adams, 90.

Adams asked, “Is there anything in [your remedies] at all?” Collins replied, “Yes there is. There’s money in ‘em if they’re pushed right.”⁴⁷

Tuberculosis received particular attention as the most feared of the germ diseases. Early reports in the press had seemed to indicate that radium could be the long-awaited consumption remedy. A handful of experimenters, reportedly including Frederick Soddy, radioactivity expert and future Nobel laureate, believed that radium could be the discovery that finally conquered the 19th century’s dread disease.⁴⁸ Such statements doubtless encouraged men like Wells to include consumption in their products’ list of indications. Ray-Cura too claimed that the dread disease could be cured in 30 to 90 days.⁴⁹

The third category of disease stressed by the early commercial radium medicines was cancer. Cancer became to the twentieth century what tuberculosis had been to the nineteenth: a disease synonymous with death itself. Radium allowed patent medicine companies to appeal to the fear of both. Fantasies about these diseases, Sontag argued, were born of the perception that they were “intractable and capricious.”⁵⁰ Both represented death sentences, literally and symbolically. Such diseases were perfect fodder for patent medicines because organized medicine did not know what to do about them. The identification of its bacillus and improvements in hygiene eventually helped limit the scourge of tuberculosis, but a cure remained elusive until the 1950’s.

Meanwhile, many forms of cancer were and remain stubborn and difficult to cure unless

⁴⁷ Adams, 91.

⁴⁸ New York *Commercial Advertiser* August 29, 1903.

⁴⁹ Ray-Cura pamphlet, AMA, Box 401, Folder 7: International Radium Company 1918-1937.

⁵⁰ Sontag, 5.

detected early. The seeming randomness of the affliction also contributed to the terror evoked by the disease, indeed the word, “cancer.” “Any important disease whose causality is murky, and for which treatment is ineffectual, tends to be awash in significance,” wrote Sontag.⁵¹ Patent medicine companies claimed they would succeed where doctors had failed, that they provided the only light at the end of the tunnel. The AMA devoted an entire chapter of *Nostrums and Quackery* to ten of the most egregious cancer cures that were proliferating early in the twentieth century.

Widely circulating ideas about radium might have helped spark the idea that it was a tuberculosis and cancer cure. Sontag has shown that notions of poorly balanced “vital forces” characterized both diseases. Each was imagined to attack those who lacked or repressed their life force.⁵² Radium, on the other hand, was seen by many as a physical manifestation of vitality itself. Newspapers reported experiments like those of British scientist J. Butler Burke, who claimed to have created life spontaneously by introducing radium into a test tube containing lifeless organic matter.⁵³ Such a powerful animating force would have seemed to many the perfect antidote for the lack of vital energy behind these dread diseases.

The fact that many Americans viewed cancer as shameful also made it well-suited for patent medicine appeals. Many cancer sufferers were reluctant to see doctors about their conditions, hoping even to hide their illness from family and friends. James Patterson has described the “conspiracy of silence” that surrounded cancer during the

⁵¹ Sontag, 21.

⁵² Sontag, 58.

⁵³ *New York Journal*, June 21, 1905.

nineteenth century and into the twentieth.⁵⁴ Patent medicines, however, offered discretion that doctors could not match. Ordering a product like Radol or Ray-Cura through the mail allowed a customer to remain anonymous and safe from the suspicions of neighbors and even family members.

While radium remedies can be grouped into loose categories, some resisted easy categorization. The press had created expectations that went well beyond a handful of disease clusters. The average American could not have been faulted for believing that radium could cure just about everything. Philip Schuck, Jr., a Denver businessman, capitalized on these fantasies of a radium panacea. His operation, set up during the first decade of the twentieth century, marketed two complementary products: Radio-Sulpho and Radio-Sulpho Brew. Radio-Sulpho, when mixed with limburger cheese, was a poultice to be applied externally, while the Brew was to be ingested. Schuck claimed that his products would cure illnesses in all three categories. He also developed his own medical philosophy based on the danger of vaccines. They, Schuck explained, were the cause of cancer, and his radium products offered a means of purifying the body and bringing it back to health. Radio-Sulpho appealed particularly to women, as Schuck claimed that “cancer of the womb and breast are the simplest, easiest, and quickest cured made.” African-Americans, however, needed not apply as Schuck treated “the white race only.”

Radio-Sulpho billed itself as a treatment for such an array of diseases that it neared cure-all territory. Bloody flux and chronic dysentery, which would have been

⁵⁴ Patterson, 4.

familiar to many a war veteran, were among Radio-Sulpho's indications. "Syphilis in any form," constipation, catarrh, nervousness, bloating, turbid liver, and kidney disorders were also curable. Radio-Sulpho prevented appendicitis as well as dissolved and removed "poisons absorbed into the skin of printers, painters, artists, and metal workers." It purified the blood of the unwell, and, for those without specific medical complaints, it was "a delightful Bath for the Healthy as well as for the sick." Everyone, it seemed, could benefit from the wonders of Radio-Sulpho in poultice or ingestible form.

However, not everyone was convinced of Radio-Sulpho's medical value. A reporter for the *Denver Post* called Radio-Sulpho "sewer gas,"⁵⁵ eliciting a charge of libel from Schuck.⁵⁶ As had been the case with Radol, press reports soon caught the attention of the government. Shipments of Radio-Sulpho made in April 1910 were found to be misbranded. The Department of Agriculture stated that the use of the word "radio" would lead purchasers to believe that the product contained radium or other radioactive substances. In fact Radio-Sulpho contained sulfur and sodium hydroxide in water, and Radio-Sulpho Brew was a weakly acidulated alcoholic solution with Epsom salts and bitter vegetable material.⁵⁷

The International Radium Company's Ray-Cura also played the panacea card, offering a huge list of illnesses to choose from. Its proprietor, J. Bernard King, included all three standard categories plus more exotic illnesses such as gangrene, pellagra, ulcers,

⁵⁵ *Denver Times* December 1, 1910.

⁵⁶ *Denver Post* December 12, 1910.

⁵⁷ National Archives. Record of the Food, Drug, and Insecticide Administration and FDA: Notices of Judgment, 1908-1940, Box 1: 1-1500, ACC.NC 3-88-76-1.

and milk leg (a form of thrombosis).⁵⁸ Few Americans would have read Ray-Cura's list of indications without finding something that appealed to them. King alleged that even Theodore Roosevelt was a customer.⁵⁹ Yet for all of radium's power to destroy disease, King insisted Ray-Cura was "as harmless as a gentle zephyr blowing over a sweet scented flower garden."⁶⁰ King, like Wells, was easy to identify as a fraud. In fact, by the time he began marketing Ray-Cura, he had already been convicted of illegally practicing medicine in Cincinnati before moving on to Philadelphia, then to Los Angeles.⁶¹

King's style and business model were similar to those of Wells, but he did make one innovation upon which later radium products would build. While most were still singing the praises of radium, Ray-Cura attempted to outdo its predecessors by offering "a new radium." Most Americans reading the advertisement would have had little reason to doubt the idea that there could be some "new radium" that had surpassed the old. Radium was discovered at a time in which major scientific discoveries were coming at an astonishing clip. X-rays and radium, two finds that radically altered the scientific landscape had come less than five years apart from each other. These, coupled with the spread of electricity, the ascension of germ theory, and other advances helped create a climate of discovery in which everything seemed possible. A "new radium?" Why not? During the heyday of 1920's, a handful of products would follow King's lead,

⁵⁸ 1919 Ray-Cura Pamphlet. AMA, Box 401, Folder 7.

⁵⁹ King to Garcia, September 29, 1919. AMA, Box 401, Folder 7.

⁶⁰ Cramp, to C.B. Pinkham, September 12, 1921. AMA, Box 401. Folder 7.

⁶¹ *Nostrums and Quackery*, vol. 3, 94.

proclaiming that they and they alone had a new radioactive substance whose properties outmatched all those that had come before.

Progressive reformers faced a dilemma when it came to regulating radium cures. Much of the progressive ethos was built on faith in experts. Historian Robert Wiebe has argued that, beginning in the late 1800's, a new middle class of professionals emerged with the belief that expert knowledge in fields like medicine would help bring order to a fragmenting society.⁶² Yet notions of expertise broke down when Americans confronted something as new and baffling as radium. When the element first appeared, it was the scientific experts themselves who helped create a context of confusion and misinformation that was then spread by the press and exploited by commercial interests. Radium resisted easy classifications of "legitimate" and "illegitimate," forcing progressive reformers to operate in a climate of ambiguity.

For men like Arthur Cramp and Samuel Hopkins Adams, the situation was simple. They believed that if the people only knew the facts they would shun all patent medicines as dangerous quackery. But that simply did not happen. As science advanced and word of the dangers of nostrums spread, Americans continued to purchase questionable over-the-counter drugs by the millions. The link between information and change worked in establishing regulatory laws, but it did not reach the people on the ground who continued to support a booming patent medicine industry.

⁶² Robert H. Wiebe, *The Search for Order, 1877-1920* (New York: Hill and Wang, 1967).

While it was easy for men like Cramp and Adams to dismiss patent medicines as evidence of the public's credulity and foolishness, such a view slights the experiences of patent medicine users. Many customers for products like Radol simply had nowhere else to turn. For some, orthodox medical care was unavailable geographically and economically. For others, Radol would have been only the most recent in a long string of attempts at a cure. The average person would not have approached his or her health from a position of knowledge and planning. Rather, he or she merely would have tried things until something worked. Without access to a doctor's advice, they would have had little to go on beyond what they read in advertisements. Maybe a testimonial caught their eye, or an attention-grabbing image helped steer them away from one product and toward another. In the case of Radol, radium's novelty may have helped nudge customers in that direction. This new miracle of science and nature would doubtless have brought hope to many who felt they were out of options.

The other problem that faced the critics of patent medicines was the public belief that the products worked. The majority of patent medicine advertisements contained testimonials that seemed to prove that there was something of value to be had. Someone like Adams could of course point out that testimonials were frequently invented or manipulated. However, there were those who genuinely swore by these products. Word-of-mouth spread tales of wonderful cures and helped sustain the market for items like Radol. Such stories could be powerful and long-lived. In 1932, decades after Wells's business had been shut down, the AMA received an inquiry from a woman in Levelland, Texas, about Radol, saying that a friend of hers had used it and that it had cured her

cancer.⁶³ For twenty-seven years this Mrs. Simmons carried around the notion that there was a product called Radol that could cure cancer. Cramp replied with Adams's line that Radol contained as much radioactivity as dishwater, but the problem presented to men like Adams and Cramp cannot be dismissed easily. Progressives worked to regulate big business on behalf of the public, but not all Americans wanted reform. Reformers faced the problem of protecting people who did not necessarily desire protection. Patent medicines worked to convince Americans that they, not the medical establishment or the government, were on the side of ordinary people.

Of course, orthodox physicians had a number of explanations for the troublesome notion that products like Radol worked. First was the observation that most diseases were self-limiting, that the body could overcome most illnesses without intervention by doctor or nostrum. This view of illness gained currency throughout the nineteenth century in reaction to the heroic interventions of eighteenth-century medicine. Patients paying high medical fees had long expected doctors to take direct action against disease to earn their pay. But when endless bleeding, vomiting and blistering became too much for patients, a new wave of more moderate medicine emerged. This view embraced the limits of what physicians could achieve.⁶⁴ However, the self-limiting nature of illness also opened the door for quackery. If a course of any patent medicine happened to coincide with an improvement that would have come anyway, it would have been natural for someone to conclude that there was a connection.

⁶³ Mrs. A.C. Simmons to AMA July 18, 1932. AMA, Box 903, Folder 10.

⁶⁴ See James H. Cassedy, *Medicine in America: A Short History* (Baltimore: The Johns Hopkins Press, 1991); John Duffy, *The Healers: A History of American Medicine* (Urbana, IL: University of Illinois Press, 1976).

A related phenomenon that helped explain the seeming effectiveness of patent medicines was the placebo effect. A 1987 study cited by historian James Whorton showed that patients who were given specific diagnoses and assured they would recover in a few days improved much more quickly than those who were not.⁶⁵ In the case of products like Radol, the placebo effect would have been reinforced by hyperbolic declarations of radium's miraculous properties that were appearing daily in newspapers across America. While the placebo effect and the power of suggestion operated in regular medicine as well, they were particularly central to the success of irregular therapies of all sorts. If a patient improved, the treatment worked. Patients agreed, and the belief that a product had medical value could be difficult to shake. Sometimes patients testified on behalf of patent medicine companies from sickbeds that had been wheeled into courtrooms. For men like Cramp and Adams, such stories were difficult to reconcile with the Progressive ideals of expertise and rationalism.

Over time the boundary between orthodox and commercial use of radium became clearer. By the heyday of patent medicine in the 1920's, radium products bore little resemblance to the field of mainstream radiology. While orthodox uses of the element narrowed toward cancer treatment, the market for supposedly radioactive products exploded into realms undreamed of by men like Rupert Wells and Abbott E. Kay. The government struggled to keep up, adapting new techniques to combat what James Harvey Young has called the "perennial proneness" of the American public to fall for

⁶⁵ James C. Whorton, *Nature Cures: The History of Alternative Medicine in America* (New York: Oxford University Press, 2002), 20.

“quackery.”⁶⁶ Yet the popularity of radium patent medicines cannot be explained through the ignorance of the public alone. Rather, it was the logical offshoot of the confusion and hope engendered by the popularization of a substance that defied easy understanding. The mysteries surrounding radium encouraged fantasies about sickness and health that encouraged commercial exploitation and frustrated the progressive search for order.

⁶⁶ Young, *The Medical Messiahs*, Chapter 20.

Chapter Four: Toward Radium Orthodoxy

Not all doctors who adopted radium therapy followed in Abbott E. Kay's footsteps. Their careers did not veer into the wilderness of quackery, and they did not go insane. For the handful of early radium specialists, radium offered an exciting, promising addition to the field of medicine. It was clear from the beginning that the element could be dangerous, but it was also clear that it held real curative value. Early radium therapists reined in some of the wild speculation that radium was a miraculous panacea and simply got to the work of establishing the parameters of what radium could and could not do. The first experimenters used radium in a haphazard empirical way in the treatment of a wide variety of illnesses. However, murky ideas about the element's effects and competing opinions on its proper usage eventually gave way to increasingly refined methods of harnessing radium's power to fight cancer. During the first two decades of the twentieth century, physicians and scientists laid the groundwork for the century of radiation therapy that has followed the Curies' discovery.

Before World War I, radium therapy was still in its infancy. Though the burns experienced by early radium experimenters were painful, they led the Curies and others to conclude that radium's effects were powerful and that perhaps the heretofore damaging rays could be redirected for good. However, the element's scarcity and high cost ensured that only a relatively small group of physicians, physicists, and other specialists were able to pursue radium medicine in the first decades of the century.

During that time, the only source of processed radium was the Curies themselves. Marie's famous slaving away in her small shed yielded minuscule amounts of the

element. What radium there was circulated among a small group of scientists who investigated its physical and chemical nature. While the public marveled at articles about the miraculous new substance that gave off its own heat and light, very few people were lucky enough even to see it in person, let alone conduct scientific or medical experiments with it. However, the Curies recognized that setting aside a small amount of radium for medical investigation would be worthwhile.

The Curies' initial gift of radium for medical research went to Dr. Danlos at the St. Louis Hospital in Paris, where the first organized research into radium as a medical treatment took place, in 1901. Lupus was probably the first condition treated with radium there. From Paris, radium therapy spread to Germany and Austria. The early dominance of France and Germany led to two rough camps into which radium therapists could be grouped: the "Berlin school" and the "French school." The Berlin school, influenced by ancient health spas like Gastein and Baden, tended to focus on the employment of internal and external radioactive water treatments as well as emanatoria, where patients could breathe radon gas. The French school generally involved the use of radium salts against skin conditions, but could also entail internal therapy, including the new idea of radium injections.¹ Eventually, American radium therapy would borrow elements of both schools. At this early stage, however, radium therapists everywhere were essentially groping in the dark. Specialists refined their methods through empirical trials, but the tiny supply of radium imposed limits on growth in the field. Because the Curies were the

¹ Claudia Clark, *Radium Girls*, 45-46

only source of the element, and their methods for its extraction were extremely laborious, there simply was not enough extant radium to pursue meaningful medical research.

The scarcity of radium in this early period led to a great deal of murkiness surrounding medical knowledge about the element. There were no organized medical philosophy to work from and no standards to follow. The best early researchers could do in terms of medical precedent were electricity, ultraviolet light, and x-rays. Radium, however, posed new challenges. X-rays, for instance, were relatively user friendly. Though doctors were improving their x-ray methods through trial and error, the basic notion of aiming the rays at a willing participant was fairly straightforward. Anyone with a cathode ray tube and a photographic plate could make an x-ray photograph of, say, a broken bone. Radium, though, did not come complete with a delivery system. Instead of a familiar electrical apparatus, a would-be radium therapist had only a pinch of powder in a glass or lead tube. Turning this innocuous looking powder into a useful and, as some were predicting, revolutionary medical treatment would take more experimenters, more radium, and more time.

Though radium was discovered in Europe and the earliest research into its medical prospects was conducted there, small amounts of radium began to trickle into the U.S. beginning around 1900. George Barker, a University of Pennsylvania physics professor and an early popularizer of radium, exhibited it in the United States as early as December of 1899. The means through which he obtained his sample remain lost to the historical record, but it must have originated in Marie Curie's shed. Barker wowed audiences with public unveilings of the element. The presentation of a tiny amount of

white powder must have been a bit underwhelming until his lecture reached its exciting climax: a demonstration of radium's "feeble luminosity" in a darkened auditorium.²

William Hammer was also among the first Americans to obtain radium. Hammer got his from the Curies themselves when he visited them in October of 1902.³ Soon he was trying out radium on a host of illnesses, including blindness. He would later claim to have been the first person in the world to treat cancer with radium.⁴ Hammer was not a trained physician and his work was typical of the empirical nature of early radium therapy. The first few years of radium medicine in America were characterized by wild experimentation and even wilder exaggeration. Investigators like Hammer aimed radium rays at just about every malady they could think of. Newspapers reported that the element would cure everything from germ diseases to cancer.⁵

The natural rareness of radium went hand in hand with another important aspect that limited early radium experimenters: high cost. Newspapers made much of the fact that radium had quickly become the most expensive substance on Earth. They declared that the element cost millions of dollars a pound, despite the fact that there was only a tiny fraction of a pound in existence. Crowds would gather to see the element when it arrived in their cities, only to find a tiny pinch of what looked like table salt. That something so minute could have the powers scientists and reporters were claiming for it must have boosted the mysterious allure of the substance.

² Badash, *Radioactivity in America: Growth and Decay of a Science*. 19.

³ Memorandum. WJH, Series 3. Box 17, Folder 8-Radium.

⁴ Autobiographical memo. WJH, Series 1, Box 3, Folder 7.

⁵ See Chapter 2 for the early press reports.

While the scarcity and high cost of radium may have served to add to the mystique of the element, about which amazing discoveries seemed to be announced daily in newspapers around the globe, it seriously hindered the element's curative potential. If radium therapy in America were going to move forward, more radium would be needed. By the 1910's, two sources of medical radium had developed. On one side, private companies pursued their own radium excavation, processing, and research. On the other, the federal government worked with the medical establishment to set up a cooperative effort to expand and professionalize the field of radium therapy.

The private, commercial branch of the American radium industry was led by Pittsburgh's Standard Chemical Company. Standard was born out of the American Vanadium Company, which mined vanadium in Peru for use in everything from Ford automobiles to the construction of the Panama Canal. The subsequent shift to large-scale radium production was born out of the personal circumstances of the company's owner, Joseph Flannery.

In 1909 Flannery learned that his sister had cancer and that radium could help her if only he could obtain it. Flannery decided to leave his vanadium concern and dedicate himself to increasing the world's radium supply. He established the Standard Chemical Company in 1911 and set up his first mines in the Paradox Valley of southwestern Colorado, where uranium ore had recently been discovered. Standard owned over 100 of the best mine claims⁶ at a time when there were only about 300 good claims known to be

⁶ Charles S. Parsons to James Douglas, December 22, 1913. National Archives. Bureau of Mines: General Classified Files, General Correspondence Files, Box 95 (1913), Folder 541.51.

in existence.⁷ The scale of work was enormous. Two hundred fifty men were needed to extract the ore and prepare it for processing. It was then shipped across the country to Canonsburg, Pennsylvania, where 150 more men extracted a purer form of radium from it. All told, production of one gram of radium required five tons of ore, 500 tons of various chemicals, 1000 tons of coal, and 10,000 tons of purified water. By 1913 Standard was already producing enough to export some to the Austro-Hungarian Empire, the original source of the Curies' pitchblende.⁸ Standard produced about nine grams of radium per year, peaking at 18.5 grams in 1920.⁹ Though Flannery's efforts were too late to save his sister's life, his company soon produced over half of the radium in use in the world.¹⁰ The United States, which had once lagged behind Europe when it came to all things radium, had surged to the forefront. In 1922 the world supply of radium was 175 grams, of which 120 had been produced in the U.S.

Though Flannery's motivations for entering the radium business were personal and medical, it was not medicine that provided Standard's chief source of revenue. The primary use of radium was in luminous paints. Dr. Sabin von Sochocky, a medical doctor and scientist from Austria, had developed a way of manufacturing luminous radium paint in 1915 for the United States Radium Corporation. Standard employed a similar process. The formula combined infinitesimal amounts of radium element with the luminescent substance zinc sulfide. In essence one ingredient of the paint lit up the

⁷ Memo: Radium Bearing Ores. National Archives. Bureau of Mines: General Classified Files, General Correspondence Files, Box 136 (1914), Folder 541.53.

⁸ *Radium*. Vol. 1. Number 4. July 1913. 7.

⁹ Joel Lubenau, "Radium City, USA." *Pennsylvania Heritage*. Fall 2005. Volume XXXI. Number 4. 18.

¹⁰ Lubenau, 18.

other.¹¹ The military helped fuel the young radium paint industry as a market for glow-in-the-dark airplane dials and instrument panels during World War I. A newly popular consumer item also proved a major boon to the luminous paint industry: the wrist watch. When pocket watches proved inconvenient for trench warfare, soldiers began jury-rigging them into wrist watches. A vogue for wrist watches began for both servicemen and civilians. Soon radium dial watches were proliferating, with thousands of men wearing those by Ingersoll and other brands. Over the coming decades, physicians and government regulators would often dismiss worthless radium patent medicines as having “less radioactivity than an Ingersoll watch.”

Novelty items also proliferated. Everything from light switches to crucifixes glowed with radium’s light. Some in the medical field lamented that too much radium was going to luminous paint and not enough was making it into the hands of physicians. R.B. Moore, Chief Chemist for the Bureau of Mines, for example, wrote letters to doctors, hospitals, and organizations like the National Research Council to encourage more purchases of medical radium. Manufacturers balked at Moore efforts, understandably reluctant to give up control over radium supply or sacrifice profits.¹²

But Standard and its rivals also pursued Flannery’s original goal for radium: medical treatment. Flannery established Radium Chemical Company, a subsidiary of Standard, to research and develop radioactive medical treatments. The company concentrated on delivery systems for radium, producing specialized instruments that

¹¹ Clark, 14.

¹² R.B. Moore to Ben Lawrence, February 25, 1920. National Archives. Bureau of Mines: General Classified Files, General Correspondence Files, Box 570, 1920.

would allow access to hard-to-reach body parts. Catalogs advertised radium containers, needles, nasopharyngeal applicators, cervical-uterine and rectal applicators, and an assortment of other contraptions.¹³

While Flannery and others who followed in his footsteps had vastly upped the domestic capacity to produce radium, the private sector was not alone in trying to increase the availability of the element for medical use. Despite assurances from Standard's house journal *Radium* that there was no reason to fear a "radium famine" in the United States,¹⁴ the federal government also became interested in fostering an American radium industry. With much of the radium processed in the U.S. going to non-medical uses, a small group in the federal government wanted to ensure that there was enough available for medical treatment. They hoped to establish a program that would form a partnership between the government and the budding field of radium therapy.

The first effort to remedy the supply problem was the National Radium Institute. The Institute linked radium mines in Colorado to a handful of hospitals, mostly in the East. The men in charge were James Douglas and Howard E. Kelly. Kelly, a gynecologist based at the Johns Hopkins University, had been among the first American physicians to experiment with radium. In 1913, when the Institute was founded, Kelly had the largest supply of radium in the U.S., still only one-third of a gram. Douglas was the head of the Phelps-Dodge Corporation, a major supplier of copper. Like Flannery, Douglas was drawn into the radium business by personal frustration over Americans'

¹³ Radium Chemical Company, Inc catalog. National Archives. RG 88-Records of the FDA. Division of General Services, General Subject Files, 1938-1974, Box 2535, 1958, Folder: 510.0-11—511.04.

¹⁴ *Radium*. Vol. 4. Number 6. March 1915. 119.

lack of access to the element. When Douglas's daughter was diagnosed with cancer, he had had to take her to Paris, where he rented exorbitantly priced radium because adequate supplies were not available in the United States. The experience left him with a zeal for making American radium more available and affordable at home.¹⁵

Kelly and Douglas partnered with the U.S. Bureau of Mines, then under the supervision of Dr. Charles Parsons. Kelly's share went to his own hospital, a private radium treatment facility called the Howard E. Kelly Hospital, while Douglas's went to Memorial Hospital (now Sloan-Kettering) in New York City. Kelly's work in Baltimore gave a new legitimacy to radiology. Many of the early publications on results of radium trials had offered single cases or grouped cases together haphazardly. Because supply of the element had been so lacking, it was hard for doctors to conduct more full-scale research before 1913. Kelly, on the other hand, finally had access to enough radium to pursue more in-depth study of its medical applications. He focused on one disease, carcinoma, and one location, the cervix, and reported on 213 cases over a period of five years. The results were promising. Of 203 cases in which radium was the only therapy given, 57 were cured and 109 showed marked improvement. Thirty-seven were not improved, despite the fact that the details of the cases were essentially identical to those of the improved cases. While radiation would clearly benefit many patients, the reasons for its success or failure in similar cases remained largely mysterious. Radium treatment also held the possibility of damage to healthy tissue. What Ruth and Edward Brecher call the "basic dilemma of radiation therapy" was beginning to emerge: an inadequate dose

¹⁵ Brecher and Brecher, *The Rays*, 272

risked a recurrence of the cancer, a curative dose risked destruction of healthy tissue. Striking a balance between these two poles would continue to be a central concern throughout the story of radium medicine.¹⁶

By the end of 1916 Douglas had provided Memorial with 2.3 grams of radium, making it home to one of the largest caches of the element in the world.¹⁷ Soon Memorial was the leading radium research and treatment center in the U.S., and among the best globally. Memorial's division of radium therapy began with a small group of dedicated researchers working under the supervision of Dr. James Ewing. Ewing selected Dr. Henry Janeway to head up the radium division, and in 1915 Dr. Gioacchino Failla joined the staff. In 1917 Janeway and Failla, along with bladder and prostate specialist Dr. Benjamin S. Barringer, published *Radium Therapy in Cancer at the Memorial Hospital*, a landmark monograph in the field. Their findings confirmed Kelly's work, demonstrating that radium achieved significant recovery rates, with more than one-fourth of cases showing "complete regressions."

Memorial's radium division was also home to one of the most prominent women working in a field dominated by men: Dr. Edith Quimby. Quimby, whose partnership with Failla marked one of the most productive research units in the U.S., arrived at Memorial in 1919. She and Failla worked together for over thirty years, in which time both ascended to the top of their profession. Quimby became president of the American Radium Society in 1954, while continuing to teach radiation physics at Cornell and

¹⁶ Brecher and Brecher, 272-274

¹⁷ Brecher and Brecher, 276

Columbia Universities. Failla retired in 1960, having presided over the top radiology research hospitals in the U.S. for over forty years.

With the National Radium Institute showing good results, the government continued to see radium as an investment that was well worth making. Getting more of it to a greater number of hospitals and practitioners became a pressing issue. Hearings before Congress bemoaned the fact that there were 200,000 cases of cancer each year, 75,000 of them fatal. “From the evidence at hand it seems probable that by the use of larger quantities of radium than are now available, a large number of present failures might be transformed into cures,” declared one congressman. The problem was radium’s astronomically high price. Supplies were still limited, and cost was beyond not only most individuals, but most health institutions as well. One speaker summarized the situation perfectly when he declared, “It has been well said, ‘cancer is the poor man’s disease, and radium is the rich man’s remedy.’” Government officials realized that if they wanted the poor to have access to radium treatment, the government would have to take a more active stance in mining, processing, and distributing the element.¹⁸

Some physicians worried that the government would become too involved, monopolizing the radium industry. James Douglas himself expressed concern that physicians could become “mere puppets in the hands of government officials.”¹⁹ However, Dr. Parsons reassured him that too many mines were owned by private companies for the government to establish a monopoly on the production and distribution

¹⁸ House of Representatives, 63rd Congress, 2nd Session, report #214. National Archives. Bureau of Mines: General Classified Files, General Correspondence Files, Box 136 (1914), Folder 541.53

¹⁹ James Douglas to Cha. S. Parsons, December 20, 1913. National Archives. Bureau of Mines: General Classified Files, General Correspondence Files, Box 95 (1913), Folder 541.51

of radium.²⁰ Some radium producers worried that even if the U.S. government did not achieve a monopoly, they would drive down the price of the element, which had settled at around \$120/mg, by giving it away free or at reduced prices. Parsons responded to producers' concerns as he had to those of doctors, that government involvement in the distribution of radium would not impact either segment of the industry negatively.²¹ Ultimately, these attempts at a government purchase of radium failed, and, beyond the efforts of the National Radium Institute, the government did not play an active role in the radium business.

Thanks to the increase of supply during the 1910's and 1920's, the initial murkiness surrounding radium therapy was somewhat reduced. The field looked increasingly like an important if inchoate branch of legitimate medicine, and, even if the loftiest hopes for the radium would not be met, there certainly appeared to be room for radium in the establishment's armamentarium. However, a gray area continued to hover at the border of what "orthodox" use of radium entailed. The element was much better understood than it had been a decade before, but it retained some of its old enigmatic qualities. The persistent cloudiness surrounding radium therapy had a great deal to do with two forms of it that were growing in parallel at this time: internal and external. Internal therapy involved having patients drink radioactive solutions or injecting them into the bloodstream. Such treatment was designed to cure a host of illnesses, many of them pain-related conditions such as arthritis and neuritis. Meanwhile, external therapy

²⁰ Charles S. Parsons to James Douglas, December 22, 1913. National Archives. Bureau of Mines: General Classified Files, General Correspondence Files, Box 95 (1913), Folder 541.51.

²¹ Joseph H. Lorimer of Radium Company of American to Charles S. Parsons, March 22, 1915 and Parsons to Lorimer, March 23, 1915. National Archives. Bureau of Mines: General Classified Files, General Correspondence Files, Box 170 (1915), Folder 541.53.

narrowed toward the treatment of cancer by aiming radioactive rays at the afflicted body part via an assortment of applicators. The vogue for internal treatments was driven largely by radium production companies. They not only refined the element but developed apparatuses for treating a variety of conditions. Because proponents of internal radium therapy often had an obvious commercial motivation, the scientific legitimacy of their medical endeavors was sometimes ambiguous.

Flannery's Standard Chemical Company opened its medical clinic and laboratory in 1913. Advertised as "the first free radium clinic in America," it featured an emanatorium where patients could breath radioactive air and offered radioactive water for visitors to drink. The clinic operated under the supervision of physician William Cameron and physicist Charles Viol. While the idea of internal radium therapy dated back to William Morton and his "Liquid Sunshine" treatment, it was only after 1913 that sufficient radium was available to study the internal effects of radium on a large scale. Cameron and Viol investigated radium injections, inhalation of radioactive air, and the drinking of radioactive water as treatments for an assortment of conditions, including arthritis, gout, diabetes, and the nineteenth century catch-all, neurasthenia. Radium also seemed to reduce blood pressure and increase red blood cell amounts under the proper dosage. Reports of radium's potential dangers were minimal. Though some negative effects on the blood occurred with too high a dosage, in general Flannery's men found radium to be safe.²² C. Everett Field, a physician who had previously worked at Standard, and his new boss at the Radium Institute of New York, Dr. Joseph Bissel, often

²² Clark, 47-48

declared that “[Radium] is accepted as harmoniously by the blood stream as sunlight is by a withering plant.”²³ The enduring image of radium as an artificial sun proved useful to physicians as well as patent medicine men.

The pursuit of internal radium therapy was very much an international one. Specialists in France, Great Britain, the United States, and especially Germany and Austria all worked to develop ways of treating the body through the imbibing or injecting of fluids rendered radioactive with radium or radon. One influential German doctor was Dr. S. Saubermann, who produced a product called Radium Emanation Activator. Saubermann was a licensed physician who published in peer-reviewed journals and appeared at gatherings of organizations of the American Roentgen Ray Society. His Activator was generally aimed at other physicians who would then administer radium treatments to patients. However, the claims made for the product often differ little from those made by more baldy commercial patent medicines peddled by less qualified men. Saubermann posited that radioactivity could increase peristaltic action, increase uric acid excretion, dilate blood vessels, diminish blood viscosity, lower blood pressure, increase metabolism, and modify blood constitution. All of these claims were consistent with what early researchers into internal radium therapy were finding. Articles attesting to these and related responses to radium appeared in journals and were corroborated by Saubermann’s colleagues.

However, other statements of Saubermann’s had a less clinical ring. He claimed that the element had “nerve-soothing” qualities, could enhance sexual activity, and could

²³ Bissell, Joseph. Quoted in pamphlet for North American Radium Corporation, *Medical Science Harnesses One of Nature’s Rarest Forces for Health*. New York Academy of Medicine.

reverse the “degeneration of old age.”²⁴ This second batch of properties of radium taken internally was likely an influence on high-profile patent medicine men, notably William J.A. Bailey, creator of Radithor. Radithor, the subject of a later chapter, made the same claims about sexual potency and rejuvenation. Though medical men like Saubermann were no doubt at odds with the unscrupulous fakers of the patent medicine industry, they also provided them with some of the best advertising fodder.

The indications for internal radium therapy had much in common with those of health spas and other non-radioactive commercially available remedies. Scientists had discovered that spa waters tended to have elevated radioactivity levels and conjectured that these might help explain their healing power. Pain-relief was central to many of the diseases for which radium therapy was recommended including: arthritis, rheumatism, gout, and neuritis. For centuries Europeans had flocked to natural springs like those in Bath, England, and Gastein, Austria. Some members of the medical community agreed with the spas that radium seemed to have analgesic properties. Neuralgia, sciatica, locomotor ataxia, and other painful maladies were often added to the standard list of arthritis and rheumatism.²⁵

Commercial radium companies like Radium Chemical should not be confused with the patent medicines that had proliferated by the 1920's, though their claims sometimes overlapped. Internal radium therapy, as practiced by radium companies and physicians, was not a cynical, exploitative endeavor. It was not pursued by unscrupulous

²⁴ Clark, 55

²⁵ Dawson Turner, *Radium and its Therapeutics* (London: Balliere, Tindall and Cox, 1911), 74

quacks, but generally by licensed doctors and trained physicists. Though it was mostly discredited and out of fashion by the post-WWI era, it was not fraudulent in the way other commercially available, internally ingested patent medicines often were. Its purveyors published in peer-reviewed journals and were members of influential professional organizations. They also, however, operated in an ambiguous border zone between medical altruism and economic self-interest. As a result, claims made by these industry researchers often found their way into patent medicine advertisements. Quotes from physicians and scientists helped bolster a product's legitimacy. Medical language and a ready-made set of conditions for which radium had shown promise helped baldly commercial enterprises wrap themselves in a mantle of scientific legitimacy.

The American radium industry was pivotal in creating the internal wing of radium therapy both by greatly increasing the available supply of the element and conducting research into its health effects. Within twenty years the United States had gone from a backwater forced to accept a trickle of radium from Europe to the manufacturer of a majority of the world's usable supply. However, the homegrown radium industry died even more quickly than it had been born. In 1921 the Union Miniere du Haut Katanga company discovered huge veins of radioactive pitchblende in the Belgian Congo. The find was much richer in valuable radioactive materials than any mines in the United States or Europe. Ten tons of African pitchblende produced as much radium as 500 tons of the carnotite mined in Colorado. Efforts at a protective tariff to keep American radium companies in business failed due to opposition to the idea of making the public and the

medical profession bear higher costs.²⁶ Standard knew when it was beaten and agreed to stop production of its own radium in exchange for becoming Union Miniere's U.S. representative. Standard Chemical Company was gone by 1933, and the American radium industry died along with it.²⁷

The Belgian monopoly on radium did not last long. A new source appeared on the other side of the world in the early 1930's. Surveyors had identified uranium near Great Bear Lake in northwestern Canada as early as 1900, but it was not until 1931 that the richness and commercial possibilities of the ores there were identified. By the end of 1932 an extraction plant in Port Hope, Ontario, was churning out two grams of radium per month. By the end of the decade its output had doubled again. Canadian and Belgian interests shared the radium market, and the huge increase in supply helped bring the price down to around \$40/mg, less than half what it had been when Standard was the largest producer.²⁸

The death of the American radium industry helped tip the scales toward external radium therapy. After 1920, with no commercial radium companies to promote it, internal use of radium in the form of waters, injections, and emanatoria gave way to an increasingly sophisticated field of external therapy for an assortment of cancers. Professional publications like *JAMA* still occasionally published articles about radium's value as a pain-killer or other general internal remedy, but their share of the total declined

²⁶ S.C. Lind to William Harbison February 6, 1924. National Archives. Bureau of Mines: General Classified Files, General Correspondence Files, Box 1080, Folder 1923.

²⁷ Lubeanau, 23

²⁸ Edward Landa. "The First Nuclear Industry" *Scientific American*. November 1982, 189

after 1920. By 1930 the overwhelming majority of *JAMA* articles about radium discussed professionalization efforts, genetic effects of radiation, or cancer treatment.

Kelly's clinic in Baltimore and Memorial Hospital in New York, the first beneficiaries of National Radium Institute's production, pioneered organized investigations of external radium therapy, but they were quickly joined by a small number of hospitals. Huntington Hospital in Boston, for example, using 1/5 of a gram of radium obtained by the Cancer Commission of Harvard University, set up a therapy program under Dr. William Duane, a physicist by training who had spent six years working in Curie's Paris laboratory. Duane's background in physics helped him establish a cooperative effort between physicists and medical doctors. By 1917 Duane had overseen the treatment of hundreds of cancer patients, with over half receiving "definite benefit." However, unlike some working in internal therapy, Duane was willing to admit that radium sometimes proved useless and was capable of producing side effects including burns, nausea, and depression. The truth lay somewhere between the rosy optimism and trenchant pessimism that were circulating among his colleagues.²⁹

Not surprisingly, much of the earliest external radium therapy concerned diseases of the skin. Because the first observed health effects of radium were painful burns at the site of exposure, experts conjectured that the destructive powers of radium could be harnessed for good. Experiments were conducted on a host of malignant and benign skin conditions, showing often remarkable results. Many skin cancers responded well to radium treatment, amazing doctors when they seemed to melt away when exposed to

²⁹ Brecher and Brecher, 275-276

radioactive rays. Carcinoma, angioma, and rodent ulcer (rodent cancer) were a few of the malignancies that were improved or cured with radium. Benign conditions often saw improvement as well. One early monograph listed warty growths, lupus, pruritis (itch), ulcers, and an assortment of other non-cancerous conditions as ones that had been treated with success by radium.³⁰ Others added psoriasis, eczema, and trachoma.

As radium became more available, specialists more experienced, and methods more sophisticated, doctors struggled to get the healing power of radium beyond the skin to treat internal conditions. New techniques and instruments helped external therapy penetrate into the body. However, it was still fundamentally different from what has been referred to as internal radium therapy. External radium therapy delivered radioactive rays through a host of methods and apparatuses, but the treatment was always temporary and was removed after a set period. It did not entail the “permanent” exposure of ingestion, inhalation, or injection.

As always, the problem of adequate supply was constant. Even the most well-equipped hospitals and clinics wished they had more radium. One way around this was the use of its daughter element, radon (then called “radium emanation”) Radon, an element in radium’s decay chain, shares that element’s tendency to emit penetrating beta and gamma rays. Because doctors got “something for nothing” with radon, they devised means of capturing it for medical use while the radium supply remained virtually undiminished. Radon could be drawn off and sealed into glass or gold tubes that could be used just like radium tubes. Radon’s short half-life (less than four days, compared to

³⁰ Turner, 41

radium's approximately 1600 years) made it less risky to work with, but the intensity of its radioactivity made it a potent treatment.

At first applicators were little more than metal rods with a bit of radium at the tip that could be inserted through body openings like the mouth or vagina. A major breakthrough occurred at Memorial Hospital when Giancchino Failla hit upon the idea of the radon seed. Emanation was typically used in the same way radium was: put into some sort of applicator and inserted into a body cavity. Failla realized that after radon had been pumped into a thin metal tube, the tube could be pinched off into tiny, air-tight "seeds" that could be placed in the body with more accuracy, then removed when the treatment was over.

Radium, though more abundant than it had been a decade ago, remained precious enough that a handful of men made money tracking down samples lost at hospitals and clinics. Robert Taft wrote a book *Radium: Lost and Found* describing his life as a "radium hound." Using a gold-leaf electroscope (a device similar to the one developed by Pierre Curie and used by Marie to measure the radioactivity of those first shipments of pitchblende), Taft recovered fully about 115 of the 187 losses he was hired to find. Occasionally he made partial recoveries, but 53 remained total losses. Applicators containing tiny bits of the element could be lost in the trash, the laundry, or into the sewers. Finding lost radium meant not only avoiding radioactive contamination but also saving thousands of dollars.³¹

³¹ Robert Taft *Radium: Lost and Found*. 2nd edition. 1946.

Though supply remained dear, the dramatic increase in radium following the discoveries in Africa and Canada allowed a new form of therapy to emerge in the 1930's. Teletherapy allowed physicians to irradiate patients with an external beam of high-dosage radioactivity. Up to 10 grams of radium could be used at a time, roughly as much as Standard could produce in a year during the 1910's.³² This technique presaged the megavolt beam-generators that would come to dominate in the decades after World War II. Teletherapy marked the beginning of a general trend toward the use of greater amounts of radioactivity for shorter periods of time.

Radium's medical promise was born out of its destructive nature. Ideas about radium's destructive nature, however, underwent a transformation in the way it was discussed during this early period. Granted, radium's rays were destructive, admitted early researchers, but they were *selectively* destructive. Researchers like those at Memorial determined that cancerous tissue was more susceptible to radium's rays than healthy tissue was, a theory that can be traced back to Marie Curie herself.³³ The notion was corroborated by an influential 1910 English translation of the work of Doctors Louis Frédéric Wickham and Paul Degrais, two of the leaders of the French school of radium therapy.³⁴ The idea was understandably exciting. "These tumors seem to melt away with the greatest rapidity," wrote Memorial's Henry Janeway, "whenever, one might almost say, radium is anywhere in their vicinity." Radium's evident ability to act selectively against unhealthy tissue spurred increased investigation into and hope for radioactive

³² Landa. "The First Nuclear Industry," 189.

³³ Clark, 43.

³⁴ Wickham and Degrais. *Radium Therapy*. English translation. 1910.

cancer therapy. However, the risk of damage to healthy tissue, identified by Kelly and others, did remain on the minds of doctors at Memorial. “The disastrous effects of exposure are so serious, and they inflict on patients already pitiable so much additional suffering, that too great care cannot be taken to avoid it.”³⁵

Another piece of accepted wisdom in most circles held that radium had unique effects on cell growth and that the organs of reproduction were particularly sensitive to its rays. Some of the earliest experiments with the substance showed that lower organisms seemed to have their normal physical development disturbed by exposure to radioactivity. Future experiments continued to bear this out. Chicken and fish embryos experienced retardation, irregularities, even “monstrosities.”³⁶ It seemed that radium affected the reproductive processes of living things before it affected the creatures themselves. A British doctor observed that cells in the process of division were especially vulnerable, and that radium could cause rapid degeneration of cells in the testes and ovaries.³⁷ This idea, though often dormant or ignored in the medical literature, would reappear in the post-war period when concern about atomic mutation was common in both laboratories and on movie screens.

The notion that radioactive rays had a selective effect on cells in the process of growth influenced ideas about radium’s value as a cancer treatment. Cancer became the prime target of external radium therapists as internal therapy fell by the wayside. In government discussions of the need for allotting radium for medical use, cancer was the

³⁵ Janeway, H.H., Barringer, B.S. and Failla, G. *Radium Therapy in Cancer at the Memorial Hospital*. New York: Paul Hoeber. 1917. Quoted in Brecher and Brecher. 278-279.

³⁶ Simpson.

³⁷ AE Hayward Pinch. *A Clinical Index of Radium Therapy*. 26.

only illness mentioned. Other uses for the elements that were bandied about in the early days of radium therapy lost popularity. Though it seemed to have germicidal qualities, specialists concluded that the damage to healthy tissue would outweigh the benefits.³⁸ Many held that the same was true for radium's ability to relieve pain. Side effects of radium therapy could be nasty. In addition to the risk of burns, doctors observed nausea, vomiting, and depression in their patients. Though sometimes patients experienced a feeling of well-being, they were just as likely to experience tiredness and malaise. The doctors themselves also felt the negative effects of exposure to radioactivity. Professional injuries included headaches, nervousness, dizziness, exhaustion, and depression. Women noticed menstrual disorders. It was not unusual for radiation specialists to take extended vacations to recuperate from the physical toll of working in prolonged proximity to radium's healing rays. Because the cure could be worse than the disease in many benign conditions, only cancer remained at the heart of external radium therapy. A cure for cancer had eluded mankind for centuries, and the disease remained, as one reporter put it, "the darkest Africa on the map of medicine."³⁹

The relationship between radium and cancer had always been a complicated one. Like X-rays before it, radium had been implicated in the illnesses and deaths of a number of early experimenters, doctors, and technicians. Too much radium seemed to be linked to cancer. Yet cancer was exactly what doctors decided radium was best at destroying. Physicians struggled to understand the connection. Clearly dosage and duration of exposure were the keys. Early accounts brim with tales of tumors seeming to vanish

³⁸ Simpson, *Radium Therapy*.

³⁹ *Electrical World* 48. 1904.

miraculously during a course of radium treatment. However, these successes were coupled with blistered hands, anemic blood counts, even death.

As general health improved and life expectancies surged in the twentieth century, cancer rates rose in parallel. Popular theories blamed cancer on germs, heredity, stress, and negative feelings. Some conjectured that the rise in the number of cancer sufferers was linked to the rise of industry. Perhaps the proper balance between people and nature had been upset. Others blamed American opulence, claiming that materialist Americans had become soft and pampered, their diets too rich. The ambiguities surrounding cancer's cause, course, and cure had long made it ripe for exploitation by an assortment of alternative practitioners, including downright quacks. However, by around 1920, Americans had generally elevated doctors to a position of high authority when it came to cancer. This period of "medicalization" of cancer coincided almost perfectly with the rise of radium therapy.⁴⁰

However, the medical establishment's authority was not total. The sense that cancer was becoming increasingly prevalent in modern life had people looking frantically for a cure. In December 1926, William Lawrence Saunders of New York offered two \$50,000 prizes, one for discovering what cancer was and how it could be prevented, one for an absolute cure. The American Society for the Control of Cancer, AMA, and American College of Surgeons would judge the entries. Saunders, who was Chairman of the Board of Ingersoll-Rand, Director of the Federal Reserve Bank of New York, and President of the United Engineering Company, clearly believed in the power of

⁴⁰ James Patterson. *Dread Disease: Cancer and Modern American Culture*. 24-47.

individual initiative both in life and in medicine. Seeing that experts had failed to find an answer, he hoped that “through the lure of a reward this serious problem might be solved through the genius of a lay mind, by chemists or through unorganized medical sources.”⁴¹

Cancer so vexed the American population that everyone seemed to be looking for a cure. The papers of James B. Murphy, an oncologist at the Rockefeller Institute, contain scores of letters from lay people offering cancer cures that they had created, seen first-hand, or heard about in the rumor mill. The Rockefeller Institute averaged almost a letter a day from people proposing cancer cures. A Nellie McKinley of Long Island claimed that she had seen cancer cases succumb to alum and castor oil.⁴² Mary O’Brian proposed slippery elm.⁴³ James Macalister recommended bed bugs, which Murphy called an old one that had been studied extensively.⁴⁴

Others wrote in suggesting the cause of cancer. A Mrs. L.F. Gebhard suggested that cancer was caused by bits of tin that fell into canned fruit. The inspiration for this epiphany was a dream in which she had heard the phrase “can sore” repeated over and over.⁴⁵ The dreams of John Holt supplied him with the idea that carrot juice would cure the disease and prevent its return.

Distrust of radium treatment is an undercurrent in many of the letters Murphy received. One man writing from the Hague, explained that x-rays and radium were major

⁴¹ News clipping. American Philosophical Society. James B. Murphy Papers (JBM). Box 2: American College-American Society for the Control of Cancer, 1933. Folder: American Society for the Control of Cancer #1, 1926. The record gives no indication of whether anyone ever successfully claimed Saunders’s prizes.

⁴² Undated letter to Murphy. JBM, Box 7, Folder: Cancer Cures #1, 1927.

⁴³ Undated letter to Murphy. JBM, Box 7, Folder: Cancer Cures # 6.

⁴⁴ Macalister to Murphy, March 21, 1925. JBM, Box 8. Folder: Cancer Cures # 13.

⁴⁵ Mrs. L.F. Gebhard to Murphy, December 17, 1940. Folder: Cancer Cures and Inquiries 1942 #6.

causes of cancer, along with a dozen other environmental factors, including vinegar, formaldehyde, and mercury.⁴⁶ A.S. Pierrel boasted that he had developed a paste that had cured all cases except one, which had been treated previously with radium.⁴⁷ Dr. Ernestine Engelhardt claimed that her cure was better than surgery or radium. In fact, she wrote, “for the radium victims I can only alleviate their suffering until death releases them.”⁴⁸

Peyton Rous, another high-profile physician, received similar letters. “My mederson [sic] is made of erbs [sic] of the Earth,” wrote an M. Gregory. “I have never failed to cure when treated before Knife or Exray [sic] or Radium was used.⁴⁹ Rous also received a report of a Montana man, George White, who claimed to have developed a cancer cure, with a secret formula known only to him, that removed tumors whole without any damage to healthy skin. One man he treated had spent \$6000 on radium treatments at Johns Hopkins trying to cure throat cancer that had wrapped around the jugular vein before being sent home as a hopeless case. White cured him in a matter of days, but the patient died one year later. The cause of death: paralysis from the large amount of radium he had received. Believers reported that White, who had been treating cancer cases for fifteen years, claimed he could treat thousands of cases a year, if only they were brought to him before they had been operated on or had their cancer “scattered by radium treatment.”⁵⁰

⁴⁶ Herman J. De Wolff to Murphy. JBM, Box 7, Folder: Cancer Cures # 2.

⁴⁷ Undated letter to Murphy. JBM, Box 7, Folder: Cancer Cures #6.

⁴⁸ Engelhardt to Murphy, August 11, 1925. JBM, Box 8. Folder: Cancer Cures #12.

⁴⁹ M. Gregory to Rous, July 20, 1925. American Philosophical Society. Peyton Rous Papers, Series I. Folder: Cancer Quacks.

⁵⁰ Peyton Rous Papers, Series I. Folder: Cancer Quacks.

Some suggestions featured quite sophisticated amateur science and echoed ideas that existed at the border between scientific thinking and bold speculation. Meredith Dennett of Portland, Maine suggested a system of electromagnetic wires surrounding a box in which a person would sit. This set-up would, Dennett claimed, magnetize the blood and kill germs. Dennett wrote that all substances were radioactive, that every surface was surrounded with a cloud of electrons that were indistinguishable from the human soul or aura. The soul was made of the same stuff that could be found flowing through an electric wire. “Electricity is life,” Dennett declared. Such a statement resembled what many marketers of electrical contraptions had said of electricity in the nineteenth century and what many radium peddlers were saying around the same time Murphy was reading this letter. The idea that life itself was inseparable from the growing number of energies and forces scientists were discovering held great currency. Murphy, however, remained unimpressed, explaining that such treatments had been attempted without success.

A current of exasperation with the medical profession also runs throughout these letters. George W. Snow of Holyoke, Massachusetts, implored Murphy to “forget the ethics of the medical profession for once and let the layman prove to you what can be done—cooperate with me.” His letter was born of his frustration at being turned away when he showed up at the Rockefeller Institute, ready to demonstrate the cancer cures he had achieved.⁵¹ This sense of medical populism also drove Saunders’s contest. These expressions from ordinary people, unmotivated by obvious financial gain, demonstrate

⁵¹ George W. Snow to Murphy. JBM, Box 7, Folder: Cancer Cures #2, 1924-1927.

the depth of opposition to the cabal-like nature that many Americans observed in the medical industry. It is easy to understand how patent medicines that set themselves up against the establishment monolith would have appealed to broad segments of the population. That groups like the AMA seemingly wanted to keep medical knowledge, and its attendant potential for profit, to themselves frustrated citizens who had seen what they understood as medical miracles in their living rooms and those of their neighbors. In his replies to these generally well-meaning letters, Murphy asserted that no such conspiracy against amateur medical knowledge existed. “No cancer cure deserving the name could remain obscure for any length of time,” he explained in a representative letter, “and if this cure is what you claim it to be all of the doctors in the world combined could not prevent it from becoming known.”⁵²

These suggestions from the public, though sometimes humorously and often painfully naïve, were ultimately harmless. However, more serious quackery based on the same ignorance that inspired some of the letters was a major problem facing the medical community. Cancer’s mysterious onset and resistance to cure had long made it ripe for exploitation. An assortment of elixirs, ointments, and contraptions claiming to treat the disease could be found on store shelves and in mail order catalogs throughout the nineteenth and into the twentieth century. Francis Carter Wood, director of the Institute of Cancer Research at Columbia University, lamented that “the human mind clings to hope against reason, and the quack who loudly promises a definite cure of advanced

⁵² Murphy to S.E. Woodard, March 31, 1922. JBM, Box 8, Folder: Cancer Cures #20

cancer is often believed when the honest physician who knows such a promise is impossible to fulfill sees his advice go unheeded.”⁵³

Many irregular practitioners worked on outdated or distorted theories about cancer’s origin. The idea that cancer was a parasitic condition, for example, was rampant and opened the door for a variety of internal remedies. If cancer was caused by some invading organism, then a cure required nothing more than killing that invader. Koch’s Serum, presumably named to evoke the legitimate work of Robert Koch, was just one of the products that played this angle. A related theory held cancer to be a germ disease that could be attacked and perhaps conquered in the way that germ diseases like anthrax, rabies, and smallpox had been. The idea that cancer was caused by a virus or bacteria was an old and understandably attractive one. As microorganisms linked to diseases continued to be identified in the late nineteenth and twentieth centuries, it seemed logical that cancer, a dread disease in its own right, would follow suit. Such ideas remained persistent into the postwar era. An article in *Life* magazine in 1962 announcing that “Scientists Find New Evidence that Cancer May be Infectious” led to fear that cancer was contagious. Rous received a letter from a man who, after losing his eldest daughter and two wives to cancer, asked if he might be a “Cancer Carrier.”⁵⁴

However, though doctors like Murphy were gently dismissive of letters from lay people suggesting causes and cures of cancer, his replies also reveal the establishment’s own difficulties in understanding and treating cancer. Murphy generally counseled

⁵³ New York *Herald Tribune*, 26 September 1929.

⁵⁴ R.B. Morrison to Rous, December 17, 1962. Peyton Rous Papers, Series I. Folder: Life. 1937, 1962-1963

surgery, but also discussed x-rays and radium as viable options. However, he admitted that physicians had a poor understanding of the cause of cancer, and that without knowing the fundamentals of the disease, advances in treatment would be long in coming. Mid-century medical science's fairly shallow understanding of the nature and origin of cancer leaps out at the 21st century reader in Murphy's discussion of tobacco. He admitted in one letter that there was little reliable information on the relationship between tobacco and cancer, but that the heat of the pipe's mouthpiece and the throat inflammation caused by the smoke could boost cancer rates. "But there is just as much danger, if not more, from a rough tooth or a poorly fitting plate," he continued. "You may judge that the danger is not so definitely defined, for I know very few doctors who do not smoke, even those active in cancer work."⁵⁵

The failure to understand and cure cancer was, according to Murphy, not for lack of trying. He frequently lamented the woefully inadequate funds available for cancer research in the U.S., especially considering the sickness and death for which it was responsible. One letter, written in response to a man who had accused the profession of indifference to leukemia, Murphy pointed out that deaths from cancer (168,000) in 1943 vastly outweighed those from tuberculosis (less than 50,000) and polio ("a very few thousand"), yet funding for cancer research was only a fraction of what was available for the others.⁵⁶ Though organizations like the American Society for the Control of Cancer tried to publicize the scourge of cancer and urged citizens to know the warning signs and

⁵⁵ Murphy to Lester G. Egan, Jr. September 26, 1946. JBM, Box 9, Folder: Cancer Cures and Inquiries, 1946 #3

⁵⁶ Murphy to Richard Page, July 21, 1944. JBM, Box 9, Folder: Cancer Cures and Inquiries, 1944 #9

see their doctors, cancer never had its version of the March of Dimes to turn its cure into a national crusade. Instead, cancer remained at the shadowy edges of the American psyche, and radium its most enigmatic treatment.

In spite of these barriers to the growth of radium treatment, it became a major branch of oncology, along with x-rays and surgery. Often it was used in conjunction with one of both of these therapeutic cousins. Thanks to improved technology and increased dosage, practitioners were able to move beyond skin treatment to attack more deep-seated cancers. Cancers of the vagina and rectum, for instance, could be relatively easily accessed with radium tubes and seeds. Some more deep-seated, decentralized conditions like leukemia remained resistant to radium therapy, but doctors continued to publish promising results in cancers of the uterus, thyroid, bladder, lymph system and other body parts into the 1940's. Tens of thousands of Americans received radium treatment for their cancers.

Whether one was able to get radium treatment or not hinged on several important socioeconomic factors. The notion that radium was a rich man's remedy for a poor man's disease had some validity. Radium treatment would have been out of reach for many lower class Americans, many of whom shunned the medical establishment entirely as elitist and overpriced. Rural Americans too would have had difficulty gaining access to radium therapy centers, almost all of which were clustered in the nation's biggest cities. It is not surprising then that many low-income and rural Americans tried to take their medical treatment into their own hands by purchasing patent medicines. Thanks to the sophistication of some of the savvier nostrums, it would have been hard for many to

differentiate between the radium in big city hospitals and that in the products they encountered at country stores and in mail-order catalogs.

While it might have been hard for some lay people to tell the difference between orthodox and unorthodox uses of the element, the field of radium therapy underwent several of the hallmarks of professionalization. What began with a handful of doctors haphazardly applying radium when they were lucky enough to get their hands on it became a legitimate branch of medical practice, complete with the professional organizations and journals that mark such a transformation. Terms like “radiation medicine” and “radiology” were and continue to be problematic due to confusion over whether they referred to x-rays, radium, or both. The two treatments often went hand in hand both in practice and in efforts toward professional organization. X-ray diagnosis and therapy spread much more quickly than radium medicine due to the ease with which x-rays could be produced. The American Roentgen Ray Society formed in 1900, before most Americans had even heard of radium, let alone obtained it. It was not until 1916 that the first organization dedicated to radium medicine, the American Radium Society, convened. ARS members included physicians, physicists, radiologists, and radium manufacturers. The Society combined exchanges of scientific and medical developments as well as activism on behalf of the field on legislative and regulatory issues. It drew strength from its interdisciplinary nature and wielded strength beyond what the relatively small number of radiation specialists could have achieved by themselves.⁵⁷

⁵⁷ Knight and Wilson, “The Early Years of Radiation Therapy,” in Gagliardi, ed. *A History of the Radiological Science: Radiation Oncology*. Reston, VA. 16.

Another standard attribute of professionalization is the creation of publications dedicated to a young specialty. Radium therapy underwent this process during its second decade, at around the same time that professional organizations started to form. In the United States, the *American Quarterly of Roentgenology* began publication in 1906, changing its name to the *American Journal of Roentgenology and Radium Therapy* seven years later. Other smaller and more local journals followed. British radiologists also published influential English-language journals like *Archives of the Roentgen Ray* and *Journal of the Roentgen Society*. As the titles indicate, radium therapy was often folded into journals that had initially been dedicated to X-rays. By radium therapy's second decade articles on radium therapy began to appear in the premier medical journals such as the *Journal of the American Medical Association* and the *British Lancet*.

While the American people had been inundated with newspaper articles about radium during the first decade of the century, public enthusiasm cooled over the following decades. Articles about the wonders of the element became far less common, and most of the medical research being done was hidden in medical journals and, therefore, unavailable to most members of the public.

However, some ideas about radium coming from the medical and scientific establishments would have trickled down to the public through books, major events, and word of mouth. When Marie Curie visited the United States in 1921, for instance, it marked a moment of renewed interest. Robert Millikan, a well-known experimental physicist, delivered an address at the Smithsonian in Washington D.C. as part of Curie's visit. While he reminded the crowd that radioactivity by no means represented a certain

cure for cancer, it could prolong life, even in cases that were too advanced for operative treatment. Two years later, Millikan won the Nobel Prize, which doubtless drew a great deal of attention to his 1924 book *Science and Life*, which reprinted his 1921 address. Work like Millikan's would have offered some members of the public a mild corrective to the exaggerations they had heard about radium's miracles over the years, but it would also remind readers that radium did have significant medical value.⁵⁸ Frederick Soddy, another Nobel Laureate, offered hyperbolic claims that would not have looked out of place in patent medicine literature, yet his bona fide credentials would have helped bolster his reliability. He reminded readers that "the philosopher's stone was accredited the power not only of transmuting the metals, but acting *as the elixir of life*."⁵⁹ Unlike the more sober Millikan, Soddy allowed himself to fantasize about the promise of radioactivity to transform life. "Radium has taught us that there is no limit to the amount of energy in the world available to support life, save only the limit imposed by the boundaries of knowledge."⁶⁰

Ideas about radium therapy also would have flowed to the public via distributors and physicians. Men like Frank Hartman of Philadelphia acted as go-betweens for the radium industries at home and abroad and American physicians. "Perhaps there may be a question in your mind, does Radium Emanation Water contain any therapeutic value?," he asked in a form letter to doctors. "After 18 years of ethical distribution and prescribing by prominent physicians, we are justified to ask a trial for some of your

⁵⁸ Robert Millikan. *Science and Life*. 1924

⁵⁹ Frederick Soddy. *The Interpretation of Radium*. 3rd edition. New York: G.P. Putnam's Sons. 1912

⁶⁰ Soddy, 254

patients in the treatment of arthritis, gout, rheumatism, sciatica, and high blood pressure.” He suggested a three month trial costing the patient \$35, an amount which “any patient could afford to pay.”⁶¹ Some physicians visited by men like Hartman would no doubt pass along the good news of radium’s wonders to their patients.

Knowledge about work being done in radium therapy also came to public attention through magazines like *Scientific American* and *Electrical World*. These journals, written for an educated readership, were not as easily swept up in the “radiomania” that sometimes impaired the objectivity of newspapers. Magazines reported some of the less glamorous news, reprinting articles from medical journals and offering summaries of the latest in radium therapy. These more sober notions of what radium therapy involved trickled down to many Americans but left many out as well. Without the corrective to the wild speculation and fantasies of the early days of radium, many continued to believe anything people told them about the element. This lack of sound knowledge about what radium actually could and could not do left the door open for exploitation by patent medicine companies.

Quackery became a central problem as the field of radium therapy worked to find its professional footing. A cursory glance through a newspaper or at store shelves, even at medicine cabinets of private practitioners, would have demonstrated the astonishing variety of patent medicines that were capitalizing on enthusiasm for radioactivity. Much of their rhetoric was drawn from the pronouncements made in the immediate aftermath of

⁶¹ Form letter, March 1926. Frank Hartman Collection., Box 2: Numbered and Combines Files, Interviews, 1958-1976, personal documents, Folder #23: Radiological Techniques and Instruments: Price Lists, Articles, Catalogues. C. 1920-1940.

radium's discovery and bore little connection to the intervening decades of research into the element's medical uses. However, some advertisements cloaked their products in a veneer of medical legitimacy. Through the use of a carefully worded testimonial or a decontextualized quote from a mainstream physician, patent medicine peddlers were able to piggyback on some of the legitimate work being done in hospitals and laboratories. Thanks to the unclear territory between internal and external therapy, between commercial and establishment practitioners, there remained a gray area around the notion of what constituted orthodox use of the element. It was in this murky zone that many Americans encountered radium when their doctors, themselves armed with ambiguous ideas about what radium could do, prescribed an assortment of questionable potions, pads, and pills. Others never saw a doctor at all. They learned about radium through advertisements for the dozens of allegedly radioactive patent medicines that proliferated during the 1920's. As many Americans struggled with the fast pace of that decade, a menagerie of patent medicine men helped convince them that radium could provide the energy they needed to keep up.

Chapter 5: Radium's Commercial Heyday: The 1920's

At the dawn of the “Roaring Twenties,” Al Jolson was the most famous and highly paid entertainer in America. He released dozens of hit records, played to capacity crowds around the world, and in 1927 starred in the first talking motion picture, *The Jazz Singer*. Jolson had earned a role in his first play in 1911, at New York’s Winter Garden, by impressing Broadway impresario J.J. Shubert with his “overpowering display of energy.”¹ Before long Jolson was a bona fide star. With his seemingly boundless vitality, he personified the constant motion of the 1920’s. Yet sometimes even Jolson had a hard time keeping abreast of the fast pace of life in the twentieth century. Like many Americans he looked to a new external source of vital energy: radium. “I have used your Radio-X pad for my throat and it has worked wonders. I am singing better than ever,” he declared in an advertisement. Radio-X, one of dozens of purportedly radioactive products on the market during the 1920’s, claimed to be a “Modern Remedy” that could restore depleted energy levels and bring bodies back into working order. “It is the sympathetic nervous system that suffers most through the bustling methods of modern life,” said one Radio-X ad. “This explains why the nervous stress of the modern life, by disabling the sympathetic system, produces paralysis and other muscular disabilities.”²

Though technological and social changes had been accelerating the tempo of American life for decades, the 1920’s seemed particularly disorienting. The isolated “island communities” described by historian Robert Wiebe³ had given way to cities that

¹ *Esquire Magazine* January, 1949. reprinted in “Ageless All,” *Reader’s Digest*. January, 1949.

² Radio-X Pamphlet. AMA, Box 720, Folder 13: Radium Remedies Company, 1919-1929.

³ See Robert Wiebe, *Search for Order, 1877-1920*.

swelled with newcomers from rural America and abroad. Automobiles, electric streetcars and subways replaced horse-drawn buggies in older cities like New York and Boston. Midwestern “shock cities” seemed to sprout up overnight. Telegraphs and telephones, invented during the previous century, proliferated in the twentieth and allowed information and ideas to flow more rapidly. Radio, another new “energy,” allowed words and music to radiate out to the masses. These new forms of communication offered constant reminders to American citizens that they were living in a “new era.”⁴ In nightlife hotspots like Harlem’s Cotton Club, jazz captured this new sense of speed and motion and transformed it into music. Soon the caricature image of the 1920’s, of men in top hats and flappers in short skirts drinking and dancing until sunrise, was born.

This image, however, was not complete. An undercurrent of anxiety ran beneath the stereotyped image of the Roaring Twenties. Many Americans felt dislocated from their more slow-moving past. They worried about whether they could maintain the new breakneck speed of life. What if they could not keep up? What if their minds and bodies gave out on them? Some looked for external energy sources that would make up for what their own bodies seemed to lack. American know-how offered an answer. If the problem was maladjustment to the contradictions of modern life, as some commentators believed, “knowledge and experience” would offer techniques to “revitalize civilization.”⁵

Radium, long heralded as a boundless source of mysterious vital energy, provided a potential solution. The Curies had discovered radium just as the twentieth century

⁴ Warren I. Susman, *Culture as History: The Transformation of American Society in the Twentieth Century* (New York: Pantheon Books, 1984), 108.

⁵ Susman, 114.

threatened to leave many behind. Perhaps this new element—part technology, part nature—could give Americans the life force they needed to face a changing world.

From the earliest newspaper stories on radium, the idea that it was a source of inexhaustible energy was ubiquitous. Reporters stoked fantasies of war ships that would sail around the world on thimblefuls of radioactive fuel. Coal and other sources of energy would become obsolete once a single power station provided electricity for the entire country.⁶ Stories about radium's effects on the human body proliferated as well. The miraculous new element showed an astonishing ability both to heal and destroy living tissue. Yet it was not until the 1920's that the energy-giving effects of radium came to the forefront in the commercial realm.

Historians tend to locate America's golden age of patent medicine in the decades leading up to the passage of the 1906 Pure Food and Drug Act.⁷ During that period thousands of brands flooded the market, claiming to cure everything from canker sores to cancer. According to the conventional narrative, the patent medicine field boomed in an unregulated business climate until pressure from the federal government began reining in the excesses of the industry. Radium appeared on the scene just as this process of regulation was beginning and defied the standard patent medicine story. The earliest purportedly radioactive medicines were among the first targets of federal government regulation under the 1906 Act. By the middle of the 1910's, most of the high-profile offenders were off the shelves. But the golden age of radioactive patent medicines was

⁶ See Spencer Weart, *Nuclear Fear: A History of Images*.

⁷ See Jackson Lears, *Fables of Abundance: A Cultural History of Advertising in America* (New York: Basic Books, 1994), 141; Holbrook, Stuart, *The Golden Age of Quackery*.

yet to commence. A new generation of radium companies appeared that learned to work around the government's regulatory framework while tapping into the fears and desires of the American people. As the tempo of life picked up in the 1920's, images of radium's unprecedented energy appealed to a population that was struggling to keep up.

The American public now had an astonishing variety of allegedly radioactive products to choose from. The Department of Agriculture analyzed "hair tonics, bath compounds, suppositories, tissue creams, tonic tablets, face powders, ointments, mouth washes, demulcents, opiates, ophthalmic solutions, healing pads, and other preparations in solid, semi-solid, and liquid form for which therapeutic value was claimed on the ground of 'radioactivity.'" It found that only five percent of these actually contained radium element.⁸ Yet they multiplied with such speed that government regulators could not keep track of them all. The American enthusiasm for radium, coupled with the age-old appeal of patent medicines, ensured a steady market.

The most popular radium health products in the 1920's were the slew of radium emanation jars that proliferated during the period. These jars boasted of their ability to impart to water the energizing power of radium. In reality the quantity of radioactivity in each was minuscule. Made from uranium ore, the jars did contain some radium, but most of their radioactivity came from the radium emanation (now called radon) given off by the ore. Instructions typically told customers to fill the jars' basins with ordinary water and let the water sit for a period of time, often overnight. The water would then become "charged" with radioactive rays (actually dissolved radon), and the accumulated energy

⁸ Department of Agriculture Press Release. 4 February 1930. AMA, Box 721, Folder 2: Radium-Radium Cures 1932-1960.

could be transferred to the drinker. Some companies encouraged their customers to drink as many as twelve glasses of the radium-infused water each day.⁹ The short half-life of radon meant that the water needed to be drunk within a few days if it was to keep its potency. Following these simple instructions, the companies urged, would allow customers to harness the awesome power of radium that they had been reading and hearing about for decades.

Marketing campaigns for radium jars revealed a preoccupation with energy that characterized the bustling 1920's. "Do you want more pep, greater vitality, better health?" asked an advertisement for the Radium Ore Revigator, the most popular of the scores of radium ore jars on the market during the 1920's.¹⁰ Ads for Revigator and its competitors—including imitators like the Radium Ore Invigorator, the Radiumator, and the Radium Vitalizer—were peppered with references to "vim," "vigor," and a host of other words meant to evoke a vague notion of vital energy. They could show up anywhere from the side of a barn to the pages of *Literary Digest*.¹¹ Their rhetoric blurred the lines between internal and external energy sources and assumed that the invisible forces that surrounded the body could be brought into it. When people became "run-down," they could refuel themselves with radioactivity.¹²

Radium jars offered two solutions to the problem of an unnatural loss of vitality. The first encouraged customers to return their bodies to their natural states. Looking

⁹ Directions for Radium Cone. AMA, Box 722, Folder 1: Radium-Radium Emanation Generators (Radium Cone).

¹⁰ Revigator pamphlet. AMA, Box 722, Folder 1

¹¹ Cramp to Fieldbrave, February 4, 1927. AMA, Box 723, Folder 3: Radium Ore Revigator (August 1926-June 1927)

¹² On radium as external energy source, see also Carolyn de la Peña's *The Body Electric*. Chapter 5

backward from the twentieth century, many Americans thought that their old ways had been more natural, more tied to the earth. But as a majority of Americans were now living in cities, a true return to nature was impossible. Nature would have to come to them. An ad for the Radiumized Water Revitalizer said that it could, “supply ailing bodies in Nature’s own way with the natural element of which they have been deprived.”¹³ Though scientific innovation had been one of the dislocating forces in American life, it also offered a partial solution to the problem of lost nature in the form of radium. It represented the perfect combination of science and nature. “Science discovered this natural mineral water,” as an ad for Raysol put it.¹⁴ After all, radium was a natural substance that came right out of the ground, but commercial interests were able to commodify its forces and make them available to everyone. Nature, it seemed, had been both the victim and the beneficiary of modern science and technology.

Radium products often connected the return to nature they promised to the healing power of ancient health springs. The springs’ health benefits were well known, but the mechanism of their cures remained elusive. With the discovery of radium, some speculated that radioactivity was the source of the springs’ mysterious healing power. Indeed, tests showed that some did show elevated levels of radioactivity, and soon natural springs began emphasizing the radioactivity angle in their ads. Claremore, Oklahoma,

¹³ Records of the Food, Drug, and Insecticide Administration and FDA: Notices of Judgment, 1908-1949. Box 9, Judgment # 27259.

¹⁴ Records of the Food, Drug, and Insecticide Administration and FDA: Notices of Judgment, 1908-1949. Box 6, Judgment # 19880.

promoted its Radium Wells on a national scale and built a thriving tourist destination.

Will Rogers, Oklahoma's favorite son, promoted Claremore's radium treatments.¹⁵

Not everyone, however, had the time or resources to visit places like Claremore. A group of radium products emerged to fill the demand for natural radium treatment. Vigoradium ads declared that it was "Mankind's Imitation of Nature's Best Creation" and that it would "make you just as glad as the waters of Carlsbad."¹⁶ The Denver Radium Service claimed that radium contained "Nature's Secret" and that its Radiumactive Vitalizer would allow users all the benefits of the world's health resorts without the trouble and expense of traveling to them. It could be used at home or at the office, and it was portable, so it could even come along on vacations. Vitalizer pamphlets claimed that radium had a selective action on the body, "vitaliz[ing] the body tissues, while unhealthy or morbid cells are broken down and eliminated." The Vitalizer also would simultaneously stimulate metabolism and the nerves and lower blood pressure and relieve insomnia.¹⁷ The key was the return of natural balance, which could take any number of forms. The Radium-Active Solar Pad promised to regulate circulation.¹⁸ Radiumac would restore "mineral balance."¹⁹ If the stresses of modern life overextended the nervous system, radium's soothing rays would have a calming effect. If other parts of the system remained sluggish, radium would provide the jolt necessary to get things moving again.

¹⁵ Brochure. AMA, Box 722, Folder 4: Radium Waters, 1928-1962.

¹⁶ Vigoradium pamphlet. AMA, Box 721, Folder 4: Radium—Radium Emanation Generators Correspondence, 1927-1929.

¹⁷ Radiumactive Vitalizer pamphlet. AMA, Box 185, Folder 19: Denver Radium Service.

¹⁸ Form Letter. AMA, Box 718, Folder 2.

¹⁹ Records of the Food, Drug, and Insecticide Administration and FDA: Notices of Judgment, 1908-1940. Box 6, Judgment # 17862.

If a return to nature was the first solution to the problem of lost energy, an embrace of modernity was the second. While products like the Revigator claimed to pick up where inadequate nature left off, they used modern technology to do so. According to one advertisement, creator R.W. Thomas had sold over 500,000 Revigators by 1929.²⁰ Thomas succeeded by presenting Revigator as a hallmark of modern technology. The cover of one pamphlet pictured some of mankind's greatest inventions, with Thomas's along side those of Edison, Curie, and Marconi. According to men like Thomas, the principal health problem facing Americans was an unnatural lack of vitality. The only solution was technology, and the only energy source powerful enough was radioactivity.

Ads attempted to dazzle readers with onslaughts of scientific images and terms. These come-ons were designed to evoke cutting edge research and often did so without saying anything of real scientific substance. An ad for Halanum, a "saline Uranium Radium solution" described how "alpha particles" helped "oxygenize the blood" to "[activate] the bland cells by reestablishing the balance between the acid nucleus and the alkaline cytoplasm of the cells." While the average American may not have known the difference between alpha particles, beta particles, and gamma rays, or what cytoplasm was, he or she certainly would have understood the gist: something was wrong with the cells, and radium rays would fix it. The appearance of scientific terminology was more important than the accuracy of the details. Even Halanum's parent company's name was chosen to evoke mainstream legitimacy. The Los Angeles Radium Research Foundations could easily have been the name of a real laboratory where orthodox research in radium

²⁰ Revigator advertisement, AMA, Box 722, Folder 16-"Radium Ore Revigator (Special Data, 1928-1930).

therapy was conducted. Actually, tests showed that Halanum contained no radium at all. Nevertheless, the dazzling scientific rhetoric of its literature doubtless would have appealed to the more credulous members of the public.²¹

Other companies established connections between their products and the progress in orthodox radium medicine. By the 1920's, a small group of specialists had made slow but careful strides in the field of radium therapy. The treatment of some diseases, notably cancer, had shown real promise, even if some of the wilder "miracle cure" claims made for radium had failed to pan out. National Radium Laboratories was one of several companies that celebrated these mainstream medical advances. Ads for its allegedly radioactive soap Ra'Balm said,

the use of radium by the medical profession is rapidly increasing, but its possibilities are not yet fully appreciated. Only an absolute lack of knowledge of the benefits to be obtained from the use of Radium can account for failure to adopt this method of treatment for disease. Radium, as a curative agent, has positively demonstrated its effectiveness in a long list of ailments and its beneficent influence upon many of the bodily functions. It has an assured place in therapeutics.

All of this was true, but it had nothing to do with Ra'Balm. While mainstream radium therapy had mostly narrowed its focus to cancers, National Radium Laboratories attempted to establish a broader usage. Meanwhile, despite the references to orthodox medicine, Ra'Balm ads reminded readers that it was "not a drug" and "not classified as a medical remedy." Such statements were designed to appropriate all of the positive associations of regular medicine while playing against the negative ones.

²¹Records of the Food, Drug, and Insecticide Administration and FDA: Notices of Judgment, 1908-1940. Box 5, Judgment 16579. Halanum. National Archives

Many radium jar advertisements, in their references to remaining vigorous and energetic, echo what historian Lynn Dumenil has called the “cult of youth” that existed in the 1920’s.²² Women, influenced by the image of the flapper as seen in films like *Flaming Youth* (1923), were expected to keep themselves looking young, while men were pressured to maintain their youthful vigor. Many Americans turned to patent medicines for help. Revigator, with its stress on energy and vitality, called itself a “fountain of youth,” an image that meshed well with radium’s connection to health springs. Advertisements referenced Ponce de Leon and his quest for that mythical fountain and told customers that they could stay young indefinitely if they kept their systems free of the impurities that poisoned the average American. “You can be old at 30 or young at 60,” said one ad.²³ How old one looked and felt meant more than how old one actually was.

In 1927 a reporter for the New York *Telegram* even offered the prevalence of radium jars on the west coast as an answer to “why Pacific Coast League [baseball] stars fail when they come east.” According to the article, radium jars were more popular among Pacific Coast players, and when players changed teams and lost access to their emanation generators, they lost some of the spring from their step. Lew Wendell, a former New York Giants player, stated that radium jars had “astonishing properties,” making “spry youngsters of old ballplayers and \$100,000 beauties out of ordinary material.” To back up his claims, Wendell, having been sent to Portland, OR, by the

²² Lynn Dumenil, *The Modern Temper: American Culture and Society in the 1920s* (New York: Hill and Wang, 1995).

²³ Revigator pamphlet. AMA, Box 722, Folder 16: Radium Ore Revigator (Special Data, 1928-1930).

Phillies, declared, “Why, look at me” before “[dashing] down the corridor like a rabbit.”²⁴ Little did Wendell or the readers of the *Telegraph* know, but the thirty-four year old Wendell had played in his last Major League game the season before. Still, the idea that radium helped maintain youthfulness was difficult to miss.

One of the defining traits of American youth in the 1920’s was a greater willingness to explore and participate in sex. Though few thorough studies of sexual behavior are available, several showed that twenties’ youth were more likely to engage in dating, petting and premarital sex than their parents had been. This fascination with sex among young people bled into the American population as a whole. Contemporary commentators and historians have often pointed to the 1920’s as the point at which Victorian notions of sexual restraint gave way to more permissive, modern attitudes. Indeed, the popularization of Freud’s theories helped familiarize Americans with sexual ideas and demonstrate the centrality of sex to human life. Though the changes in sexual mores in the 1920’s were the culmination of gradual changes that had begun earlier, a reputation of increased freedom and openness in the sexual realm clings to the decade. Historian Paula Fass has shown that the idea that love was erotic as well as reproductive gained ground during the period.²⁵

Though the ubiquitous references to “vim” and “pep” could be read as a general preoccupation with energy, they often were code for a more specific problem: sexual

²⁴ New York *Telegram*, 12 February 1927.

²⁵ Paula S. Fass, *The Damned and the Beautiful: American Youth in the 1920’s* (New York: Oxford University Press, 1977), 261.

dysfunction. “Waning vigor” and similar problems mentioned in ads for radium products were widely understood as euphemisms for lack of male virility. One local advertisement said that under treatment with “radium rays,” “men get amazing results, new vigor.” A representative of the Boston Better Business Bureau wondered in a letter, “just what amazing results men get, we should be very interested to know.”²⁶ However, the implication of improved sexual performance would have been clear to most readers.

Some advertisements made the connection to sex explicit while others maintained a front of vaguely worded descriptions. Patent medicine ads from the 1920’s reveal a widespread anxiety over “loss of manhood” and “premature fatigue” within the broader concern with depleted energy levels. “Halanum is probably the greatest aphrodisiac known,” boasted one ad.²⁷ Often, as in Radiumator ads promising a return of “youthful vigor,” claims of sexual rejuvenation linked directly with the promise of eternal youth.²⁸ The decade’s celebration of youth and vitality left those suffering from sexual problems feeling all the more ashamed and isolated. Many Americans, embarrassed by intimate bodily functions, were reluctant to speak to anyone, including their doctors, about them. Patent medicines offered a discreet way to obtain the benefits of supposedly cutting edge science without the attendant loss of privacy.

Typically, purveyors of radium products directed their appeals at men. Terms like “vigor” were coded male and outnumbered those aimed at their female counterparts. Ann Douglas has argued that the 1920’s witnessed a reaction against the figure of the

²⁶ Edward Gallagher to AMA, January 23, 1937. AMA, Box 721, Folder 2: Radium-Radium Cures, 1932-1960.

²⁷ Records of the Food, Drug, and Insecticide Administration and FDA: Notices of Judgment, 1908-1940. Box 5, Judgment # 16579.

²⁸ Radiumator pamphlet. AMA, Box 719, Folder 2: Radiotherapy (Radiumator, 1930-1941).

Victorian matriarch and the feminization of American culture she encouraged.²⁹ This resistance to female dominance led to a heightened concern with male potency in the 1920's. Though radium jars were marketed to every member of the family, many men would have read between the lines about "vital energy" and "premature weakness" and seen a message aimed directly at them.

Some companies approached women with promises of increased sexual performance, but more often they aimed their products at more superficial issues. While potency defined the image of the ideal sexual man, physical attractiveness did the same for women. Vanity cases became a mainstay of American women's purses, and makeup gained widespread acceptance. Long associated with prostitutes and therefore regarded as impure, makeup allowed women to present a sexually provocative image that exceeded the constraints of what reality would allow. White powder and rouge allowed women to turn their faces into doll-like masks of perfect femininity.³⁰

In response to these new attitudes toward female sexuality, radium products increasingly focused on sexual attractiveness for women. Though the Revigator was the top selling radium emanation jar on the market, R.W. Thomas sensed that he could boost sales by marketing an emanation device that was designed specifically for women. Thus, the Revigorette was born. While the Revigator had been bulky, weighing over fifteen pounds, the Revigorette was small and light enough to fit comfortably in a woman's purse. Now women could have the benefit of radium water wherever they went. While

²⁹ Ann Douglas, *Terrible Honesty: Mongrel Manhattan in the 1920's* (New York: Farrar, Straus, and Giroux, 1995).

³⁰ Fass, 283.

the mechanism of radioactive infusion was the same, the stated benefits of the Revigorette were markedly different from those of the Revigator. Revigator ads stressed the energizing and health-giving aspects of radium, but the Revigorette campaign promised “a Beautiful Complexion.”³¹ Radium helped women fulfill their sexual promise not through enhanced performance, but through improved appearance.

The increase in concern about sexual dysfunction often linked up with the burgeoning field of endocrinology. The 1920’s were the “golden years of sex gland research,” according to one historian. Experiments with glandular rejuvenation, including the implantation of monkey glands into humans, sparked worldwide interest in the power of the endocrine system. Though the impact of the glands on sex were well-established, enthusiasm for all things glandular extended well beyond sex. Glands seemed to hold “virtually miraculous powers...over the entire body and mind.”³² Another historian has argued that “glands became, for many, a religion.”³³

Radium advertisements in particular showed a preoccupation with problems of the endocrine system and their relationship to sex and life. Products like Dr. McMichael’s Allgland offered to regulate and rejuvenate the glands. It promised to restore “energy and push” to men and to cure hot flashes, irregular monthlylies, “feeling as though you would blow up,” and other common “female complaints.” Like many of its competitors, Allgland billed itself as both a natural product and a scientific treatment. According to its

³¹ Revigorette pamphlet. AMA, Box 722, Folder: Radium Ore Revigator (Special Data, 1928-1930).

³² Chandak Sengoopta, *The Most Secret Quintessence of Life: Sex, Glands, and Hormones, 1850-1950* (Chicago: Chicago University Press, 2006).

³³ De la Pena, 166.

literature, it was “Nature’s Remedy,” a “gland and body food” that corrected “all diseases cause by overwork, nervous or rundown conditions.”³⁴ The ad implied that working too hard and feeling nervous and rundown were the results of the unnatural temper of modern life. Radium had never been a natural or necessary part of the human diet before because the slower pace of the past had not required it, but the bustling 1920’s moved too fast for the average person, or his glands, to catch up with. Allgland helped restore the natural order of things by putting energy back into the system. A handful of other radium purveyors offered to do the same. Luther S. H. Gable, a Detroit doctor, offered radium highballs, mixtures of fruit juice and a “derivative of radium” that would “prolong human life” by stimulating the glands.³⁵ Glands shared with radium their status as naturally occurring phenomena that were just beginning to be understood by scientists. Each encouraged references to sex and energy, which made them perfect commercial bedfellows.

Though glands had physical reality, they were often discussed with a sort of mystical reverence. They seemed to represent a life force that was out of proportion with their chemical and biological properties. The doctrine of vitalism argued that living things were animated by a vital force that existed outside of the measurable physical realm. Opinions on the nature of the force varied. Some envisioned a soul while others described phenomena that were even more amorphous. Though vitalism as a stand-alone

³⁴ National Archives. Records of the Food, Drug, and Insecticide Administration and FDA: Notices of Judgment, 1908-1940. Box 5, Judgment 14724. Allgland.

³⁵ Detroit *Mirror*, 14 November 1931.

doctrine had lost popularity in the twentieth century, a vitalist impulse runs through much of the commercial rhetoric of patent medicines. Ads painted an image of a world in which cures defied the explanations of mainstream science. There was an intense vitalist current running through much of the discussion surrounding radium in the 1920's. Product names like "Vitalizer" were not chosen frivolously. They reflected a sense that radium, like glands, contained a power that went beyond its tangible properties. When one radium company declared that "radium [was] a conductor of vital forces in the air to animal life,"³⁶ it was not alone in the sentiment. Concepts like "energy" and "vitality" were ubiquitous but were used very loosely from a scientific standpoint. Rather they were terms meant to evoke a hazy idea of a life force that had to be brought into balance if the body were to function at maximum efficiency and power.

The vitalist current in descriptions of radium appeared in other trends of the 1920's including the vogue for vitamins. Vitamins seemed akin to magic pills that could cure diseases and even increase sexual potency. Like radium, vitamins seemed to have an almost mystic quality and, though their operation was imperfectly understood, they were marketed as scientific breakthroughs. By the early 1920's, Vitamins A, B, and C had been identified and linked to deficiency diseases like beri beri and scurvy. These mysterious substances straddled the same line between nature and science that radium did.³⁷

³⁶ Clipping from *Field and Fancy*. AMA, Box 720, Folder 12: Radium-Radium Mines Corporation, 1922-1928.

³⁷ On vitamins see Rima D. Apple, *Vitamina: Vitamins in American Culture* (New Brunswick, NJ: Rutgers University Press, 1996).

Electricity encouraged some of the same fantasies of invisible forces surrounding all matter that animal magnetism had in the previous century. The late-19th century vogue for electrotherapy brought some of Mesmer's ideas into the commercial arena. For decades electricity seemed to satisfy Americans' dream of boundless energy, but by the 1920's it was proving to be insufficient in many people's minds. As the "Golden Age of Electrotherapy" ended around 1920, radium stepped forward to pick up where electricity left off in its effort to transform the human body into something perfect.³⁸

Claims of radium's alleged ability to animate the body were rooted in vitalism because they offered no mechanism through which radium worked. It was true that radium gave off heat and light with almost no measurable depletion. Humans, in contrast, seemed to be increasingly worn down with every passing year. Yet the idea that the former could remedy the latter was essentially a leap of faith. Scientists had no evidence that the energies of radium and of humans were compatible. The commercial portrayal of radium's operation was essentially an abstract metaphorical one, not a physical one.

Of all the images that could have symbolized the vital energy of radium, none was evoked as frequently as that of the sun. From the earliest newspaper reports on radium, journalists and scientists forged a lasting link between the ancient power of the sun and the miraculous properties of the new element. When William Morton and his fellow MIT alumni toasted with "liquid sunshine" at their 1903 Technology Club gathering, they

³⁸ On electricity see Jackson Lears, *Fables of Abundance* and Carolyn de la Peña, *The Body Electric*.

helped solidify a symbolic connection that remained at the heart of radium's story for the next half century. High-profile scientists wondered if the sun's seemingly inexhaustible heat and light indicated that it burned radioactive fuel.³⁹ Radium companies were paying attention, and sun imagery became ubiquitous in the advertisements for their products. For them the sun embodied the same properties that made radium so special: boundless energy and mysterious healing power.

The veneration of the sun as a giver of life is as old as humanity itself. For eons mankind has recognized the centrality of the sun's rays to all living things. Ancient cultures from Egypt to the Americas, Europe to the Middle East, have worshipped sun gods and seen them as embodiments of life itself. The sun's seasonal cycles determined the rhythm of life and death to such an extent that the two became permanently linked. Solar scholar Georgio Abetti was not alone when he declared of the sun, "It's alive." The sun has been compared to a beating heart by everyone from the ancient Aztecs to contemporary astronomer John Eddy.⁴⁰

In fact, some scientists speculated that it was solar energy that helped create the first life on Earth. As primordial matter combined into the basic ingredients of life, they argued, something had to provide the initial spark for the lifeless molecules. At the same time that radium patent medicines were booming, British biologist J.B.S. Haldane claimed that the sun's action on the building blocks of life (including water, carbon dioxide, and ammonia) helped created the "hot dilute soup" in which life first appeared.

³⁹ See Chapter 2.

⁴⁰ Both quoted from *Fire of Life: The Smithsonian Book of the Sun* (Washington D.C.: Smithsonian Exposition Books; New York: Distributed by Norton, 1981), 117.

Tellingly, lightning and electricity, to which radium had symbolic ties, also were posited as candidates for life's catalyst.⁴¹

Radium too had been granted mysterious life-giving powers when newspapers began reporting that British scientist J. Butler Burke had created spontaneous life with the help of radium. Burke claimed that he had exposed inanimate bouillon to radium rays and produced small organic bodies he called "radiobes." Though other members of the scientific community doubted the legitimacy of his conclusions, Burke was convinced that he had produced new life from scratch. He surmised that small amounts of radioactivity in nature were responsible for life's origin; direct exposure to radium merely accelerated the process. Burke shied away from the philosophical and theological implications of creating new life, but he did see his work as evidence of the "continuity of nature" which "reveal[ed] the harmony of the universe in the works of the Almighty."⁴²

Commercial radium products were quick to adopt solar imagery. The implication of unlimited energy proved particularly suitable to the radium emanation jars that boasted of their ability to reinvigorate and vitalize their run-down patients. Ray-X-Water's ads billed it as "liquid sunshine," in an open reference to Morton's famous speech of twenty years before.⁴³ Vigoradium called itself "the liquid sunlight that makes you live right," in a slight variation on Morton's theme.⁴⁴ Radium's connection to the sun allowed advertisements to play up the element's natural occurrence. An ad for Torbena, another

⁴¹ Ponnampereuma, Cyril, "The Quickening of Life." *Fire of Life*.

⁴² "Burke Tells How He Made Life Awake in Radium Test" *New York Journal*. 21 June 1905.

⁴³ *Journal of the American Medical Association*. August 6, 1932, 492

⁴⁴ Vigoradium pamphlet. AMA, Box 721, Folder 4: Radium—Radium Emanation Generators Correspondence, 1927-1929.

emanation jar, quoted a supposed expert on radium, “Is radio active water a medicine? No. Radio-activity in water is a natural property. Is radio active water harmful? No. It is accepted as harmoniously in the body as sunshine is by the withering plant.”⁴⁵

Some made radium’s connection to the sun manifest in their names. The Radio-Active Solar Pad appeared on the market in 1917 and proved to be one of the longest lasting of the radium brands. The Radium Appliance Company, based in Los Angeles, reportedly had sold over 130,000 Radio-Active Solar Pads by 1930, when they were selling for \$19.50 a piece.⁴⁶ Ads for the Radio-Active Solar Pad hit many of the themes of the era. Vague ideas about “energy and vitality” mingled with more specific claims about “[restoring] arteries to pliable condition” and “[stimulating] heart action.”⁴⁷ Like many companies of the time, it based its medical philosophy on the importance of keeping things moving. The Radio-Active Solar pad looked to the circulatory system as the locus of health’s essence. “The one underlying cause of nearly every known malady is congestion—the one remedy Circulation,” declared a form letter.⁴⁸ Poor circulation and the obsession with motion were in keeping with the 1920’s preoccupation with combating sluggishness.

Advertising materials presented the Solar Pad as an inexpensive alternative to orthodox radium therapy. While the range of conditions treated by mainstream radiologists had narrowed substantially by the 1920’s, Radio-Active Solar Pad continued to see all illnesses as conducive to radioactive treatment. “The difficulty heretofore in

⁴⁵ Torbena pamphlet. “Medicine Heals—Nature Cures” AMA, Box 722, Folder 6: Torbena, 1927-1930.

⁴⁶ About \$250 2010 dollars.

⁴⁷ Pamphlet, 1917. AMA, Box 718, Folder 2: Radiotherapy (Radio-Active Solar Pad, 1911-1920).

⁴⁸ Letter in same folder as above.

using radio-activity as a curative agent has been that it could be administered in certain indications only, and at a cost far beyond the reach of the person of ordinary means,” wrote John Dutcher, a Radium Appliance Company employee. In the same letter, Dutcher claimed that the improved circulation promoted by Radio-Active Solar Pad would remedy “constipation, rheumatism, neuralgia, high blood pressure, diabetes, locomotor ataxia, partial paralysis, insomnia, diseases of the nerves, stomach, bowels, heart, bladder, kidneys, liver, prostate gland, women’s complaints, and many others.”⁴⁹

While the Radium Appliance Company guaranteed that its products were highly radioactive, its literature gives little sense of the connection between radioactivity and the diseases it supposedly cured. While the occasional ad would namedrop well-known radiologists and atomic scientists, the company typically stressed more abstract notions of “energy.” This was keeping both with the era’s obsession with the concept, as well as the link between radium and the sun. Though its advertisements rarely played the sun angle, Radio-Active Solar Pad’s name was enough to imply the connection. The symbolic chain that led from radium to the sun to energy to circulation to health seemed to go without saying.

References to the sun’s health benefits were not solely the dominion of radium purveyors. A host of products during the period claimed to harness the sun’s healing rays in the treatment of a wide array of disease. The nature of the rays varied from one end of the spectrum to the other. General Electric, for example, allowed customers to bring

⁴⁹ Dutcher to Bondurant, November 19, 1930. AMA, Box 719, Folder 1: Radiotherapy (Radio-Active Solar Pad, 1930-1942).

ultra-violet rays into the home with its Indoor Sun.⁵⁰ Niels Finsen had pioneered the field of UV therapy and earned a Nobel Prize for his treatment of disease. Later with the discovery of the link between vitamin D and sun led to a vogue for enriching foods with ultraviolet light and a new type of “Bottled Sunshine.”⁵¹ At the lower end of the electromagnetic spectrum was the Super Sun, which provided the “important infra-red” rays in addition to the “vital Vitamin-producing” ones. “Man has created a sun,” beamed a 1933 ad.⁵² The ubiquitous references to the sun highlight the vitalist ideas about solar energy that were rampant in the 1920’s. The makers of one electrical device claimed that the glands operated by “electrically generated thermic energy, an element that...came directly from the sun.”⁵³ Even cod liver oil was billed as “liquid sunshine.”⁵⁴ However, it was radium, more than any other substance, that seemed to stoke the most fantasies about a life force that coursed through the universe and through all living things.

While some radium companies dealt in abstractions, others confronted the physicality of the body and its relationship to radioactivity. Historian Stephen Fox has argued that the 1920’s witnessed a “discovery of the human body.”⁵⁵ With the loosening of Victorian ideas of propriety and privacy, Americans became increasingly willing to discuss and even obsess about their own bodily functions. Radium products reflected this

⁵⁰ Nation Archives. Records of the Food, Drug, and Insecticide Administration and FDA: Advertising Material for Patent Medicines and Health Devices, 1933-1937. Box 12.

⁵¹ Apple, 39.

⁵² National Archives. Records of the Food, Drug, and Insecticide Administration and FDA: Advertising Material for Patent Medicines and Health Devices, 1933-1937. Box 13.

⁵³ De la Pena, 167.

⁵⁴ Lears, 173.

⁵⁵ Stephen R. Fox, *The Mirror Makers: A History of American Advertising and Its Creators* (New York: Morrow, 1984), 97.

trend, diversifying and specializing on ever more specific parts of the body. Radium Spectacles appeared that would remedy cataracts and glaucoma.⁵⁶ Audiophone with “Hearium” promised a cure for deafness.⁵⁷ From gout in the feet to arthritis in the hands, radium offered something for every ailing body part.

One body part of growing concern was the mouth. Before World War I, only 26 percent of Americans did anything to maintain their oral hygiene. By the mid-1920’s that percentage had swelled to 40 and continued to grow. The increase in concern over dental care was due in part to the work of advertisers, who stressed the importance of fresh breath and a bright smile. One adman said of the toothbrush, “no one creation of man has done more to lift the individual out of the sordid slough of mediaevalism and place him on a new aesthetic plane.”⁵⁸ “Halitosis” entered the American lexicon, and concern over “pink toothbrush” and “tender gums” spread. One radium company, Radium Remedies Co. of Minneapolis, was paying attention. It began marketing Pyradium and offered an “Iron Clad Guarantee to give satisfaction in the treatment of pyrorrhea, trench mouth, bleeding gums, gum boils or ulceration of the gums.” Advertising materials for Pyradium offered few specifics on how radium could act against oral diseases. Rather it fell back on generalities that could have been applied to hundreds of other radium lines: it “[carried] energy into the depths of the body”; it “[vitalized] every organ”; it “[made] every cell in the body full of health and vitality.”⁵⁹ Other ads offered vague descriptions of scientific processes that might have impressed lay people but in reality amounted to

⁵⁶ Pamphlet. AMA, Box 251, Folder 8: Eye Cures, Radium Products Company (Cincinnati) 1923-1928.

⁵⁷ Audiophone advertisement. AMA, Box 410, Folder 13: Kay, Abbott E. 1922-1926.

⁵⁸ Fox, 100.

⁵⁹ National Archives. Records of the Food, Drug and Insecticide Administration and FDA: Notices of Judgment, 1908-1940. Box 6, Judgment 19166.

little more than a collection of empty phrases: “It is believed when pyradium is held in the mouth, the tissues rapidly absorb the alpha particles stored therein while the rays expelled during the retention in great numbers and velocity come in contact with the tissue.” Readers of such a statement were left to make their own connections between the science of radioactivity and success against oral disease. Predictably, Arthur Cramp, head of the AMA’s Bureau of Investigation, was unwilling to make such a jump. He told a colleague of Pyradium, “we get the impression that it is merely one more of the fakes based on the peoples’ lack of knowledge of radium and the mystery surrounding that element.”⁶⁰

The new focus on the mouth reflected an increasing concern with hygiene and purity that permeated American advertising throughout the 1920’s. The ideal presented in many advertisements showed a nation that desired uniform antiseptic cleanliness. Unsightly filth and offensive odors had no place in the United States of the twentieth century.⁶¹ One particular manifestation of the ideal of purity was an obsession with constipation. If Americans had discovered their bodies, they were paying special attention to their bowels. Patent medicine peddlers were quick to follow. R.W. Thomas, creator of the Revigator, mined the public preoccupation with regularity with another brainchild, the Radium Cone . The Cone consisted of a brick of radioactive ore that imparted radioactivity to water in which it was placed. Instructions told customers to drink no less than nine glasses of “[revitalized]” water each day to help with elimination

⁶⁰ Cramp to C.J. Sells, April 7, 1925. AMA, Box 410, Folder 6: Periodontal Diseases-Pyradium 1925-1933.

⁶¹ See Fox, *The Mirror Makers*; Lears, *Fables of Abundance*.

of waste. “Follow the above directions,” the label warned, “or, if you prefer, keep the constipation.” Constipation was, Radium Cone ads declared, “the cause of all sickness and premature death.” And thanks to radium’s long half-life, the benefits of Radium Cone did not have to be limited to the present generation. “You may have children and possibly grand children. The Radium Cone positively insures them better health and longer life. Please keep these directions in your library for your descendants to read. They will recognize the value of Radio-active water,” boasted one of the company’s circulars.⁶² Radium Cone reflected a broader concern with motion and keeping the bodily processes moving. The Radium-Active Solar Pad, which stressed the circulation of blood, echoed that theme. In the 1920’s, slowing down or stopping meant the risk of illness, decay, and death.

Advertisers sometimes extended the concern for internal purity beyond mere constipation to more horrific territory. The Muirdar Radium Company manufactured a number of items including the Polarizer, which boasted an amazing ability to remove stubborn parasites. One advertisement, designed to look like a news article, declared, “Two-headed kidney worm removed...Six Hours After Using the Polarizer.” The “hydro-head [sic] monster” was still alive when it was removed. The Polarizer succeeded in removing parasites in cases where others failed because “they seem to succumb to the bolts of lightning in the form of emanations [sic] or scintillations into the body by the millions.” As was often the case in advertisements for radium products, this rhetoric

⁶² Records of the Food, Drug, and Insecticide Administration and FDA: Notices of Judgment, 1908-1940. Box 7, Judgment # 20944.

conflated radioactivity and electricity into one beneficent energy that was capable of restoring health and balance to the system.⁶³

As Americans became more conscious of their bodies, radium products branched out accordingly. New products promised to not only energize and cure but to beautify as well. Several of the trends in radioactive rhetoric dovetailed with the claims of radium beauty products like Radior. Radior's product line included hair tonics, compacts, rouge, and other items. From the beginning radium was often said to contain a vital force akin to life itself, so when the cosmetic product Radior claimed that it sold "daintiest of toilet preparations all imbued with LIFE by Radium," it would have been playing on what many Americans already knew. Radior ads also referred to radium as a "purifying element akin to sunlight." In addition to the ubiquitous symbolic link between radium and the sun, this statement also highlighted the preoccupation with purification that characterized many products in the 1920's. The mechanism through which radium "[assisted] the skin to purge itself of all impurities" was less important than the promise of perfection implicit in the claim.⁶⁴

Radioactive patent medicines reached their peak in the 1920's for several reasons. Foremost was the sense that they worked. Although the medical establishment was less and less convinced that water infused with radioactivity had any medical application, customers seemed to get results. Ads were filled with testimonials to the value of

⁶³ Polarizer advertisement. AMA, Box 720, Folder 2: Muirdar Radium Company (Anzac) 1918-1926.

⁶⁴ John H. Sisson to Ray-X Corporation, March 10, 1932. AMA, Box 720, Folder 7: Radium-Radior Co. 1914-1920.

emanation jars and other products. John Sisson, in a letter to the Ray-X Corporation, described years of hellish decline that included constant pain, the loss of the use of his legs and arms, and blindness. “After taking a month’s treatment, one case of Ray-X,” he wrote, “I began to regain the use of my legs and arms, and at the end of two month’s I was free from pain and suffering and feel 100% better.” Stories like Sisson’s were common in the pamphlets and circulars of dozens of companies. Word-of-mouth no doubt spread similar tales of miraculous cures and helped convince new customers that their suffering would soon be at an end.

There was also a broader surge in enthusiasm for radium thanks to Madame Curie’s 1921 visit. She finally arrived in the United States after months of courtship spearheaded by Missy Meloney of *The Delineator*, one of the top women’s magazines in the country. Meloney, invited to interview Curie in Paris, discovered that the Nobel laureate was working in an inadequate laboratory with an insufficient supply of radium. She called on her readers to raise money for a gram of radium that would be presented to Curie in person. It worked, with the “Women of America” raising over \$100,000. Meloney had stressed the medical applications of radium in her appeals. Curie’s arrival was heralded with headlines such “Curie Cures Cancer” that helped remind Americans of the miraculous element that had first been met with such dazzling headlines almost two decades before. People were once again ready to believe anything about radium.⁶⁵

⁶⁵ On Curie see Barbara Goldsmith, *Obsessive Genius: The Inner World of Marie Curie* (New York: W.W. Norton, 2005); Rosalynd Pflaum, *Grand Obsession: Madame Curie and Her World*; Susan Quinn, *Marie Curie*.

Radium's ascension to mass commercial popularity occurred in spite of resistance on several fronts. On one side, the advertising industry was working to distance itself from its embarrassing patent medicine origins. Like the medical establishment, the advertising industry underwent a process of professionalization during the late nineteenth and early twentieth centuries. During the nineteenth century, patent medicine companies had become the first to market themselves on a national scale, but for twentieth century ad executives, patent medicines still had the whiff of the seedy snake oil salesman. The propaganda campaigns of World War I, orchestrated by leaders in the advertisement field, had helped elevate the status of the advertising industry in America.⁶⁶ If that industry wanted to achieve respect on par with other professions, it would have to reposition itself as far from the negative associations of the past as possible. This put radium companies in an awkward position. The market for their product was booming just as advertisers were becoming less willing to take them on as clients. As a result advertisements for radioactive products often lagged behind the increasingly sophisticated campaigns being created for other products. In many respects the style of their ads differed little from those of their nineteenth century forefathers, but their substance reveals a complex psychological connection between radium and Americans' health fantasies. While their format was often simple and old-fashioned, radium advertisements managed to create an image of radium that both nurtured and fed on Americans' hopes and fears.

⁶⁶ Roland Marchand. *Advertising the American Dream: Making Way for Modernity, 1920-1940* (Berkeley: University of California Press, 1985). 5-6.

Like American sexual attitudes, advertising also bore the imprint of Sigmund Freud's ideas. Advertisers appropriated concepts from Freudian psychology to approach consumers from an unconscious, as well as conscious, level. In fact, Freud's nephew Edward Bernays put his psychological heritage to use as one of the founding figures in modern public relations. His book *Propaganda* encouraged advertisers to target the "motives which [men and women] conceal from themselves."⁶⁷ After stoking anxieties, whether over bad breath or an outdated car, advertisers could play a therapeutic role. Whatever problem existed could be remedied with a given product. Patent medicines shared this therapeutic approach with Madison Avenue's bigger clients. They went about it, however, in a different way. The dramatic narrative and shared consumer experiences of high-profile ads were mostly missing from patent medicine ones. Instead, they tended to list diseases and symptoms that would draw in potential sufferers and reassure them that a cure was at hand. Though the increasing sophistication of modern advertising left patent medicines safely in the past, the enthusiasm for radium products persisted.

While patent medicine was being left behind in some quarters, it was being attacked in another. Though the golden age of muckrakers had passed, the press continued to play an important role in the fight against patent medicines. The most famous exposé to appear at this time was Arthur Kallet and F.J. Schlink's *100,000,000 Guinea Pigs*. Kallet and Schlink worked for Consumers Research, an advocacy organization that guided consumers by publishing results of thousands of product tests.

⁶⁷ Douglas, 47.

Kallet and Schlink determined that many companies knowingly exposed their customers to dangerous items in order to boost profits. As historian Charles McGovern has written, “corporate greed and scientific ignorance turned consumers into unwitting victims, no better than lab animals.”⁶⁸ The book reached a wide working and middle class audience, and RKO and Fox both considered movie adaptations to capitalize on its success.

Kallet and Schlink urged readers that they as consumers had rights that needed to be protected through protest and organization. Government agencies like the FDA and FTC were overworked, undermanned, and inadequate and needed desperately to be strengthened. Only a beefed-up federal government could protect consumers from the excesses of corporate greed. The book called for better funding and organization within the FDA, greater cooperation with the AMA, stricter regulations, and stiffer punishments for offenders. The public also had a responsibility. The authors urged readers, “First and foremost, let your voice be hard, not once, but often, by your city, county, state, and national legislators and your newspaper editors, if you think that some or all of the foregoing provisions and changes should be made.”⁶⁹

Chapter titles like “A Steady Diet of Arsenic and Lead,” “Prescriptions, Magic, and Poison,” “Danger in Cosmetics,” and “The Quack and the Dead” point to the variety of subjects examined by Kallet and Schlink. Nothing escaped their watchful eye including radium products. The high profile deaths of the “Radium Girls” from their exposure to radioactive paint and dust, and of industrialist Eben Byers from drinking the

⁶⁸ Charles McGovern, *Sold American: Consumption and Citizenship, 1890-1945* (Chapel Hill: University of North Carolina Press, 2006), 245.

⁶⁹ Arthur Kallet and F.J. Schlink, *100,000,000 Guinea Pigs: Dangers in Everyday Foods, Drugs, and Cosmetics* (New York: Vanguard Press, 1933), 296.

radium water Radithor⁷⁰ led the authors to bemoan the failure of the federal government to fight back.

Millions have heard of the radium-water death (just as they have heard some years ago of the fatal poisoning of several women workers making radium-glow watch dials), but only a few have realized that behind the ignorance and shyster practices of the nostrum vendor, there lies an incompetent and indifferent and quite cold-blooded Government regime, unwilling to step into a public emergency of this or any other kind unless public opinion, *including that of the most influential business enterprises concerned*, demands such attention.

The medical establishment joined the press in denouncing “quacks” in the radium field. At first, thanks to strides in orthodox radium medicine, the medical establishment had been open to the possibility that radium emanation jars could have value. The AMA’s Council on Pharmacy found “acceptable evidence” of health benefits and worked to establish standards for radioactive waters. Commercial products failed to live up to the standards if they were insufficiently radioactive. Any radium generator that yielded less than 2000 millimicrocuries of emanation during a twenty-four hour period was deemed unacceptable. Revigator, for example, produced only 20 millimicrocuries. This was a rare instance in which patent medicines were deemed unsuitable due to a lack of dangerous substance. Arthur Cramp wrote that “radium and radium emanations are much too powerful to be put in the home remedies class to be used indiscriminately by the public.” Commercial products with lower outputs, on the other hand, were dismissed as ineffective. Users would have to drink 120 gallons of water to get a dosage of radioactivity that could conceivably yield health benefits.⁷¹

⁷⁰ To be discussed in the next chapter.

⁷¹ Cramp to Rea, October 14, 1925. AMA, Box 720, Folder 19: Radium-Radioak, 1925-1930.

However, it did not take long for the AMA, and the medical establishment as a whole, to change its tune when it came to radium emanation jars. By the end of the 1920's, the Association deemed all commercial uses of radioactivity unfit for public consumption. Government regulators agreed and established what would become a mantra for opponents of products like the Revigator: If a product contained enough radioactivity to affect health, its potential for harm was too high; if it did not contain radioactivity, it was useless.

The AMA continued to publish reports on the worst patent medicine offenders in *JAMA*. A third volume of *Nostrums and Quackery*, the Association's compendium of articles on quack medicines, appeared in 1936, cataloguing the spate of new products that had entered the market since the previous volume, published in 1921. Anyone who believed that the Pure Food and Drug Act of 1906 had substantially injured the patent medicine industry needed only to look at the index of the new volume. A number of radium products received attention including Ra'Balm, which was reported to contain no radium at all. Like its ancestors Ra'Balm was merely a collection of innocuous ingredients including soap and "mineral matter."⁷² The AMA also reprinted its articles about J. Bernard King and Abbot E. Kay, both of whom had been out of the radium business for some time.

Nostrums and Quackery also helped show that not all radium quackery followed the typical patent medicine model. Some operated on a much smaller scale. James M. Harris, for example, operated his business alone from a farm outside Tulsa. He claimed

⁷² *Nostrums and Quackery*, Volume 3. 189.

to have a cancer cure he called “Radium Oil” and operated locally, face-to-face with his patients. One woman came to Harris with what was later determined to be an operable case of breast cancer. Under Harris’s care the cancer progressed beyond the point of being treatable. The woman brought suit against Harris in April, 1924 and was awarded \$10,000 in damages. She died the next year. Harris appealed the case up to the Oklahoma Supreme Court, which upheld the decision of the trial court.⁷³ By publishing stories like these, the AMA hoped to fan the flames of public outrage and put pressure on the government to act against patent medicine offenders.

The problem facing opponents of these products was the persistence among orthodox physicians of the idea that radioactive waters and devices could have some role in the legitimate doctor’s armamentarium. Cramp wrote in response to a New York *Times* inquiry about the Radiumator

this particular line of quackery is very popular, and I am sorry to say that there are some members in the profession who still believe that radium emanation dissolved in water has therapeutic value. There is no scientific evidence for such a position. It was thought, a few years ago, that there might be some therapeutic value in water in which radon was dissolved. Greater experience and fuller knowledge have shown that position to be untenable.

When faced with the problem of explaining why devices deemed worthless by the medical establishment seemed to effect a variety of cures, Cramp had a simple answer. “A very large number of people who buy the device are actually benefited because they drink much more water—something that a great many of us should do,” he wrote. Most of the devices called for patients to drink as many as a dozen glasses of activated water

⁷³ *Nostrums and Quackery*, Volume 3. 13.

each day. Even without the benefit of radioactivity, the resultant hydration would have gone a long way toward alleviating the constipation and other complaints of emanation jar users. Cramp added that there was a “psychic element” of these devices, as there was for all patent medicines.⁷⁴ Just by doing no harm, such products allowed nature and time, the most effective healers of all, to take their course. If a cure coincided with a course of Radiumator or one of its competitors, it was understandable if a customer attributed the success to his or her new gadget.

Radium companies did not take such criticism lying down. R.W. Thomas attacked the medical establishment for its greed and obtuseness. He argued that the “Medical Trust” opposed Revigator because it took patients and their money away from doctors. When the AMA spoke out against the Revigator and its ilk in *JAMA*, Thomas countered that ultimately the Revigator would be vindicated

like poor old George Washington was right when he protested bleeding (yet was bled three times by the doctor for sore throat, and died from the effects); like William Henry Harrison, who ordered a bath tub installed in the White House, was right regardless of the medical agitation to the contrary, and of the fact that various medical associations had succeeded in having laws passed in 13 states prohibiting or restricting the use of bathtubs.

Interestingly, several products that Thomas identified as having been unfairly maligned by the medical mainstream, including Bayer’s aspirin, Lysol, and Vick’s VapoRub, have ascended to mainstream acceptance. However, the same could not be said for Thomas’s Revigator.

⁷⁴ Cramp to New York *Times*, April 29, 1931. AMA, Box 719, Folder 2: Radiotherapy (Radiumator, 1930-1941).

The press and medical establishment could speak out against the excesses of the patent medicine industry, but they lacked the authority to do anything about them. Ultimately, the government would have to step up if the situation were going to be improved. In response to the booming market for radium products that ranged from harmlessly useless to potentially dangerously radioactive, the federal government tried to stop their sale. The Department of Agriculture's Bureau of Chemistry tested scores of radioactive products and found that very few contained any radium. Yet the Food, Drug, and Insecticide Administration was hamstrung by the limitations of the regulatory laws. If companies avoided blatant untruths on their labels and in their advertisements, they were difficult to prosecute. A handful of products were shown to be fraudulent, but many more stayed in business. Ultimately it would take two well-publicized scandals to spark increased efforts to eliminate all radioactive medical products from American shelves for good.

In the late 1910's, a group of women began working for the U.S. Radium Corporation painting watch dials with luminous paint compounded from radium. Told the paint was harmless, the women were cavalier about "[slapping] radium around like cake frosting." They amused themselves by painting their fingernails and even their teeth to make them glow in the dark. They also ingested microscopic amounts of radioactive material when they used their lips and tongues to maintain fine points at the end of their brushes.

Around 1922 some of the women began to develop mysterious health problems. Bone fractures, anemia, and a form of necrosis that came to be known as "radium jaw"

beset a handful of U.S. Radium employees. Although the company denied it, medical evidence that the illnesses were the result of radium poisoning mounted. The women, known as the “Radium Girls” sued for compensation in a series of lengthy legal battles that continued for years. The case was settled in 1928, and the surviving Girls were compensated with \$10,000, a \$600 annuity, and the costs of their medical care and legal counsel.⁷⁵

The saga of the Radium Girls became a high-profile cause célèbre. Americans were outraged that a heartless corporation could treat its young employees with such disregard. Radium itself also took a hit in the American imagination. Though the negative effects of radium had always been apparent, they had mostly been glossed over in favor of an image of radium’s unlimited potential as a healer. Now Americans could read day-by-day coverage of the painful decline and deaths of innocent young girls at the hands of deadly radium. Although radium patent medicines weathered the storm and continued to sell after the story of the Radium Girls faded from the headlines, the writing was on the wall that radium was not a miracle substance.

It would take a second scandal to usher in the last days of radium patent medicines. While most of the products that appeared during radium’s 1920’s heyday were of dubious medical value, they were largely harmless. The amount of ingested radium was insignificant, a tiny fraction of the radium found in the Radium Girls. Consequently the products were essentially innocuous. However, one product appeared that contained enough radioactive material to be deadly. William J.A. Bailey’s Radithor

⁷⁵ See Claudia Clark, *Radium Girls: Women and Industrial Reform, 1910-1935* (Chapel Hill: University of North Carolina Press, 1997).

would be the subject of a second major radium scandal when a well-known endorser of the “radium-impregnated water” died a gruesome death that Americans could follow day-by-day in the newspaper. The story of Radithor would prove to be the beginning of the end for radium patent medicines.

Chapter Six: Radithor and the Downfall of Commercial Radium Medicine

Before radium entered Eben Byers's life, he had everything going for him. He was born in 1880 into a wealthy family, attended private schools, and graduated from Yale. By his late twenties he had taken over an iron foundry that had been built up by his father. He was a young millionaire with a handful of homes and two stables full of racehorses. Byers also was a prominent amateur athlete, a skilled shooter and the 1907 U.S. Amateur Golf Champion. He seemed the paragon of manly vigor. His wealth and vitality made him popular with women, and he was a known playboy. Yet by the time of his death in 1932, he had withered away to less than 100 pounds. Most of his jaw had been removed due to cancer, and brain abscesses had eaten through his skull. He claimed that a radioactive patent medicine called Radithor had brought him to this gruesome end.

Byers had begun taking Radithor on doctor's orders after injuring his arm when he fell from his berth on a Pullman car returning to New York after the Harvard-Yale game in 1927. Byers was an enthusiastic convert, drinking several bottles a day for years, sending it to his friends, and allegedly even feeding it to his racehorses. By the end of the decade he had consumed over 1000 bottles. It was not long before Byers started to suffer from a new set of health complaints. He was having headaches, toothaches, and other unusual pains. He refused to believe that Radithor could be the culprit. Then his teeth began to fall out. He kept drinking the nostrum, confident that the vitality it had given him would soon return. Less than two years later he was dead.¹

¹ Mackliss, Roger M. "The Great Radium Scandal." *Scientific American* August 1993, 96

Byers's death made national headlines and turned public attention to the question of how this could have happened. How could Radithor, assumed to be Byers's killer, be marketed for years in plain sight? Government regulators and members of the medical establishment had been aware of Radithor and its con man creator, William J.A. Bailey, for years before the Byers case surfaced but failed to successfully pursue it. The AMA failed to recognize the danger posed by Radithor. The FDA was hamstrung by weaknesses inherent in the regulatory laws. By the time Radithor came under serious attack, Byers was dying and Bailey had already moved on to other ventures. However, the Radithor scandal did help galvanize an effort to strengthen regulatory laws and close loopholes that had allowed radioactive patent medicines and other dangerous over-the-counter products to prosper. It marked the beginning of the end for commercial radium medicines.

Radithor was the brainchild of William J. A. Bailey, a man with a background very different from that of Byers. It was one of a slew of radium products he marketed in the 1920's. However, the man who would over time be seen both as a pioneer in radium medicine and as a dangerous fraud did not begin his professional career as a scientist or doctor. Bailey was a business man, and a look at his earlier ventures sheds some light on the one that would eventually make his name.

Bailey was born on May 25, 1884, and brought up in a modest Boston neighborhood. He and his eight siblings were raised by their mother after their father died when William was a child. William did well enough in school to get into Harvard,

which he attended for two years until mounting debts forced him to quit.² After leaving college, Bailey worked as a solicitor in Boston and as an agent for a variety of import-export firms from Iowa to Milwaukee to Philadelphia.³ His work eventually brought him to Kalamazoo, Michigan, the scene of his first recorded run-in with the law.

In 1915 Bailey began publishing ads for the Carnegie Engineering Corporation of Kalamazoo. The ads offered automobiles that cost \$595 but could be secured with an advance of only \$50. The offer was so enticing that Bailey's company received 15,000 advance orders, including a huge one all the way from tsarist Russia. The name Carnegie must have made the ads particularly attractive. Bailey sent out letters declaring, "we believe it unnecessary to state in announcing the CARNEGIE to you that our name is known throughout the world." "The car that everybody has been awaiting" would be the ultimate in design and construction and at the lowest price available in the world for a fully equipped car.⁴ The only problem was that the "Carnegie Engineering Corporation" had neither the intention nor the facilities to produce the cars. Where there supposedly was a state-of-the-art automobile factory, investigators found little more than a shed and a box of tools. A fraud order was issued later in 1915, and Bailey spent thirty days in jail.

After this failed venture, Bailey continued along similar lines for a few years. He started an unsuccessful non-skid tire company in Boston. Then he tried to open a chain of garages under the moniker United Automotive Garages, Inc. After a few more

² Mackliss, 96

³ Letter from Proudfoot's Commercial Agency to Arthur Cramp, May 8, 1915. AMA, Names Box 1, Folder: Bailey, William J. A. Special Data.

⁴ Letter from Carnegie in Post Office Department memorandum from the Office of the Solicitor for the Postmaster General, September 7, 1924. AMA, Names Box 1, Folder: Bailey, William J. A. Special Data.

hardware ventures failed to pan out, Bailey decided to try his hand in the patent medicine market. The details of his transformation into a patent medicine peddler are not known, but a man like Bailey, interested in getting rich quickly, could not have missed the commercial medicine business booming all around him. He probably saw medicine as the perfect opportunity for a man who could find a niche to fill.

Bailey's medical ventures first came to the attention of the authorities in 1918, when he was fined \$200 for fraudulently promoting a product called "Las-I-Go for Superb Manhood." Aphrodisiacs had long been a favorite of patent medicine makers, and Bailey no doubt saw a little more room in the market for himself. Chemical analysis of his product showed its active ingredient to be strychnine.⁵ Though Las-I-Go failed, Bailey persisted in the patent medicine field, seizing enthusiastically on the vogue for products that boasted the energizing and healing properties of radium.

He learned as he went along, marketing a string of products that would culminate in Radithor. Through these products one can trace the development of Bailey's elaborate medical philosophy. He borrowed advertising strategies from competitors while appropriating medical ideas that he discovered by combing through the literature, cherry-picking any tidbit he could potentially use to boost sales. One of Bailey's promotional strategies was to present himself, as Dennis DuPuis and others had before him, as a trained expert in both radium and medicine. Unlike DuPuis, Bailey did not create a professional pseudonym, though he did invent a new past for himself. Bailey falsely

⁵ Mackliss, 97.

claimed to have degrees from Harvard and the University of Vienna.⁶ His falsified credentials gave his commercial appeals the weight of authority and even managed to open doors for him within the mainstream science community. In 1924 he made an appearance before the medicinal products division of the American Chemical Society, a prominent scientific organization, though his presentation was roundly criticized. Charles Parson, executive secretary of the society, wrote to Arthur Cramp, head of the AMA's Bureau of Investigation, "I very much fear that the American Chemical Society has been made the victim of an undesirable member." Parson claimed that the abstract of Bailey's presentation that circulated ahead of time gave no indication of the true nature of the talk.⁷ The Society hoped to take action against Bailey, but there is no record it did so.

Bailey also managed to appear in newspapers as an expert on radium therapy and endocrinology. A *Washington Post* article declared "Science to Cure all the Living Dead. What a Famous Savant has to say about the new plan to close up the insane asylums, wipe out illiteracy and make over the morons by his method of gland control." The piece touted Bailey's supposed multiple degrees and claimed that his method was widely used.⁸ While the details of Bailey's method were vague, he was building his reputation as a radium specialist.

⁶ Bailey did attend Harvard but never received his degree. As for Vienna, there is no evidence that he received a degree there either. Bailey presumably chose to give himself a European degree to further bolster his image as a well-trained specialist. Europe had long been the destination for American would-be doctors desirous of the best training available. Bailey may have chosen Vienna because it was a leading center for radium research and was where Eugen Steinach, a pioneering researcher in endocrinology and likely influence on Bailey, lived.

⁷ Charles Parson to Cramp, May 23, 1924. AMA, Names Box 1, Folder: Bailey, William J. A. Correspondence, 1924-1926.

⁸ *Washington Post* 8, June 1924.

Bailey's commercial radium endeavors formed a complicated tangle of businesses and products. He operated several companies at once, each putting out products that shared similarities while differing in the specifics. Taken together Bailey's products reveal a medical philosophy that developed over time and allowed him to sell products to hundreds of thousands of Americans. At the heart of Bailey's philosophy was a connection among illness, the endocrine system, and radioactivity. In essence he claimed that all illnesses physical and mental could be linked to the improper functioning of the glands. Radium would regulate the system and bring it back into balance and good health. Bailey's ideas borrowed from currents in mainstream science and medicine, but he crafted his own take on the value of radium and presented a populist ideal of individual medical empowerment under a veneer of scientific legitimacy.

American Endocrine Laboratories was one of Bailey's early attempts to capitalize on the burgeoning vogue for radium. He operated A.E.L. with Herman H. Rubin, who had been thrown out of county and state medical societies in New York in 1924. Rubin was a fellow patent medicine peddler and A.E.L. shared an office with his Vitamon Corp. and Mastin Co. Rubin had earlier ties to a fake obesity cure called Citrophan.⁹ Together Bailey and Rubin marketed the Radiendocrinator, a gold-plated device to be worn over the endocrine glands. The name of the product sums up the heart of Bailey's medical philosophy. "Radi-" points to radioactivity while "endocrinator" evokes the role of the glands in a well-functioning body. The ability of the former to affect the latter is implied here, and stated explicitly on behalf of many of Bailey's products. A Radiendocrinator

⁹ Cramp to L.J. Friend, June 23, 1926. AMA, Names Box 1, Folder: Bailey, William J. A. Correspondence, 1924-1926.

pamphlet boasted that looks, character, and memory could all be improved by wearing the device at night. “Said to be the greatest achievement in the field of modern medicine,” the pamphlet declared, without mentioning who exactly had said it. Originally the Radiendocrinator sold for \$1000.¹⁰ Eventually the “Radi-” was dropped from the name and the Endocrinator went on sale for the slightly more modest price of \$150. Ruth deForest Lamb of the Food and Drug Administration explained the timing of the change, saying it occurred “when suckers ceased to bite.”¹¹ It also may have indicated that Bailey had broken ties with Rubin and moved on to his next venture. This view is given further credence by the fact that the AMA listed the renamed Endocrinator in its “Obesity Cures” pamphlet.¹² Obesity had been Rubin’s hobby horse for years and it seems likely that he changed the name and his strategy when Bailey was no longer involved.

Critics dismissed the Radiendocrinator as another bogus radium product that could not possibly contain significant amounts of radium. However, in 1967 a Radiendocrinator was discovered under a home in Roxbury, MA. Radiation measurements showed that it contained one hundred times the acceptable dose of radioactivity for a radiation worker’s eight hour day.¹³ Herein lies an aspect of the Bailey case that would come back to haunt those who dismissed Radithor as just another bit of innocuous fakery. Whereas most supposedly radioactive medicines did not contain any significant radioactivity, Bailey’s products did, as Eben Byers and others would come to

¹⁰ Roughly \$12,000 in 2010 dollars

¹¹ Ruth deForest Lamb, *American Chamber of Horrors* (New York: Farrar & Rinehart, 1936), 77.

¹² American Medical Association, Bureau of Investigation. “Obesity Cures.” Chicago, 1929.

¹³ “A Radiation Booby Trap,” *Massachusetts Physician*. October 1967. 856.

find out years later. In fact the American Medical Association received a letter in 1933, a year after Byers died, describing a cancer case supposedly caused by a Radiendoctrinator.¹⁴ Although Radithor would go down in history as the most dangerous of the commercial radium medicines, the writing had been on the wall in earlier Bailey products, but no one had managed to read it.

Radiendoctrinator was just one of many products Bailey sold in addition to Radithor. He also was behind Associated Radium Chemists, along with business partners James B. Hopkins and George Langley. Associated Radium Chemists put out a medicine called Arium, “the substance of the sun.” The link between radium and the sun dated back to the earliest days of William Morton’s “liquid sunshine” treatments. Only the sun seemed to offer an appropriate analog to the power of radium, and one finds myriad references to the sun’s healing rays in the promotional literature of Bailey and others.

Arium purported to cure a wide array of illnesses. One of these, sexual dysfunction, was a favorite of Bailey’s before and after his embrace of the marketing possibilities of radium. As noted earlier, Bailey had dabbled in aphrodisiacs at the end of the previous decade, and he would continue to market them into the 1930’s. The advertising literature is peppered with words indicating sexual potency: pep, magnetic power, vital energy, youthful thrill. Or to sum up: “supreme virility in every nerve, gland, and organ of your body.”¹⁵ In addition to sexual dysfunction, Arium was purported to cure a lengthy list of troubles from pain and exhaustion to more esoteric

¹⁴ Carl Joseph von Lahtz to AMA, May 17, 1933. AMA, Names Box 1, Folder: Bailey, William J. A. Correspondence, 1927-1953.

¹⁵ Arium Pamphlet. AMA, Box 719, Folder: Radium Special Data, 1909-1935.

problems such as “lack of proper normal interest in business, home, and social life,” and “an unwarranted sense of fear that ‘something is going to happen.’”¹⁶ These were all “nature’s warning signals,” and one or more of them would have been found in most adult Americans from time to time. Arium, therefore, would have had some appeal to just about anyone. If Arium did not appeal to a potential customer, he or she might have been more interested in its spin-offs: Linarium (a pain liniment for muscles and joints), Ointarium (for “skin eruptions”), Kaparium (a hair and scalp treatment), and Dentarium (for the teeth and gums); or in its sibling products, Dax and Clax (for coughs).

Arium advertisements made taking the drug seem like a matter of life and death. Without it, one surely was in danger.

The marvelous radium energy supplied by ARIUM may mark the difference to you between success and failure, plenty and want, power and weakness, independence and subjugation, master and servant, a healthy growing bank balance and a thin, flat pay envelope, a fascinating personality or one that people slight; and the love and affection of the opposite sex, or their disdain.¹⁷

Reading this, it would be easy for anyone to imagine that he or she risked becoming sick, poor, and alone without Arium’s help. However, the ad also admitted that Arium was only an “indirect means” to happiness and youth. The missing link between the use of the product and the promised results was not mentioned. Not surprisingly, Arthur Cramp called Arium “an obvious piece of quackery.”¹⁸

At around the same time Bailey was trumpeting the radium-infused Arium as the “substance of the sun,” he was pushing another product that seemed to indicate that even

¹⁶ Arium Pamphlet. AMA, Box 719, Folder: Radium Special Data, 1909-1935.

¹⁷ Arium Advertisement. AMA, Box 719, Folder: Radium Special Data, 1909-1935.

¹⁸ Cramp to State Chemical Laboratory, Vermillion, SD, April 1, 1926. AMA, Box 720, Folder 720: Radium-Throne Company (Arium), 1924-1926.

the power of radium was not enough to treat ailing humanity. In the mid-1920's he also headed the Thoronator Company, which marketed an eponymous product. In practice the Thoronator functioned much like the radium ore jars that glutted the market around the same time. Purchasers filled vials with water, which would then be infused with thoron, the gaseous emanation of the radioactive element thorium.

Despite its powerful radioactivity, thorium had never approached the popular appeal of radium despite the fact that it was discovered decades earlier. Perhaps because it was not as well known, thorium might have had an exotic appeal for people whose willingness to believe in the amazing properties of matter had already been strengthened by two decades of radium. In a period of great discovery like the one that existed around the turn of the century, succeeding innovations soon conditioned the public both to expect exciting new developments and become quickly inured to last week's discovery. Radium sparked a sense of wonder and endless possibilities in science, but some people may have grown impatient for the next big thing. Bailey seemed to say that thoron was for the present what radium had been for the past.

Thoronator ads played on the power of radium even while belittling it, claiming that the Thoronator gave off over one thousand times as many alpha rays as radium emanation. This indeed sounded impressive. However, alpha rays had been largely discarded in legitimate medical circles because they combined too much radiation with too little penetrative power. They wreaked havoc on the surface without causing much benefit, but the average person would probably not have known this. Here was a prime example of language that appeared to be scientific but had no roots in actual science. The

logic behind the ad was that alpha rays were a powerful product of modern science, so more of them could only add to the power of Thoronator. Yet no legitimate scientist would make such an argument. While claiming to be “The Newest Miracle of Science,” Thoronator also kept a foot in the past through comparisons to health springs. In this sense, Thoronator was both old and new, a product of cutting edge science that bottled the healing properties of waters that people had employed for centuries.

Bailey also marketed Thorone tablets that claimed to be 250 times more radioactive than radium, costing one hundred times as much. Yet despite the great alleged potency and high price, Bailey was able to sell 1000 tablets for \$20. Bailey claimed that Thorone was better than insulin in diabetes cases and would cure sexual impotence. In a letter, Bailey said that he and his staff had worked with hundreds of leading physicians and hospitals in developing radioactive medicine. They had found that radium led to some successes but did not work quickly enough. “Through exhaustive tests and with co-operation of some of the best men in Europe,” Thorone was born.¹⁹ Evidently Bailey saw Thorone as a product that would pick up where Arium left off. When a doctor wrote a “frank letter” to Bailey in 1923 complaining of a lack of results in a diabetes case under Arium treatment, Bailey replied with an offer of Thorone tablets.²⁰ Arthur Cramp was uncharacteristically ambiguous on the subject of Thorone at this early stage in Bailey’s career, saying only that he did not know what to make of it.²¹ One imagines that he would have leaned toward skepticism.

¹⁹ Bailey to Light, August 8, 1923. AMA, Box 719, Folder: Radium-Correspondence 1913-1931.

²⁰ Bailey to Stewart, July 31, 1923. same folder as above

²¹ Cramp to Light, August 15, 1923. same folder as above

Yet of all the products that Bailey marketed over his long career, it was Radithor that made him famous, then infamous. Put out by Bailey Radium Laboratories, Radithor was quite popular, with hundreds of thousands of bottles sold. Radithor made an astonishing variety of curative claims, more than the other Bailey products combined. One Radithor booklet indicated it for over sixty complaints. These ranged from problems of aging, such as senility and impotence, to generalized conditions, such as neurasthenia. Neurasthenia diagnoses were on the decline in the 1920's in medical circles, but this knowledge would not necessarily have trickled down to the average American. Older Americans in the 1920's would no doubt remember that neurasthenia was a popular diagnosis at the turn of the century, so popular in the United States that William James called it "Americanitis." One Radithor pamphlet focused specifically on neurasthenia, calling it "the most common ailment in America" and claiming it could be successfully treated with radium.²² Here again the question of what can rightly be called scientific language came up. In this case the science was misleading because it was outdated. Neurasthenia was indeed a popular medical diagnosis at one time, but by the late 1920's it was becoming passé. Still, Bailey was able to use the term as evidence that his product was a real treatment for a diagnosed medical problem.

As he had in several of his earlier medicines, Bailey focused on the sexual rejuvenation angle in much of the Radithor advertising materials. Though he often wrapped issues of sexual virility into wider narratives of rejuvenation, it is likely that those suffering from sexual problems would have read between the lines. That said,

²² AMA, Names Box 1, Folder: Bailey, William J. A. Special Data.

Radithor did promise rejuvenation outside the bedroom as well. It also promised to counter senility, echoing back to the newspaper article that described Bailey's work freeing "morons" from mental institutions.

Ironically, in light of the looming Byers case, Bailey also boasted that Radithor could guard against cancer. In a letter addressed only to "Dear Friend," Bailey wrote,

we have never seen a case of cancer develop in anyone who had been on a course of Radium Water for any reasonable period. While we do not claim that Radium Water is an absolute preventative of cancer, yet all signs seem to point that way. If Radium Water did nothing else but prevent cancer it would be the greatest therapeutic agent in all history.²³

On this last point Bailey may have been right, but he would later be proven wrong about Radium Water as a cancer preventative. Of course this contradiction was not solely the result of deceit on Bailey's part. Radithor shared with radium itself a complex relationship between radioactivity and cancer. The element had proven itself as an effective form of treatment for a variety of cancers, but evidence also indicated that radium could cause cancer as well.

Like all successful purveyors of commercial medicines, Bailey relied on a blitz of promotional material to get the word out on his product. Much of it was geared toward doctors, who were urged to recommend Radithor to their patients. By working through physicians, Bailey gave his product the stamp of medical legitimacy. With medical knowledge more difficult to gain for the lay person than it is today, patients had little choice but to defer to what their doctors told them. If a doctor recommended Radithor, then surely it was the opinion of medical science as a whole.

²³ Bailey to "Dear Friend" Jul 7 3, 1925. AMA, Names Box 1, Folder: William J. A. Bailey Special Data.

The most complete articulation of Bailey's medical philosophy came in a book called *Modern Rejuvenation Methods* by Charles Evans Morris. Morris graduated from the Medical Department of the University of the City of New York in 1891 and earned his license to practice in Connecticut, but he was not a member of his local medical society or of the AMA. He dedicated *Modern Rejuvenation Methods* to Bailey, whose picture appeared on the first page. The dedication praised Bailey's "brilliant achievements in correlating endocrinology and radioactivity" that "made possible the results [Morris] described in the book."

Morris related all diseases to malfunctioning endocrine systems and indicated radium as a natural gland regulator. Morris explained all human life in terms of chemicals. As was the case with much of Bailey's materials, the focus was often on sex. Morris described a chemical philosophy of sex, romance, and love, arguing that the mating impulse was a matter of chemistry, not of sentiment. The emotions originated in a few tiny glands, and could be manipulated from love to hate and back merely by inducing chemical changes. Morris's message seemed to be primarily aimed at men; he stated that "in order for a man to love a woman he must physically i.e. chemically desire her." The love potions of the past, Morris said, were only myths, but the modern love potion was a reality.²⁴

Aging and its reversal marked another major theme of Morris's book. "No person ever died of old age," he claimed. "When people die it is because of some ailment—

²⁴Charles Evans Morris, *Modern Rejuvenation Methods* (New York: Scientific Medical Publishing Co., 1926), 80.

always.”²⁵ The aging process could be countered by keeping the endocrine system fully functional. In some cases glands declined due to heredity. In other cases microbial invasion due to stress, over-eating, alcohol, sexual excesses, and emotions damaged the glands. The result in nine cases out of ten of imperfect endocrine function was a diminished output of energy. The all-too-common problem, neurasthenia, was often the manifestation. Malignancy too could be explained by the reduced functioning of one or more glands. Morris even cited an unlikely source, chemist and first commissioner of the Food and Drug Administration Harvey Wiley, on the importance of the living cell.²⁶ Of course Wiley had never referred to Radithor. Morris was employing the classic strategy of taking quotes out of context to make them look like testimonials.

The *Journal of the American Medical Association* dismissed *Modern Rejuvenation Methods* as such “commercial puffery that even the most unsophisticated can hardly be deceived.”²⁷ However, it seems likely that many readers would have been fooled by the allure of endocrinology and by a credulous belief in the power of radium to do just about anything. Morris said he had misgivings at first but that the truth of Bailey’s methods eventually came through. In another classic move, he compared skepticism toward Bailey to skepticism toward the recent breakthroughs of the Wright brothers, Roentgen, and Curie.

Morris took great umbrage at the article in *JAMA* and fired off an angry letter. “I can’t conceive why you would deliberately proceed to wreck a man’s reputation in such a

²⁵ Morris, 84.

²⁶ Morris, 98.

²⁷ *Journal of the American Medical Association*. January 29, 1927.

high-handed manner without first making some personal investigation,” he wrote. He also placed much of the blame on Bailey himself. Morris claimed that the book was not published as he had written it, with much added and subtracted later. He went on to say that he did not even know Bailey and had never received money or a drop of Radithor as payment for this work. He did admit to using Radithor with wonderful results but claimed that he bought it from Bailey Labs like anyone else. In response to the charge that he was not a member of his local medical society, Morris replied that he had been invited but declined to join. Morris was primarily upset because his business had fallen off sharply in the years since the article appeared. Cramp’s reply was predictably unsympathetic.²⁸

In addition to distributing copies of Morris’s book to doctors, Bailey also sent out a variety of Radithor pamphlets. Some focused on individual illnesses such as arthritis. Others played Radithor against organized medicine, emphasizing that it was not a drug, but rather a “Modern Weapon of Curative Science.” By stressing the scientific basis of Radithor, while downplaying its status as a drug, Bailey enjoyed the best of both worlds. He could sell a product with all the benefits of cutting edge science without the negative baggage connected to the impersonal, monolithic medical establishment. Bailey melded twentieth century science with 19th-century ideals of self-determination.

Bailey, like many patent medicine peddlers, also made creative use of testimonials. Testimonials had become a central part of modern advertising, offering what looked like proof of a product’s effectiveness. Bailey’s trick was to make his

²⁸ Charles E. Morris to *JAMA*, March 13, 1929. Cramp’s reply to Morris, March 16, 1929. AMA, Names Box 1, Folder: Bailey, William J.A. Correspondence 1927-1953.

testimonials anonymous. One Radithor pamphlet was called “A Tribute to Radium Water” by “A Great Newspaper Editor.”²⁹ The identity of the editor is left unknown, but that does not keep Bailey from portraying him as the ultimate authority on Radithor’s power. Radithor pamphlets also included many short quotes from physicians. Of course, the names of the physicians were omitted. Bailey explained this by claiming that doctors shunned publicity and did not want to see their names in print. While this is certainly possible, it is more likely that refusing to give specific names allowed Bailey to alter or even create the testimonials himself. He often cited only the first initial of a doctor’s name, so the testimonial pages became lists of Dr. C’s and Dr. A’s.

Some pamphlets touted the product as an integral part of the medical establishment’s armamentarium. “Why I Prescribe Radithor” by Thomas S. Pitt, M.D., for example, described one doctor’s use of Radithor to cure his wife’s “arthritis deformans” and in his work at Pine Tree Sanitarium. Pitt absolved himself of bias by claiming that he had been conservative and resistant to medical faddism before being won over by the wonders he observed while working with Radithor. In a variation on the sun theme, he wrote that Radithor was, in addition to being a powerful healing agent, as harmless as sunshine.³⁰ The extent to which Bailey shaped or even wrote such material himself is impossible to know. In fact a number of Bailey pamphlets used quotes from *Modern Rejuvenation Methods* as external confirmation of Radithor’s value. In reality, Bailey was merely backing himself up under a different name, one with the symbolic weight of medical training.

²⁹ AMA, Names Box 1, Folder: William J. A. Bailey Special Data.

³⁰ AMA, Names Box 1, Folder: Bailey, William J. A. Special Data.

In addition to testimonials, Bailey also employed another standard of modern advertising, the guarantee. Parts of the guarantee were proven in time to be true. Bailey guaranteed that Radithor contained genuine radium and mesothorium, which it did. He offered \$1000 to anyone who could prove that each and every bottle of Radithor did not contain both elements when it left the laboratory. Later tests indeed upheld Radithor's radioactivity. Bailey also guaranteed that Radithor was produced under sanitary conditions and that the physiological results ascribed to radium were due to the action of radioactivity, not to any drug action. These too would have been difficult to disprove. One promise, however, would prove far from true: "We guarantee that Radithor is harmless in every respect."

Bailey even published his own periodical, the *Radithor Bulletin*. The *Bulletin* featured testimonials for Radithor mixed in with assorted articles, mostly on science and technology. Other topics touched on included eugenics and the development of the Hendershot magnetic motor. By including a variety of articles surrounding his plugs for Radithor, Bailey positioned his product as only one part of the exciting climate of scientific advance that characterized the early twentieth century. Wonders were all around us; if one could believe in them, one could believe in Radithor too. The *Radithor Bulletin* used sensational headlines to grab reader attention. One representative issue included articles such as: "Radium to warm poles?"; "Vitamin D (produced by

Radithor's internal ultraviolet treatment)"; "Is light matter?"; "To Check Infantile Paralysis"; "Will Have Whole Town Going on Radithor" and many others.³¹

Promotional materials made explicit connections between Radithor and the work being done with radium both at home and abroad. For example, he cited progress being made with radium water treatment in France. Reference to Europe, long at the forefront of scientific achievement, was a common strategy employed by Bailey and others.

Bailey played on the fact that, thanks to Marie Curie, many Americans associated Europe with the science of radioactivity. According to his *Bulletin*, Radithor was just as good as anything being employed in France, only easier to use. Bailey seemed to indicate a shift from the old world to the new when it came to radium therapy. However, he avoided details of the French experiments that might have revealed a gap between cutting edge European science and his own radium work. Bailey offered his readers just enough that they might be intrigued and enticed to buy without giving concrete details that could be refuted.

The *Bulletin* also offered Bailey another forum for his anonymous alphabet soup of testimonials. These offered vague descriptions of cases treated with Radithor or sound bites about radium in general adapted to appear related to Radithor. Perhaps in response to complaints that his testimonials lacked weight because they omitted the names of real doctors, Bailey offered an explanation for using only initials in the *Bulletin* of November

³¹ *Radithor Bulletin*, 5 November 1927. AMA, Names Box 1, Box File 556, Folder: Bailey, William J.A. Correspondence 1927-1953.

5, 1927. In “A plea for case histories,” Bailey wrote,

We know of several able physicians who have confidently reported to us very pronounced success with Radithor, but under no circumstances do they wish to write their reports or be quoted in any way. They have a deep-seated prejudice against publicity in any form. One doctor in particular states that he had used Radithor in isotonic solution in place of blood transfusion and saved the life of the patient. But he would not permit us to publish the case...As a manufacturing laboratory we are limited to quoting what medical men have written regarding the use of Radium Water. It is not for us to make any claims as to its value in any disease. Our duty is to make Radium Water as well as possible.³²

Here he employed the same strategy he used with Morris, putting distance between himself and the evidence that his product really did work. By using doctor’s testimonials he gave something to people who were not willing to take his word for it. However, as we have seen, he often distorted quotes or removed them from their original context to fit his purpose. Bailey clearly read widely on the subject of radioactivity and radium therapy. After quoting Dr. Michael Pupin, scientist, inventor, and Columbia professor, on the relationship between the life energy of living cells and rays, he declared, “it looks as though Prof. Pupin had been reading our booklets on Radithor.”. The opposite is much more likely, that Bailey read Pupin’s work and appropriated it for his own purposes.

Bailey often marketed directly to doctors, writing an untold number of letters informing doctors of the wonders of Radithor. Radithor was supposedly only available by prescription, but anyone could get it. That a doctor was not entirely necessary is shown by the fact that doctors received five dollar discounts on cases of Radithor. Bailey would not have turned anyone away for failure to provide proof of medical credentials. If

³² *Radithor Bulletin*, 5 November 1927. AMA, Names Box 1, Box File 556, Folder: Bailey, William J.A. Correspondence 1927-1953.

doctors received a discount, someone must have been paying full price. One letter to a Dr. Spence urges the physician to try out Radithor on some his more intractable cases. “The neurasthenic, hypertension, anemic, rheumatic, senile, and impotency cases, for example, never fail to show marked [underline in original] improvement in a very short time.” Bailey goes on to say that he has never seen cancer develop in a Radithor user or existing cancer metastasize after surgical removal.³³ Another letter proclaimed that Radithor succeeded where all other medicines had failed. Bailey cited an unnamed doctor in Pennsylvania who had such great success with Radithor in his practice that he spent \$20,000 on the stuff. “It stands to reason that no doctor would go along month in and month out buying thousands of dollars worth of Radithor from us unless he were getting results with Radium Water that he could not possibly obtain in any other way.”³⁴

It is impossible to know exactly what to make of a letter like this. Perhaps Bailey invented the doctor from Pennsylvania. However, such a doctor may have existed. Some physicians were convinced of Radithor’s therapeutic value. Morris was just one example. Arthur Cramp lamented the credulity of the medical profession in believing such claims. “Bailey is a shrewd scamp and undoubtedly is cleaning up handsomely, and the reason is that the medical profession doesn’t know any more than to fall for this sort of buncombe. And the public, of course, is paying the bill!”³⁵ He added to another correspondent that

³³ Bailey to Spence, June 1925. AMA, Names Box 1, Folder: Bailey, William J. A. Correspondence 1924-1926.

³⁴ Bailey to Smith, January 24, 1927. AMA, Names Box 1, Folder: Bailey, William J. A. Correspondence 1927-1953.

³⁵ Cramp to Osborne May 7, 1928. same as above

doctors fell for new products because they did not take the pains to investigate their scientific basis or lack thereof.³⁶

Word of mouth must also been a key component of Radithor's success. Though Bailey spent big money on advertising, real success stories of real people must have been circulating wildly during Radithor's heyday. The AMA received a number of letters in support of Bailey when it attacked him in the pages of *JAMA*. One H.A. Thurlow wrote that Radithor had greatly improved the condition of his wife's arthritis after it had been recommended for the wife of an acquaintance. Here we can see word of mouth in action. In response to *JAMA*'s article condemning Radithor, Thurlow wrote that he was not convinced Radithor was not everything that it claimed to be.³⁷ It was people like Thurlow that presented one of the barriers to would-be regulators of products like Radithor. There was widespread belief that they worked. The question in retrospect became, why did no one step forward and save poor ignorant souls like Thurlow from themselves?

There were in fact a number of skeptics inside and outside the medical establishment. Many doctors found Radithor's therapeutic claims as laughable as Cramp did. Dr. Alec Thomson, secretary of the Public Health Committee of the Medical Society of the County of Kings [Brooklyn] wrote Cramp in reference to an earlier exchange about Bailey. He enclosed a high cost Radithor pamphlet saying, "if you have not received one

³⁶ Cramp to C.R. MacCann , June 16, 1927. same as above

³⁷ Thurlow to Bureau of Investigation. AMA, Names Box 1, Folder: William J. A. Bailey correspondence 1927-1953.

you are missing an opportunity to read some wonderful fiction.”³⁸ Cramp replied with another lament about the gullibility of many of his colleagues. Only that could explain Bailey’s ability to produce such “gorgeous” promotional materials.³⁹ Bailey, it seemed, was laughing all the way to the bank.

Sometimes it was the patients who were skeptical and their doctors who were taken in. Mary Dunlop wrote the AMA asking if Radithor was a proper medicine after having it recommended by a “most reliable physician.” She also inquired whether Radithor was for adults only or if it was safe for a child. Dunlop had read something about radium over the years because she knew enough to ask, “isn’t radium very strong—and would it have too stimulating effect on young glands?” The question shows her to be Bailey’s ideal quarry. She knew just enough about radium to know that it was powerful, but not enough to know that it was unsafe unless taken under trained medical supervision. Other elements of her story also fit perfectly into Bailey’s appeal. She stressed the fact that regular medication and other treatments had not done what she had hoped. Dunlop complained of exhaustion and said her doctor told her that her “glands needed toning up.” Such a phrase could have been lifted almost directly from any Bailey publication. The record shows no reply from Cramp.⁴⁰

What made Radithor different, and ultimately much more dangerous than other commercial radium medicines, was the fact that it contained significant amounts of

³⁸ Thomson to Cramp, May 9, 1928. AMA, Names Box 1, Folder: William J.A. Bailey Correspondence 1927-1953.

³⁹ Cramp to Thomson, May 11, 1928. same folder as above.

⁴⁰ Dunlop to AMA, undated. AMA, Names Box 1, Folder: William J.A. Bailey Correspondence, 1924-1926.

radium and mesothorium, and it was used by hundreds of thousands of people. During the decades after the discovery of radium, there was a prevailing trend toward increased radioactivity in over-the-counter radium medicines. The first products contained no radioactivity at all. The popular radium ore jars contains minute amounts, less than an Ingersoll radium dial watch. By the mid-1920's, though, it became possible to include actual radium in a product without making it too expensive thanks to a huge increase in supply with the discovery of rich radium deposits in Africa.

It is only with hindsight that one can say with assurance that Radithor contained radium and consequently was dangerous. Those watching the field of commercial medicines in the 1920's would have been justified in believing that such products were dangerous only indirectly, because they misled customers and kept them from seeing real doctors. Most of the products were harmless in themselves. Bailey's history of fraud only served to further cloud the waters. Arthur Cramp followed the world of health fraud as closely as anyone in America, but he too failed to see the active danger represented by the contents of the Radithor bottle. His experience and knowledge of Bailey's past misled him into believing that Radithor was innocuous. In a letter to Robert Stahlin of the National Better Business Bureau, he outlined Bailey's other professional activities and concluded by saying that Radithor was "merely one of the score or more of fake radium emanation products on the market. The majority of them consist of a jar in which there is incorporated, either as part of the lining or as something to put into the jar, some

ore of low radioactivity.”⁴¹ This was an assumption that turned out to be incorrect. Radithor was not one of the dozens of uranium ore jars that flooded the market at that time. It was something very different and much more dangerous; only the prevalence of more harmless rivals allowed it to slip under the nose of the most active crusader against fraudulent medicines in the country.

After the Byers case, Cramp and others had to face the fact that they had underestimated the threat posed by Bailey’s products. For years Cramp had corresponded with Dr. Oliver T. Osborne, who urged him to take action against Radithor well before the Byers case surfaced. In 1932 Cramp explained, “one of the reasons that we took no more aggressive action against ‘Radithor’ was that I had the feeling all the time that Radithor contained practically no radioactivity, and that while it was, undoubtedly, a fraud because of the claims made for it, I did not for a minute suppose there was any direct public health menace in its sale.”⁴² Though all patent medicines posed indirect threats to health, it was harder to pinpoint ones that were actively dangerous. In response to inquiries concerning the safety of Radithor, Cramp seemed more concerned about too little radium than too much. “None of the so-called radium waters sold to the public contain enough radium to be of value, so far as we know,” he wrote to one correspondent. However, he also added, ominously, “if they did, they

⁴¹ Cramp to Robert Stahlin, September 14, 1926. AMA, Box 720, Folder: Radium-Thorone Company (Arium), 1924-1926.

⁴² Cramp to Stahlin, September 14, 1926, Box 720, Folder: Radium-Thorone Company (Arium) .

would be too powerful to be used with safety except under the careful control of a physician.”⁴³ This worst case scenario was occurring even as he wrote.

Bailey’s past as a business man does little to explain why he put real radium into his products. His early business ventures, namely the Carnegie car scam, point to simple fraud. He was not building shoddy, dangerous cars. There were no cars. Based on his past one might expect him to do what Dennis Dupuis had done—that is, claim radioactivity where there was none. Perhaps he would have if he could have. It seems that Bailey’s inclusion of radium in his products was actually an ironic byproduct of the regulatory laws that sought to keep dangerous products from the market. The Pure Food and Drug Act of 1906 focused on the truthfulness of a product’s label, and regardless of the dangers inherent in an unregulated radioactive product, Bailey’s labels told no lies. The Radithor label guaranteed that every bottle contained radium and mesothorium in triple-distilled water, which was in fact true. With no false claims on the packaging, there was, under existing laws, little that could be done.

Another question follows: if one assumes that Bailey included radium to avoid false claims, why did he use enough to be deadly? There are a number of possible answers. A simple one is that he did not think he did. Eben Byers died with less than a dollar’s worth of radium in his system. There is no indication in the documentary record that Bailey did not believe in the value of his products. He never wavered, even when scandal destroyed his radium business. He claimed that he took Radithor daily, and that he never received any negative results.

⁴³ Cramp to Linsemier, 2/22/27 AMA, Names Box 1, Folder: Bailey, William J. A. Correspondence, 1927-1953.

The high cost of radium was another factor that might have limited Bailey's ability to include significant amounts of radium in his products. In fact, it was this notion that kept some regulators from worrying about the dangers inherent in a radioactive medicine. If Bailey could afford to sell the bottles for a dollar, Radithor could not possibly contain more than nominal amounts of radium. However, the price of radium had dropped precipitously in the early 1920's after huge deposits of radium ore were found in the Belgian Congo. Radium there was so abundant, and could be produced so cheaply, that the American radium industry was destroyed virtually overnight. Bailey bought his radium from the U.S. Radium Corporation as it struggled to stay in business after the African discovery. He put in enough to make good on the claims of the Radithor bottle, which probably was enough for the drinker to feel some effects. For decades medical literature described the real physiological effects that radium had on the system. When Eben Byers and other claimed that they felt invigorated when they drank radium, it was not necessarily psychosomatic. Bailey would have known that to keep people coming back to his product, they would have to get something out of it in the first place.

Radithor drew rhetorical strength from a handful of themes and images that connected it to the broader culture of American science and public life in the 1920's. One theme was the symbolic connection between radium and sunlight. The ubiquity of the connection cannot be fully explained by its accuracy. After all, the sun is not made of radium, and radium does not give off sunlight. What both shared was a sense of mysterious power. The nuclear fusion of the sun was not well understood in this period,

so scientists were eager to explain what made the sun give off so much light and heat. Radium seemed to offer one possibility. Like the sun and unique among earthly materials, radium did give off its own light and heat.

In terms of bodily effects, the sun had long been recognized as beneficial to health. Longevity and the sun were frequently connected in the literature for Radithor and other radium medicines. Several pamphlets linked lack of sunlight to illness and claimed that cultures that lived outdoors and wore less clothing tended to live longer, healthier lives. “Every tiny speck of the radioactive elements is like a miniature sun pouring forth rays constantly and continuously upon body cells,” claimed one pamphlet. “Economic reasons prevent us from taking advantage of the sun. Science today provides us with other rays that have already demonstrated their power to defeat old age and disease.” In other words, the exigencies of modern life made adequate exposure to health-giving sunlight impossible, but fortunately remedies like Radithor were available to make up for Americans’ shaded lives. The appeal was not unlike modern vitamin supplement companies that claim that there are pieces missing from the modern diet that can be replenished through pills tailored to specific needs. One particularly interesting pamphlet called, “What Happened to the Spaghetti?” described the fact that pasta was healthier back when it was dried on fire escapes, but when the practice ceased to be allowed the pasta became less delicious and nutritious.⁴⁴ Like many commercial radium advertisements, Radithor’s mixed the old and new. One called the sun “the oldest physician in the world.” When combined with the newest product of science,

⁴⁴Radithor pamphlets. AMA, Box 719, Folder: William J.A. Bailey Special Date folder.

radioactivity, this ancient force could be harnessed for health and perfected for the twentieth century.⁴⁵

The power of the sun was not the only one mined by Bailey in his advertisements. He, like others in the field, also connected radium to electricity. Like the sun, electricity was simultaneously a powerful natural agent and the product of modern science. “The steady flow of Radithor acts like an electric current, furnishing increased motive power to the cells,” boasted one pamphlet.⁴⁶

Comparing Radithor to sunshine and electricity also allowed Bailey to employ another classic patent medicine trope by claiming that what he was selling was not a drug. The Radithor literature is littered with lines such as “no drug action” and “not a drug.” By denying that Radithor was a drug Bailey could both avoid making fraudulent claims that would make him vulnerable to regulators and play himself against the medical establishment. Patients fearful of the brutal operations and heroic treatments of the past could rest assured that radium required no such courage on the part of the patient. Again the old and new are built into radium’s appeal. On the one hand, radium is a natural substance that comes out of the ground. On the other, it is the domain of some of the world’s top scientists including the world famous Curies. Here was no medical fad. Here was a miracle of nature and science.

More than any other purveyor of commercial radium medicines, Bailey had his foot in the up and coming field of endocrinology. Though Bailey’s philosophy of

⁴⁵ “The Defeat of Old and Age and the Dawn of Perpetual Youth” Pamphlet. AMA, Box 719, Folder: William J. A. Bailey Special Data.

⁴⁶ “Radithor Perpetual Sunshine” 1928. AMA, Box 719, Folder: William J. A. Bailey Special Data.

radium's effect on the glands was his own, it also was rooted in the science of the day. For many Americans, glands and health were synonymous with John S. Brinkley, the "goat doctor of Kansas." Brinkley became a millionaire by developing procedures that purported to improve virility. Despite constant run-ins with the medical establishment, Brinkley was skilled as a surgeon. His best-known operation involved transplanting the glands of Toggenberg goats into human men. Since the days of Pan, the goat had been symbolically linked to virility, and many of the men Brinkley operated on did claim to experience results. Morris Fishbein, in an explanation he might also have offered for Radithor's success, claimed that Brinkley merely treated the psychological roots of impotence, which worked because the "human being craves miracles."⁴⁷ At any rate, Brinkley prospered in the twenties, operating on movie stars and promoting his practice through his pioneering use of radio. For many Americans who encountered Bailey, Brinkley would have been the nearest touchstone.

Brinkley's work itself was largely an extension of endocrine research that came before. Pioneering work had been done in Europe by nineteenth century researchers like Charles-Edouard Brown-Sequard. Brown-Sequard, the basis for Robert Louis Stevenson's *Dr. Jekyll and Mr. Hyde*, had led the way in elucidating the importance of hormones in health. Later Russian Sergei Voronoff tried transplanting the testicles of apes into humans in Paris. His work inspired Leo Stanley, physician at San Quentin, to conduct hundreds of such operations on prison inmates. The notion that the glands and sexual performance were related gained currency.

⁴⁷ R. Alton Lee. *The Bizarre Careers of John R. Brinkley* (Lexington: The University Press of Kentucky, 2002), xvi.

Most Bailey literature makes no mention of this background, although *Modern Rejuvenation Methods* does credit Brown-Sequard and Voronoff as trailblazers in endocrine research. Bailey's inspiration seemed to come mainly from an Austrian physician named Eugen Steinach. Steinach today is most well-known for the vasoligation procedure that bears his name. Like his predecessors he experimented with animal-human implantation. His goal, like Bailey's, was general rejuvenation, which was intrinsically connected to sexual rejuvenation. Steinach performed vasectomies on men and even used x-rays on women in the name of regeneration. Steinach's views were brought to America in the early 1920's by Dr. Harry Benjamin and seem to have influenced Bailey. It seems likely that Bailey claimed to have a degree from the University of Vienna due to the influence of the Viennese Steinach.⁴⁸ Bailey borrowed from other scientists and doctors when it was convenient, but his medical philosophy was a hodgepodge of scientific rhetoric, resistance to the medical establishment, and appeals to the healing power of nature.

After the Byers case, Radithor was widely criticized in the press and the medical establishment. Ruth DeForest Lamb's classic *American Chamber of Horrors* included a section on Radithor that bemoaned Bailey's sales methods. The book began as a presentation to Congress urging a strengthened Pure Food and Drug Act. In particular Lamb lamented the ease with which the public could be duped by "pseudo-scientific

⁴⁸ More on Steinach in Sengoopta.

palaver to impress non-scientific readers.”⁴⁹ She admitted that radium in particular offered easy opportunities for such commercial appeals. “The history of radium is so picturesque, the element itself is so weird; its action so little understood—especially by the man in the street—that it is easy for an unscrupulous quack to capitalize on its mysterious properties.”⁵⁰ However, despite the ease with which so-called quacks like Bailey could hoodwink readers, Radithor was difficult to regulate because it met none of the criteria for regulatory action. All claims were made on advertising materials, not on the label, so the product could not be considered adulterated or misbranded. For Lamb this revealed a fundamental problem with the government regulatory system itself. “Can the Department of Agriculture only make impotent gestures? Is the Food and Drug Act a joke?” she asked before answering both with a resounding yes.⁵¹

In the case of Radithor, Cramp and others pushed the Post Office to get involved. Since Radithor traveled through the mails, it was subject to investigation for fraud. The mails, however, did not intervene. As Cramp wrote to one correspondent, “the whole trouble is, as I see it, that the Fraud Order Department of the Post Office is afraid of its shadow.” He complained that the Post Office was too willing to accept affidavits from companies promising to cease only to continue with a simple name change.⁵² An added irony in the case of Radithor: Bailey’s East Orange offices were conveniently located above a post office.

⁴⁹ Lamb, 78.

⁵⁰ Lamb, 76.

⁵¹ Lamb, 74

⁵² Cramp to Osborne, 7/29/27. AMA, Names Box 1, Folder: Bailey, William J. A. Correspondence, 1927-1953.

The legal case against Radithor began quietly. In 1928 the Department of Agriculture, upon increasing evidence of the potential dangers of even small amounts of radium, finally began to investigate Bailey, and by 1930 the organization had accused him of false advertising. The case proceeded bit by bit but too slowly to help Byers or other anonymous victims of Radithor. It never succeeded in securing a judgment against Bailey.

After the failures of the Post Office and the Department of Agriculture to pursue Bailey, the Federal Trade Commission built a case against him based on false advertising. In 1931 Byers, already deathly ill, managed to testify against Bailey in FTC proceedings against Bailey. He was too ill to make the trip to the courtroom, so he provided testimony via his lawyer. By the following year, the FTC was able to bar Bailey's firm from the use of certain advertising statements. Without advertising, the lifeblood of Bailey's business, he would not be able to operate. However, the decision proved to be something of a dead letter. Byers was already dead, and Bailey had already moved on to other ventures.

The highly public death of Byers did manage to create a firestorm around Radithor and radium more generally. The beneficent element now appeared to be deadly. The New York *World-Telegraph* claimed that Byers was the second victim⁵³ and that scores of other patients were in danger. The article also described the redoubled effort of the authorities to prevent future deaths. In addition to the FTC, the New York Board of Health began an investigation. The Food, Drug, and Insecticide Administration also

⁵³ A friend to whom Byers had recommended Radithor had also died.

undertook a broad investigation of radioactive patent medicines. “Of the great number of products supposed to be beneficial because of radium’s action that were analyzed only five percent were found to have sufficient radium content to justify their consideration as possibly having medicinal value,” according to the Administration’s report. A Better Business Bureau statement supplied the missing element of the statement above: “if any of the radium waters contain any real radium this would be deposited in the tissue and would produce necrosis...and ultimate death, even in small particles.”⁵⁴ The investigations confirmed what Cramp and others had been saying for years. Most allegedly radium-bearing patent medicines contained no radium at all, and those that did were too dangerous to be used willy-nilly by the public.

Another article added a class wrinkle to the Radithor story. “High Price of Tonic Points to Wealthy as Victims,” declared the Newark *Star Eagle*. “Fear arose today that hundreds of wealthy persons, many of them in this vicinity, face the ‘living death’ of radium poisoning through use of ‘Radithor,’ a radioactive water, which is blamed by medical authorities for the death of Eben MacBurney Byers.” The article surmised that because of Radithor’s relatively high price, it would have disproportionately affected the wealthy. Although this is impossible to confirm, it does seem likely that many Americans would have been unable to afford the dollar per day or more required by the recommended course of Radithor. The article went on to describe the public health threat posed by Radithor. According to Frederic Flinn, the doctor who also worked on the New

⁵⁴ New York *World-Telegraph*, 1 April 1932. Products like the Revigator, which contained radon, were less dangerous because they contained radon, an chemically inert element that does not combine chemically with tissues.

Jersey Radium Girls case, more than 100 patients were afflicted with radium poisoning, and the menace of Radithor was more widespread than that of the radium workers.⁵⁵

Because of the broad threat posed by Radithor consumption, at least one doctor, Josiah J. Moore of the National Pathological Laboratories, urged those who had been taking radium preparations to have their jawbones x-rayed to determine if they had been injured.⁵⁶

Not everyone was willing to admit that Radithor and radium were harmful. Bailey himself, when interviewed at his home after Byers's death, called the allegations regarding Radithor "ridiculous." Bailey pointed out that even Byers's autopsy identified the cause of death as pneumonia. Although this was true in a technical sense, it failed to account for the massive bone and tissue damage. Bailey also claimed that he was not at fault because Radithor had been prescribed by Byers's doctor. This, too, was true according to the letter of the law, without much attention to its spirit. In another somewhat distorted truth, Bailey noted that the AMA itself had approved of radium water for years and that it was used by legitimate doctors like the Mayo brothers. It was true that the AMA had included radioactive solutions in its *New and Non-Official Remedies* in the 1920's, but it had ceased to do so years before Byers's death. As for the use of radium water by the medical establishment, this was undeniable, although clinical experiment and pell-mell use by ordinary people were hardly the same thing. At any rate Bailey remained slippery and unapologetic until the end.⁵⁷

⁵⁵ Newark *Star Eagle*, 1 April 1932.

⁵⁶ Chicago *Tribune*, 2 April 1932.

⁵⁷ Newark *Star Eagle*, 1 April 1932.

Bailey continued to sell radioactive medicines and devices after Radithor. Even after the radium angle dried up for him, he kept up his patent medicine enterprise. By 1933, he was operating under the name Seavigor Company, selling compressed sea weed. Despite its completely different source, his new product contained tell-tale Bailey flourishes. His Seavigor products had many of the same qualities as radium, including the toning of the glands and aphrodisiac properties. Seavigor boasted that four to five tablets a day was equivalent in its reaction on the male glands to three dozen oysters per week. (Oysters had long been touted as a powerful aphrodisiac). According to Bailey, Seavigor could cure anything from hangnails to a “slight touch of pregnancy.” He even mentioned a Long Island doctor who had cured cancer through injections of the dissolved tablets.⁵⁸ Bailey, it seemed, could not be kept down.

The fall of Radithor marked the beginning of the end for commercial radium products. The Byers scandal, coupled with the heart-wrenching story of the Radium Girls, showed Americans that radium was far from a miracle substance. Fear replaced wonder as the market for radium products dwindled. Changing consumer attitudes were coupled with increased regulation. With such high profile examples of radium’s potential deadliness, government regulators and other groups redoubled efforts to control the use of radium. When a new regulatory law was finally passed in 1938, it no longer contained a loophole that would let products like Radithor through. Under the new law, any product that could be dangerous when used according to its directions was forbidden.

⁵⁸ Schlink to Cramp, August 17, 1933. AMA, Names Box 1, Folder: Bailey, William J. A. Correspondence, 1927-1953. .

By the end of the 1930's, radium products had essentially disappeared from the shelves. Years later radioactivity would experience a minor vogue as a commercial health treatment, but in its new form it was virtually unrecognizable next to the ore jars and Radithor bottles of the previous decades. The renewed interest in commercial radioactive treatment had more to do with changes external to the medical field than within it. It would be the atomic bomb that gave birth to the next wave of enthusiasm for radioactive cures.

Epilogue

The government may have stamped out the sale of over-the-counter radium products, and medical use of radium may have given way to cheaper and more effective artificially-created isotopes, but the links between radioactivity and health never entirely disappeared. To this day a handful of mines—including the Free Enterprise, the Merry Widow, and the Earth Angel—provide the service of exposure to radon gas, considered in most mainstream scientific and medical circles to be a carcinogen. Mine visitors swear they have witnessed miracles, though the mechanism through which cures are effected remains a mystery. “But what does it?” asks Earth Angel owner “Wild Bill” Remior rhetorically. “I don’t know. Now, I cannot see the radon in there, and I cannot smell it, and neither can I see the good Lord nor smell him neither, but there’s something in there that does ya good.”¹

The radon mine trend began in the 1950’s as radium was on its way out as an orthodox medical treatment. Artificially-created isotopes, a fortuitous byproduct of the Manhattan Project, had superseded their natural counterparts. These new isotopes offered distinct advantages over radium: they could be produced in greater abundance and at lower cost, and they could be tailored to specific medical needs. Iodine, for example, has a tendency to settle in the thyroid glands, so its radioactive cousins, isotopes like iodine-131, could be used effectively in thyroid cancer cases. A bevy of radioactive isotopes of elements like cobalt, gold, and iridium became a part of oncology’s

¹ “Mining for Miracles,” *National Geographic*

armamentarium. Facilities that had been part of the atomic bomb project, like the one at Oak Ridge, TN, began producing these radioisotopes at a fraction of the cost of radium.

Radium was also being edged out of the imaginations of Americans. For decades radium and radioactivity had been synonymous. Yet by the 1950's, it was uranium and plutonium that people read about in connection with the atomic bomb, the new representative of the power that could be unleashed from within the atom. Mines that had once extracted radium shifted their attention to uranium, which was needed in huge quantities for the production of atomic weapons. The same African mines that had flooded the market with radium in the 1920's provided the bulk of the uranium that went into the Manhattan Project.

Attitudes toward radiation and its symbolic power changed rapidly in the wake of the dropping of the atomic bombs on Japan. Immediately recognized as a moment of profound import for humanity, the bomb shifted whatever attention radium received to the new age of atomic power and nuclear weapons. Historian Paul Boyer has argued that within days of the bombings of Hiroshima and Nagasaki, new terms were set that have dominated nuclear discourse ever since. Concern about patent medicines and radiation medicine's side effects were replaced by fear of atomic annihilation and radiation sickness. Hope mingled with fear as Americans confronted the power of the atom on a scale unimaginable before August, 1945. The positive associations people had attached to radium through the 1930's were almost wholly replaced by fear of radiation as a form of poison.

Yet there were glimmers of positivity. Images of an atomic utopia, not unlike what was seen at the turn of the twentieth century, began to appear in American newspapers. Old ideas about atomic-powered transportation and energy too cheap to meter reemerged. Papers like the Dallas *Morning News* stressed the potential of radiation treatment for cancer, showing a skeleton labeled “cancer” fleeing from “atomic energy,” which, like radium before it, was depicted with lightning bolts.² Eisenhower’s Atoms for Peace program sought non-military uses of atomic power including the production of electricity. Operation Plowshare entertained the idea of using nuclear weapons for largescale construction projects.

While Americans struggled to make sense of the dawning nuclear era, vestiges of old attitudes about radiation and its effect on the body refused to die out. With radium on its way out, attention shifted to its atomic parent, uranium, which had powered the bomb that fell on Hiroshima. In response to the market for uranium fueled by the Manhattan Project, numerous mines opened in the western United States. Miners who once might have dug for radium were now looking for uranium. Like their predecessors, they faced competition from mines in Africa, which continued to supply most of the radioactive material used in the United States. A few of these struggling mines found a new sideline that proved more profitable than mining itself. They represented the last gasp of the notion that radioactivity had general health-giving properties. Proprietors of the mines found that people would travel great distances to breathe the air, made radioactive by

² Boyer, *By the Bomb’s Early Light*, 109.

radon gas, in their mineshafts. Visitors made pilgrimages there for the same reasons they bought products like the Revigator and Radithor: improved health and relieved pain.

The story of the Montana mines began with Wade V. Lewis, proprietor of the Elkhorn Mining Company and owner of the Free Enterprise Mine located in Boulder, Montana. Lewis, a graduate of the Oregon State School of Mines, and two partners acquired the lease of the dormant mine after detecting radioactivity with a Geiger counter in the summer of 1949. They began mining uranium ore and sending it to the Vitro Chemical Company in Salt Lake City for processing, eventually to be used for industry or defense. Two years later a woman visiting the mine with her husband asked to see the mine. During their descent Davis joked that perhaps the shaft's radioactivity would cure the woman's bursitis. The comment proved prescient when the woman's husband called the next day to tell Davis that his wife was now pain-free. Soon, word of mouth spread the news that a mine in Montana had miraculous pain-killing properties. The owners, reluctantly at first, allowed the hundreds of visitors that flooded the site to enter the 85-foot deep mineshaft free of charge. It became clear that health-seekers could prove a more steady source of income than uranium mining. The proprietors spent over \$100,000 setting up facilities to accommodate their influx of pilgrims and converted Free Enterprise from a uranium mine to a "health mine." "*The afflicted public*, in a manner, discovered it, and *demanding it*," [italics in original] wrote Lewis in his history of Free Enterprise.³

³ Wade V. Lewis, *Arthritis Relief in a Cave: The Story of the World Famous Arthritic Health Mine at Boulder, Montana* (Boston: The Christopher Publishing House, 1955. Revised, 1984), 20-25.

Soon there was a miniature craze for uranium and radon cures. Newspapers and magazines, including *Time* and *Life* reported on the phenomenon. *True*, a men's magazine popular at the time, delivered an in-depth report on what went on at the Montana mines. Not surprisingly, the magazine found the mines at the heart of a debate between the medical populists who operated and patronized the mine and the medical establishment. The AMA had already denounced the mines as a hoax. Mine supporters were not so sure. "If the whole thing is a hoax as the AMA says, why hasn't someone put a stop to it? Why hasn't the Post Office Department prosecuted the mine owners for using the mails to defraud? Why have many persons revisited the mines two or three times, if they are receiving no actual benefits?"⁴ These questions hit on a number of themes that thread throughout the story of radium as well. That the mines had not yet been shut down was mainly due to the lack of resources of regulators and the low priority of the issue in comparison with more pressing health needs. In fact, the AMA offered to send a representative to Montana to conduct an in-depth analysis of the mines' health-giving properties. However, when the mines balked at the idea of funding such an undertaking, the idea died on the vine. *True* does, however, tell the story of a doctor who claimed that he was helped by the mines, and that he wore a muffler around his neck so no one would notice him. When asked by a reporter whether he had reported his experiences to the AMA, he replied, "I have *not*. They'd laugh at me."⁵

Apparent inconsistencies in orthodox theories about the health effects of radioactivity also allowed mine operators to set themselves in opposition to the

⁴ *True Magazine*, December, 1955. 16-20, 28-29.

⁵ *Ibid.*

establishment. Since early in the twentieth century, scientists had known that the amount of radiation administered was crucial to a patient's recovery. Too little, and the patient would receive no benefit; too much, and the rays that in some cases could cure cancer would also cause it. Although there is no inherent contradiction in such a stance, the idea that scientists could not agree opened a rhetorical hole in the mainstream argument.

Fergus C. Fay, manager of the Free Enterprise mine, complained, "I wish they would at least be consistent...One says one thing and the other contradicts him, and that's what we're up against."⁶

Regarding the apparent successes seen at the mines, they could not be explained by any rational, orthodox means. Even the operators of the mines were generally unwilling to offer scientific explanations. However, the evidence of medical miracles left the *True* reporter asking, "is it possible that there is some unknown element in these mines that has not yet been isolated—something science has not yet been able to put its finger on—which is actually helping these people?"⁷ This notion that science still had myriad mysteries waiting to be found also harkens back to the early days of radium, when scientists everywhere were on the lookout for new elements and rays that would match the awesome power of radium. N-rays, brillium, solium, and a handful of other false trails were the result. Like radium before it, uranium seemed to open up a new world of possibility in which science attained an almost mystical quality.

Wade Lewis of the Free Enterprise stressed his quest for a scientific explanation of the mine's apparent ability to heal in his book *Arthritis and Radioactivity*. Lewis was

⁶ *True Magazine*.

⁷ *Ibid.*

not a doctor and was careful to avoid making medical claims, but he did describe cases, cite testimonials, and offer personal observations of thousands of successful cases.

Wanting a better understanding of the science behind these “cures,” Lewis wrote letters to numerous scientists, only to find that little work had been done on the health effects of the short-lived daughters of uranium’s atomic decay process. His investigations eventually led him to a conclusion that William J.A. Bailey would have found familiar. Because Lewis did not name or cite his scientific sources it is impossible to trace the development of his hypothesis, which claimed that uranium decay products like radon “stimulate[d] the pituitary gland in its production of ACTH, this body thereupon acting upon the adrenal cortex to produce hydrocortisone.”⁸ Though the scientific language was a bit more precise than that of Bailey and his ilk, the mechanism through which the gland “stimulation” occurred remained mysterious.

Like Bailey, Lewis also linked radioactivity’s action on the glands to improved sexuality. In his chapter “Romance, Sex Life: Arthritis,” he advanced the idea that the endocrine system may be stimulated toward hormone production by exposure to radon. Radithor’s success was largely built on the idea, expressed most fully in *Radium and Rejuvenescence*, that it was radium’s effect on the endocrine system that accounted for its remarkable aphrodisiac qualities. Lewis was not as bold in his pronouncements, admitting that improvements in the function of the reproductive glands could be due to improvements in general health. Testimonials boosting radon’s effect on “marital sexual relations” tended to place sexual rejuvenation within a broader return of health and

⁸ Lewis, 29.

reduction in arthritis pain. However, Lewis did observe that fertility sometimes spiked after a visit to the mines. He offered several stories of marriages that had for years failed to produce a child only to report pregnancy soon after leaving Free Enterprise. Lewis was not as reckless or dogmatic in his claims as some of his distant relatives in radium patent medicine, but he did not discourage the idea that radioactivity seemed to have some basic connection to a mysterious life force, most easily pictured in the glands. Perhaps radon triggered production of pain-killing chemicals in the body, but that did not explain the fertilization of eggs. By offering neutral “observations” of such cases, Lewis allowed the reader to connect the dots between radioactivity and the source of life itself.

This mystery behind radioactivity’s stimulating powers was accentuated by Lewis’s use of the term “transmutation elements” throughout the text. While transmutation was an accepted scientific term for radioactive elements’ decay through a series of “daughter” elements, readers may also have been reminded of the word’s more traditional meaning: the process sought by ancient alchemists through which base metals could be turned into gold. The philosopher’s stone that would allow such a transformation would not only allow the alchemist to transmute metals but to produce a panacea that could cure all illnesses. Though alchemy may have seemed archaic and had long been dismissed as superstition by the mid-twentieth century, it still evoked images of magic and transformation, of perfection and immortality.

Dr. Barbara Erickson, an anthropologist at Cal State-Fullerton, spent four years studying off and on the patrons of Montana’s radon mines. Her findings concerning their expectations of radioactivity’s potential health effects and their motivations for exposing

themselves to an element most consider dangerous mesh well with the appeals of radium patent medicines decades earlier. Like many patent medicines, the mines tend to appeal to those suffering from chronic, protracted illnesses. Arthritis is the most common affliction among patrons, but others come to treat their asthma, bronchitis, psoriasis, or a host of other complaints. The common denominator in almost all cases is pain. Radon is prized by devotees for its analgesic and anti-inflammatory properties. Erickson notes that “pain is a powerful motivation to experiment with a wide range of treatments, even bizarre and unusual ones.”⁹ Not surprisingly, the average mine visitor is elderly, ranging in age from 60 to 92.¹⁰ Many have been making yearly visits for many years. Some come sporadically or every other year. Though the mines have received some press coverage and advertise with billboards nearby, most people hear about the mines through word of mouth.

The relationship between mine patrons and the medical establishment is a complex one. Some mine visitors had had their arthritis diagnosed by a mainstream physician, but others were self-diagnosed. Even those who had seen an allopathic physician were likely to have visited an alternative practitioner as well. Others had gone even further afield, trying out “magnets, copper bracelets or other copperware, vitamin and herb regimens, and home remedies” with little to no benefit. Radon in these cases seemed to have been a last resort. The desperation behind such a move could go towards explaining why someone would intentionally expose him- or herself to an element that is

⁹ Erickson, Barbara. “Radioactive Pain Relief: Health Care Strategies and Risk Assessment Among Elderly Persons with Arthritis at Radon Health Mines.” *The Journal of Alternative and Complementary Medicine*. Volume 13, Number 3, 2007. 376.

¹⁰ Erickson, “Radioactive Pain Relief.” 376.

considered dangerous by almost every American health and government organization. Mine patrons were by no means ignorant of radon's deadly reputation. Their knowledge of radon as a cancer risk factor was outweighed by the pain relief it offered. As one patron put it, "When you hurt you'll try anything."¹¹ Some claimed that even if they did have their lives shortened by their exposure to radon, the improvement in the quality of the life they did experience would be worth it. Many bemoaned a loss of autonomy and independence that came with their arthritis pain. They were willing to pay a high price in order to be able to enjoy the activities they once did. "I tell them, [radon] can't hurt, you know. Even if it did hurt you down the line, if it takes away your pain you're going to choose this life instead of that one anyway," remarked one participant in Erickson's study.¹²

Another theme familiar from the story of radium medicines that runs through many of the responses of Erickson's interviewees is a suspicion of the medical establishment. Some saw radon as a way to "kick the medicine cycle" and avoid the side effects and high cost of their prescription medication. Common side effects of their arthritis medications included bleeding in the stomach, liver problems, ulcers, migraines, and kidney problems.¹³ Radon also offered relief from drug prices that were often exorbitant. Prescription costs reaching hundreds of dollars a month left many looking for other options. Some made regular trips to Mexico, where prices were lower for those who could not afford insurance in the United States. Radon too offered a cheaper

¹¹ Erickson, "Radioactive Pain Relief." 377.

¹² Ibid, 377.

¹³ Ibid, 378.

alternative. The typical yearly treatment of ten days in the mines cost about \$150, less than the cost of one month of some prescription pain medication.

Frustration with medical costs was bolstered by a more general suspicion of the medical and pharmaceutical industries and of the government. This included skepticism concerning the real danger of radon. While government agencies warned people that radon in their basements was a potential health crisis, mine visitors tended to scoff. “There’s such a fear of radon in some parts of the country; well, I think a lot of that is over-played just like a lot of things,” said one participant. “There’s too much control by government and the medical profession. Too many scare tactics are repeated in the press and on TV, and it scares people into not believing there could be help with [radon],” commented another.¹⁴ Even before the public outcry over radon, many mine patrons believed that they knew something the doctors did not. Arthur Peck, a retired banker who claimed to have spent over \$20,000 for arthritis treatment only to be deemed beyond medical aid, boasted, “I don’t care what the smart doctors say about these mines. I’ll be coming back here every six months from now on and I’ll live a hell of a lot longer than some of these specialists who gave me up.”¹⁵

The medical establishment also received criticism for wanting to suppress radon therapy because it would hurt profits. “The health care community, doctors and drug companies, are afraid of the competition. A lot of doctors are not open-minded—they only know how to dispense drugs,” said one typical mine visitor. However, the relationship between radon mines and orthodox medicine became more complicated

¹⁴ Erickson, “Radioactive Pain Relief,” 378

¹⁵ *True Magazine*

when one considered the fact that in Europe radon health mines were considered a biomedical treatment that was in many cases even covered by health insurance. Mine owners made this medical literature available to customers, allowing them to bolster their own positive experiences of radon with medical evidence from Europe, the birthplace of radioactivity.¹⁶

Indeed, some legitimate scientific studies in Europe have demonstrated the benefits of radon therapy. One randomized, double-blind experiment conducted in Germany divided a group of sixty rheumatoid arthritis sufferers into two groups: an experimental group that received radon baths, and a control group that received baths containing no radioactivity. Short-term improvements in both groups revealed little disparity between the two. However, follow-ups after three and again after six months revealed greater long-term improvements in the radon group. The control group members had mostly returned to their pre-experiment pain levels.¹⁷ These findings echo some of the earliest medical investigations of radium, which demonstrated the element's analgesic and palliative effects. The use of radium as a pain-reliever fell by the wayside as doctors focused on its cancer-killing properties, but subsequent studies seem to corroborate a link between exposure to radioactivity and subsidence of pain.

As always, commercial interests maintained a complicated relationship with medical opinion. Mine owners kept medical literature on hand as long as it corroborated the mines' value. The large body of hostile materials was understandably absent. Yet for

¹⁶ Erickson, "Radioactive Pain Relief." 378.

¹⁷ Franke, A. et al. "Long-term Efficacy of Radon Spa Therapy in Rheumatoid Arthritis—a Randomized, Sham-Controlled Study and Follow-up." *Rheumatology*. 2000; 39.

those who mistrusted science and the medical establishment more broadly, there were ways around some of the common criticisms of the mines. An obvious counter to the mines' physiological value was that the cures experienced in them were psychosomatic. Patients hoped and expected to get well, so they did, or thought they did. Mine operators hit on an ingenious way around such an argument. From the beginning they related tales of dogs that had been healed of their own old-age infirmities. Erickson found that a number of patrons brought their dogs with them into the tunnels and noticed an immediate difference. Since a dog, lacking in human reason, could not be expected to experience a psychosomatic cure, that argument had to be discarded wholesale. The *True* article also mentioned a dog named Solomon that was back chasing cats after only two visits to the mines.¹⁸

Though the Montana mines received most of the national attention, there were copycat schemes operating throughout the country, mostly west of the Mississippi. In Texas there were "uranium sitting rooms" operating around Comanche. State Board of Health official Dr. Holle dismissed the dust being used as having "as much radioactivity as the granite walls of the state capitol at Austin."¹⁹ Other uranium tunnels and "sitting rooms" appeared from Wisconsin to New Mexico. The operator of the Black Copper Uranium Mine in Taos was told to stop selling crushed uranium ore when it was given the familiar dismissal of containing less radioactivity than a radium dial watch, a

¹⁸ *True Magazine*.

¹⁹ National Archives. RG 88-Records of the FDA. General Correspondence. Division of General Services, General Subject Files, 1938-1974, Box 2163, Folder 508.1-511.07.66.

comparison which would have had much greater currency during the radium era.²⁰

Though not on the scale of its radium predecessors, uranium products experienced a brief surge in popularity. An ointment appeared in Dallas, its makers stating that it was helpful against sores. They even had a doctor, described as “broken down” by a health official, to back their claims. Thousands of miles away in Pennsylvania, the Jackson Uranium Corporation marketed the allegedly radioactive Wonderpad and Wonderglove. Oliver Field, Director of the AMA’s Bureau of Investigation, was excited to receive these items from an FDA official for the AMA’s museum.²¹ Contrasting Field’s amusement with the vehemence and exasperation of his predecessor Arthur Cramp may demonstrate the degree to which purportedly radioactive commercial products had diminished as a priority of the AMA. Though the organization denounced the Montana mines, it did little to actively shut down these companies. Neither their popularity nor their danger could touch those of Radithor, so they remained low priorities.

Another scheme operating in Arizona did draw the attention of the FDA. In the late 1950’s, Andrew Mercier began marketing his Mercier Radioactive Device. Unlike the simple, self-explanatory mine treatments, Mercier’s method was highly complicated and invasive. The Device offered low-level irradiation of the blood, a service not substantively different from many of the products from radium’s heyday. However, the process required that 10 cc’s of blood be removed from the patient, placed in the device, refrigerated for twenty-four hours, then re-injected back into the patient. Mercier’s

²⁰ National Archives. RG 88-Records of the FDA. General Correspondence. Division of General Services, General Subject Files, 1938-1974. 1957, Box 2363, Folder 511.04.11.

²¹ National Archives. RG 88-Records of the FDA. General Correspondence. Division of General Services, General Subject Files, 1939-1974, Box 2535, Folder 511.04.11-511.04.

literature claimed that the procedure would “increase the energy quantum in the blood plasma” and “re-establish the normal chemistry of the body.” The vague use of scientific terminology coupled with the notion of radioactivity as a source of abstract energy made Mercier’s Device a throwback to products like the Revigator. However, its medical claims were bolder than almost all of its predecessors. In addition to the arthritis being treated in the mines, the Mercier Device would cure diabetes, anemia, cancer, numerous bone ailments...blood clots and...inflammation.” Even more seriously Mercier included epilepsy and mental retardation in children among the conditions for which his Device was indicated.²²

Mercier operated a clinic for crippled and mentally handicapped children where his device was used.²³ Before being investigated by the FDA, Mercier claimed that he had several medical degrees. However, when pressed he admitted that he was a self-made man.²⁴ Mercier was in fact a 73-year old retired geologist who “mastered the principles of nuclear physics” through correspondence courses. Along with A.H. Lee, a Scottsdale doctor, Mercier carved out a niche for himself treating the handicapped children of Arizona. One woman who believed in Mercier’s treatment was Bernice Kussell. She was the director of the Valley of the Sun School, a “training school for retarded children” in Phoenix. A dozen or so children were treated at her school using

²² Letter to Rudy Kalcich. National Archives. RG 88-Records of the FDA. General Correspondence. Division of General Services, General Subject Files, 1938-1974, Box 2917, Folder 570—572.2-.11.

²³ Wallace F. Janssen to National Better Business Bureau, Food, Drug, and Cosmetic Division, August, 12, 1960. RG 88-Records of the FDA. General Correspondence. Division of General Services, General Subject Files, 1938-1974, Box 2917, Folder 570—572.2-.11.

²⁴ Memo of interview with Bernice Kussell by John T. Cain. RG 88-Records of the FDA. General Correspondence. Division of General Services, General Subject Files, 1938-1974. 1960, Box 2917, Folder 570—572.2-.11.

Mercier's method. Kussell swore by it, claiming that "all of them have been profoundly benefited." The children, suffering from epilepsy and a host of nervous disorders, were treated by Lee and a Dr. Robert F. Watterson at their own medical offices off of school grounds.

Not surprisingly, the FDA grew concerned when it heard about what was going on at Kussell's school. Though they were largely hands off when it came to adults who chose to visit mines and expose themselves to low levels of radiation, the invasive treatment of mentally challenged children was another matter. The FDA seized the device from the Valley of the Sun School.²⁵ Government investigators found that whatever radioactivity was in the Device was not properly contained, that the device could have no medical benefit, and that it could be dangerous.²⁶

Kussell reacted in the way that patent medicine sellers had been reacting since the passing of the Pure Food and Drug Act in 1906. She railed against the medical establishment, inveighing that any physician who chose to use Mercier's Device would be ostracized and run out of the profession. She continued in the familiar fashion, arguing that the AMA opposed the device because it was too effective and too cheap, that it would put doctors out of business. She even challenged the NIH to conduct a test and interview the children's parents to learn more about the Device. An FDA representative countered that the Bureau of Medicine had in fact spoken with a number of the parents and conducted a study which found that the devices were "without value."

²⁵ Memo of interview with Bernice Kussell, May 17, 1960. National Archives. Records of the FDA. Division of General Services, General Subject Files, 1938-1974, Box 2917, Folder 570—572.2-.11.

²⁶ Janssen to the NBBB, August 12, 1960. same folder as above.

Finally, the investigation of Mercier ended on a tragicomic note. When asked about the source of his radioactive material, Mercier replied straight-faced, that it was given to him by “some little men in space ships.” Evidently, as Mercier told it, the aliens bequeathed the materials to Earthlings so they would not spread bacteria and disease into space. Like Abbott E. Kay’s decades earlier, Mercier apparent delusion and possible mental illness is difficult to separate from his medical activities. Both shared the idea, common to schizophrenics, that invisible rays held profound secrets of life.²⁷

In the post-war period, ideas about radiation and radioactivity splintered in several directions. On one hand, “radiation” became an accepted part of mainstream cancer medicine, along with the ancient treatment of surgery and the cutting edge one of chemotherapy. Although a course of radiation treatment could have nasty side effects, most saw it as a shred of hope against a disease that continued to plague humanity in spite of all its technological and medical advances. The medical value of radiation kept it from being a uniformly negative idea, with associations of Radium Girls and mushroom clouds. Radiation as a word simultaneously embodied the good and the bad of radiation as a physical force.

Though radiation treatment was, in effect, exposure to radioactive rays, it bore little of the symbolic baggage that the word “radioactivity” gained after the detonation of the bomb and fear of fall-out made it something of a dirty word. Thanks to the horrors of the atomic bomb, coupled with incidents like the exposure of the Japanese fishermen on

²⁷ Memo of interview with Bernice Kussell, May 17, 1960. National Archives. Records of the FDA. Division of General Services, General Subject Files, 1938-1974, Box 2917, Folder 570—572.2-.11

the Lucky Dragon to deadly amounts of radiation, “radioactivity” began to evoke notions of sickness, decay, and mutation. Cheap science fiction movies of the 1950’s featured a menagerie of mutated animals, like the ants in *Them!*, that had become blood-thirsty freaks after coming in contact with high radiations levels. “Fallout” joined radioactivity in the American lexicon to conjure images of a world poisoned with invisible rays that carried sickness and death in their wake. Despite the fact that radioactivity was a natural phenomenon, it came to represent the potential folly of science run amok. Cancer patients rarely said they were going in for “radioactivity treatments,” which would have sounded to many like a contradiction in terms.

“Nuclear” also entered common parlance in the post-War era and, like radiation, could evoke strong negative and positive associations. On one hand, nuclear weapons threatened the annihilation of the human race. On the other, nuclear power offered the promise of fulfilling some of the earliest fantasies about radioactivity that had appeared at the turn of the century. The gleaming “White City” imagined in these early utopian visions became a real possibility as nuclear reactors got up and running. However, fear of nuclear catastrophes lurked in the minds of many as campaigns for an end to nuclear power picked up steam as the nuclear era wore on and failed to meet the lofty expectations many had held out for it. Incidents like the one at Three Mile Island reminded Americans that nuclear power could be dangerous, and the fears of many were confirmed by the meltdown at Chernobyl. Like radiation as a whole, nuclear power became a Janus-faced God, seeming to offer both enormous benefits and terrible risks.

The dizzying set of associations surrounding words like “radiation,” “radioactivity,” and “nuclear” becomes even more complicated when one looks at those surrounding individual radioactive elements. Uranium became inextricably linked to the atomic bomb. Though it had been identified centuries ago and used to dye glass, uranium did not enter the American consciousness until the dropping of Little Boy on Hiroshima. By far the world’s most famous nuclear explosion, Little Boy was a uranium bomb that instantly introduced the world to the astonishing potential of the atom. Scientists had been working on the puzzle of nuclear fission for years, but most non-scientists remained in the dark about the work being done with uranium. After the war uranium became a cornerstone of the burgeoning nuclear power industry, again revealing the dual ability of radioactivity to both create and destroy.

One radioactive element retained an unambiguous position in the American imagination: plutonium. Named, perhaps appropriately, for the Roman God of the Underworld, plutonium does not exist in nature. Instead it was born in a cyclotron in Berkeley in 1941. While the naturally radioactive elements had long conjured ideas both of the healing powers of nature and the marvels of modern medicine, plutonium evoked only death. The citizens of Nagasaki were the first to experience its devastation when the Fat Man, a bomb with a plutonium core, exploded over the city, killing tens of thousands in an instant. Others faced exposure to the element, which was a chemical poison in addition to its high radioactivity, through laboratory work or as medical test subjects. All

radioactive elements had proven harmful under certain circumstances, but plutonium was, as one author put it, “the world’s most dangerous element.”²⁸

Research during the Manhattan Project showed that plutonium had a powerful effect on the human body, but it never achieved a position in orthodox medical treatment. The earliest experiments involved animals and determined that a few milligrams of the element could be lethal. Next, in a case that has become a notorious example of violated medical ethics, a handful of human test subjects were injected with plutonium, sometimes without their knowledge or consent. This story, given mass exposure in Eilenn Welsome’s *The Plutonium Files*, shows the dark underbelly of the Manhattan Project and of radiation experiments more generally.

Radon, though a cornerstone of early radiation therapy, came to be seen as a household poison in the post-War era. A gaseous daughter of radioactive elements existing in trace amounts underground, radon can seep upward into basements, where radioactivity levels can become dangerously elevated. Studies showed that household radon could raise cancer rates. Strontium 90, a radioactive isotope, caused some to worry when tests discovered it in American milk supplies. As radioactive threats in the home seemed to multiply, even televisions came to be seen as emitters of dangerous radiation. Though televisions contained no radioactivity, parents warned their children that they should not sit too close to the TV because of the radiation they gave off. The notion that

²⁸ Jeremy Bernstein, *Plutonium: A History of the World’s Most Dangerous Element* (Ithaca: Cornell University Press, 2007).

radiation was invading the home through the most innocent of entry points gains credence. It came from our appliances, in our milk, even in the air we breathed.

. The complexity and ambiguity surrounding radium faded in the post-World War II era as the element became increasingly a part of history instead of everyday life. Its status as both a miracle cure and a deadly substance gave way to a more general notion of radium as a landmark in scientific discovery. Millions of Americans could tell you that radium was discovered by Madame Curie, a great woman and one of the most important scientists of the twentieth century, but few could describe the web of images surrounding the element before World War II. Radium became, for many, a bit of historical trivia rather than a lens through which to examine decades of American attitudes toward science, sickness, health, and business. Nevertheless, for fifty years radium acted much like a radioactive tracer in the body politic, revealing aspects of American bodies and minds that had previously remained hidden. America's encounter with radium medicine brought to the surface a complex tangle of hopes, fears, and misunderstandings. It created a middle ground between medical orthodoxy and "quackery," between science and nature, in which physicians, scientists, commercial interests, and citizens struggled to understand a discovery that threatened to overturn accepted truths about the universe and the body.

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