

2 Historical Background

The Medical Uses of Radium

After the isolation of radium in 1898 by the Curies, this element presented intriguing challenges for chemists and physicists. These challenges were in part due to radium's rarity and to the difficulty of separating minute fractions of it from its surroundings, but even more to the complex array of daughter products that accompanied the parent element. Physicians, too, were intrigued with radium and with the energy lost during the process of radioactive decay. Interest centered on the use of the gamma rays given off during decay, primarily by the daughter products of radium. These gamma rays appeared similar to the recently discovered X-rays. Also of interest were the effects of energetic heavy particles within the human body. This new form of energy deposition suggested that radium decay might have some therapeutic potential. Such speculation led to the first laboratory trials of radium in the United States.

The limited availability of radium and its high monetary value encouraged two brothers, Joseph M. and James J. Flannery, to form a company called the Colorado Chemical Mining Company to mine carnotite ore and extract radium from it (Lounsbury 1938). The Flannerys were spared the problem of obtaining mining properties, because the American Vanadium Company, of which they were founders, owned numerous claims in Colorado and Utah (Bruyn 1955). In 1910 the Flannerys organized another company, the Standard Chemical Company, to handle their new operations and set up a plant in Canonsburg, Pennsylvania, where radium was extracted from the ore. The first commercial radium was produced by the end of 1912, and by 1914 the Flannerys provided 4 g of radium to England for use in the war efforts (Silverman 1950). By 1920, 30 g of radium had been produced, and by 1922 the Canonsburg plant was producing radium at a rate of about 18 g per year, satisfying the U.S. demand.

The Standard Chemical Company, in an attempt to expand the market for radium, examined a number of potential uses. Of particular relevance were those related to the manufacture of dial paint and to the medical uses of radium. The company formed a wholly owned subsidiary, the Radium Chemical Company, Inc., to handle the sales of radium. This organization produced a dial paint containing radium and experimented with the addition of rare earths to the zinc sulfide in the dial paint for better light emission under alpha-particle bombardment. The Standard Chemical Company also maintained a well-equipped and well-staffed biological laboratory to investigate medical uses of radium. Out of the latter came the establishment