

radioactive material. The amount present was related to the length of exposure. The greatest amount of radium found in an individual of the occupied group was 3.5 micrograms, while that of an individual of the formerly occupied group was 11.3 micrograms. Although the use of mesothorium in the paint had been discontinued since 1927, there was still a continuing rate of accumulation of radioactive material among the workers of the occupied group, and there existed still an appreciable amount of mesothorium in the bodies of the workers of the formerly occupied group. The average erythrocyte count was lower than normal in members of both groups, while only members of the formerly occupied group showed upon roentgen-examination focal atrophy or osteoporosis as well as densifications of the jaws.

III. HISTORICAL ASPECTS

The use of luminous paints on watch dials was first introduced in Germany in 1908. In 1923 the attention of the United States Radium Corporation was called to the possible existence of an industrial hazard in its plant located at Orange, New Jersey, by a dentist, who had observed several cases of necrosis of the jaw among employees of this establishment (Castle, Drinker and Drinker; and Flinn). Two years later Martland, Conlon and Knef reported severe leukopenia and anemia among girls employed in this plant in which luminous paint was applied to watch dials. Investigations instituted afterwards brought out the following facts:

From 1917 to 1924 an accumulative total of approximately 800 girls were employed in this factory, which was engaged in the painting of dials on clocks and watches with a luminous paint. The number of girls working at any one time varied between 12 to more than 200. Some of the girls were employed in this work 6 to 9 years, many for shorter periods. The paint used consisted of crystalline, phosphorescent zinc pyrosulphide, rendered luminous by the addition of small amounts of sulphate salts of radium, mesothorium, and radiothorium (highest amount 1 mgm. radium element or its equivalent mixed with 8 gms. of zinc sulphide, usually, however, with 30 to 40 gms. of this chemical). Some of the girls employed were engaged in the preparation of the paint by mixing the powdered chemical with an adhesive compound in a small crucible with the aid of a glass rod and thinning the paint with distilled water to the required consistency. When this operation was done energetically radioactive material was spilled on fingers, clothing, benches, and floors. The girls transferred the radioactive material later from their hands to other parts of their body (face and hair), which became luminous when "flashed" and then examined in a dark room. The aprons of these girls shone even after return from the laundry as if the paint had been set in the washing process. There was, on the other hand, no luminosity of those parts of the body where an active contact of the skin with the paint had not taken place. The paint could be washed off readily from the skin with soap and water.