

treated for the recovery and purification of their radioactive components. One of these laboratory workers had been in contact with radioactive substances for a period of 25 years, while the second technical worker had an exposure of only nine years (Löwy), before they developed a pulmonary neoplasia. Similar observations were recently made in several commercial and therapeutic radium laboratories in Germany (Baader; Neitzel; Teleky).

In a plant in Berlin, in which commercial mesothorium containing 30 per cent of radium was handled, a woman with 20 years of occupational contact with this radioactive material developed a bronchial carcinoma located in the left lower lobe, which formed metastases in the hilum nodes, liver, ovaries and suprarenals. The pulmonary tissue examined by Rajewsky for radioactivity gave a positive reaction. The skin of the person showed, moreover, pigmentary disturbances indicating an injurious effect of the rays upon the skin. Two other technicians, employed in the same factory, succumbed to an extensive radiation fibrosis of the lung, while a fourth worker of this plant developed, in addition to a pulmonary fibrosis, a melanosarcoma of the skin. Another case of this pulmonary radium disease was mentioned by Teleky, who reported the occurrence of a pulmonary carcinoma in a female technician, employed in a radium laboratory, subsequent to the appearance of a radium necrosis of the upper jaw. Martland mentioned in 1939 that a carcinoma of the ethmoid cells had been observed in a girl who had applied luminous paint upon watch dials.

Occupational exposure to the inhalation of radioactive matter does not invariably lead to the development of a pulmonary malignancy, as was demonstrated by the presence of pulmonary fibrosis causing the death of two persons in a radium plant in Berlin. Additional cases of this type were published recently by Kalbfleisch; Tönges and Kalbfleisch; Doenecke; and Belt. One case was a chemist, 35 years old, with 2 years of exposure to radioactive material, while in the other report a female technician, 24 years of age, with 4 years of exposure was the victim. The histological examination of the lungs of these two cases did not reveal any lesions indicative even of a preparatory precancerous epithelial proliferation. The feature apparently common to all cases of pulmonary fibrosis of a radioactive genesis is the relatively short time of exposure in contrast to the much longer time seemingly necessary to elicit a neoplastic response in the lungs by the same agents.

The occupational radiation pneumonitis is comparable to the post-irradiative pulmonary fibrosis which is sometimes observed in patients who have been subjected to prolonged and massive roentgen-treatments for therapeutic reasons (malignancy of the breast or lung). The extensive induration of the lung may become the direct cause of death (Bauer; McIntosh and Spitz; Bauer and Schraer; Warren and Gates; Warren and Spencer).

*Experimental Production of Pulmonary Pathology by Radioactive Substances and Roentgen-Rays.* Several attempts were made to duplicate these