

the neoplasms produced in rats with the aid of solar rays and ultraviolet rays were sarcomas, while the others were carcinomas and carcinosarcomas. The skin of the mice in which Büngeler produced sarcomas by an intense exposure to solar rays had been sensitized by applications of hematoporphyrin, eosin, or anthrasol, respectively.

II. ROENTGEN-RAYS

Whereas the occurrence of occupational roentgen-carcinomas of the skin is not uncommon, the development of roentgen-sarcomas in the skin of persons exposed to these agents for professional reasons is very exceptional. There are so far only two occupational roentgen-sarcomas on record (Mulsow; and Unna). A third case reported by Porter and White is doubtful, as these investigators were uncertain whether they were dealing with a sarcoma or with a chronic granuloma. A fourth case, also of doubtful significance, is that observed by Gütig, who noted a fibrosarcoma in the scar of a roentgen-carcinoma located on the back of the hand, and surgically removed two years previously. The sarcoma noted by Unna was found in a worker employed in a roentgen-tube factory; Mulsow's case involved a physician (roentgenologist); while the doubtful case of Porter and White was seen in a roentgen-technician. The sarcomatous neoplasms were located on the fingers or hands, the skin of which exhibited the typical changes of chronic roentgen-dermatitis (epidermal atrophy and hyperplasia, pigmentary disturbances, and telangiectases) and simultaneously or subsequently roentgen-carcinomas. Roentgen-sarcomas form reddish, vascular nodes with smooth tips and verrucous marginal or basal portions, resembling in many respects as to gross appearance the roentgen-carcinomas (Hellner). The exposure period of Mulsow's case was twelve years. The two authentic cases of roentgen-sarcoma were spindle cellular fibrosarcomas displaying a moderate degree of vascularity.

Therapeutic Roentgen-Sarcoma. Occupational roentgen-sarcomas are thus relatively rare neoplastic sequelae of professional or industrial hazards, and constitute a very small fraction of the malignant cutaneous responses elicited by an occupational exposure to roentgen-rays (more than one hundred cases of roentgen-carcinomas have been recorded). Sarcomatous reactions after therapeutic application of roentgen-rays are by far more frequent, amounting to 12 per cent of the total number of therapeutic roentgen-cancers observed (Coenen).

The first cases of therapeutic roentgen-sarcoma were described by Perthes in 1904. Subsequent reports on neoplasms of this type were made by Alius; Pels-Leusden; Rosenbach; Deuticke; Kaplan; Hellner; Fischer-Wasels; Bohmer; Montgomery and Vieceili; and O'Donovan. The great majority of therapeutic roentgen-sarcomas were observed in connection with the roentgen-treatment of tuberculous lesions (lupus vulgaris and tuberculous arthritis, especially of the knee joint). Several roentgen-sarcomas have followed the roentgen-therapy of other conditions (psoriasis (Bohmer); sycosis