

means of early discovery is offered by periodic cystoscopic examinations of the persons exposed (Oppenheimer, 1926; Gehrmann; Baader). Unfortunately, such a procedure frequently meets with resistance by workers (Wolfe). For this reason in German and Swiss plants cystoscopic examinations are not done as a routine, but only when hematuria has been demonstrated repeatedly. Urinalyses are there performed at intervals as a routine. A similar practice is observed in English plants (Bridge).

Engel (1937) stated that cystoscopic examination may show *three morphologic types of lesions of the bladder in chronic poisoning with aromatic amines*:

1. *Lesions due to chemical irritation of the bladder.* The bladder presents hemorrhagic spots, situated mainly in the trigonal space and around the ureteral and urethral orifices. This reaction usually recedes within two to three weeks. Months or years later tumors may be observed rarely in the same areas in which the hemorrhages occurred.

Wolfe observed these "submucosal hemorrhages" of varying size and extent in some of his patients, especially during the summer months, and commented that on subsequent cystoscopic examinations the hemorrhages had disappeared, leaving the bladders of these patients clear and normal. Reference to the presence of such hemorrhagic spots in the mucosa of the bladder of the dye worker was first made by Simon (1932), who observed the development of tumors at the sites of these spots several years later. Gay and di Maio (1937) described them as hyperemic spots, resulting from capillary hyperemia and telangiectases (spider vessels). They were usually located in the lower half of the bladder, where the convolutes of dilated vessels caused slight local elevations of the overlying epithelium. While Simon, di Maio and Ferguson asserted that these lesions are precursors of tumors and that thereby the future occurrence and location of bladder neoplasms can be predicted, Engel (1937); Berenblum; and Hueper, Wiley and Wolfe concluded that they are not of precancerous character but represent transient acute vascular reactions of the vesical mucosa.

2. *Benign papillomas.* These may be polypous or villous, pedunculated or sessile, and are often multiple. They are most often located in the trigonal and paratrigoal region, especially around the ureteral orifices, conforming in this respect to the cryptogenetic tumors (Hueckel; Matthews).

3. *Carcinomas.* These are usually broad-based papillary tumors, but nodular infiltrative neoplasms also occur. They are situated, according to Engel (1937), with equal frequency in all parts of the bladder, unless they develop from primary papillomas. In the latter case they are most often found near the ureteral orifices and in the anterior and posterior walls, as well as near the urethral orifice. The tumors are rarely located in the renal pelvis or in the posterior part of the urethra (Oppenheimer).

Similar lesions were seen cystoscopically in the bladders of dogs exposed to subcutaneous and oral administrations of large amounts of commercial