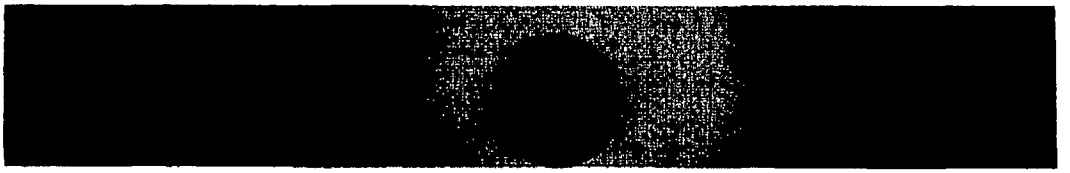

FIG. 6. X-ray diffraction film of lung residue of E. R.* The lines listed when compared to the known pattern for asbestos give positive proof that the lung residue is essentially asbestos.

Table of "D" lines:

4.52	2.42	1.61
4.20	2.38	1.531
3.35	2.115	1.49
2.98	1.84	1.44
2.67	1.70	1.38

* A 68.5 gm. sample of formalized lung tissue was digested in 20 volumes hydrogen peroxide, the digestion being accelerated with gentle heating. The residue from the digestion was treated with dilute hydrochloric acid, filtered, washed and ignited at 500°F. The ignited residue was analyzed by x-ray diffraction by the method described in the article by Hanawalt, J. D., Rinn, H. W., Frevel, L. K., "Chemical analysis by x-ray diffraction," *Indust. & Eng. Chem., Anal. Ed.*, vol. 10, no. 9, 1938. This work was done by R. I. Chamberlin and A. Woewucki, Jr. of the Massachusetts Bonding and Insurance Company, Boston, Mass.

tained brown pigment granules many of which took an iron stain, and portions of asbestosis bodies were also found in the macrophages. (These cells have been called dust cells and are thought to lay down the iron on the asbestos fiber, constituting the asbestosis body.) Anthracotic pigment was also present in the macrophages. Multinucleated giant cells of the foreign body type were found in abundance in all areas; many of these contained birefringent asteroidal bodies. Few lymphocytes were seen; those present were scattered around the bronchi near the hila. A few focal areas of bronchopneumonia with polymorphonuclear infiltration were present; these had no particular relation or location to any grouping of the asbestosis bodies and were undoubtedly a terminal phenomenon.

Throughout the lungs many air sacs were dilated and contained a granular eosinophilic material, probably fibrin. Some of these plugs were undergoing organization, mainly in alveolar ducts; this type of fibrosis probably accounts for a small percentage of the total fibrosis seen.

Bronchi: The bronchi of the lower lobes showed marked bronchiectasis; there was dilatation, fibrosis of the muscular coat and peribronchial fibrosis. While the latter was most marked in the lower lobes it was seen in the hilar and midzonal regions of almost all segments. Another striking feature was widespread squamous metaplasia of the bronchial epithelium. (Fig. 4.) This was most marked in the alveolar ducts; it was found in all areas and was not particularly related topographically to the adenocarcinoma described later.

Blood vessels: The arteries and arterioles of the right middle and both lower lobes showed moderate intimal thickening with hyalinization and narrowed lumina. This was most marked near the hila but was found occasionally farther into the periphery.

Tumor: Adenocarcinoma was found originating in the inferior lingual segment of the left upper lobe bronchus. The tumor was present in the mid-zonal area of the apical posterior segment of the left upper lobe, the entire lingula and left lower lobe, as well as the right middle and lower lobes. It had spread by submucosal and lymphatic routes. Sections of the left atrium showed direct extension through the left hilum into the pericardium and myocardium. (Fig. 5.) Metastatic tumor was seen in the fourth lumbar vertebra.

Asbestos "granulomas": The white plaques described in the diaphragm and Glisson's capsule were made up chiefly of hyalinized connective tissue. No asbestosis bodies or giant cells were seen. These distinctive areas grossly suggested granulomas.

X-ray diffraction studies were carried out on a sample of formalized lung tissue. The resulting pattern indicated that the lung residue was mostly asbestos. (Fig. 6.)

COMMENTS

Asbestosis may be defined as a specific occupational disease caused by the inhalation of asbestos fibers and leading to a progressive fibrosis and scarring within the lungs.[17] It has been demonstrated by Gardner[20] and again by