278 Direct Photomicrography of Air-Borne Particles. R. D. Cadle and E. J. Wiggins. Arch. Ind. Health 12, 584-591 (Dec. 1955).

A method is described for photomicrography of particles suspended in air. The difficulties involved in such methods are that the particles are in motion and that only a small number of particles are in focus. These difficulties have been overcome by: (1) short exposure periods (1 to 10 microseconds) and high intensity illumination; (2) a large number of flashes to expose each film; and (3) a high repetition rate so that numerous exposures can be obtained on each negative in a reasonable period of time. Details of construction of the apparatus are described. The method is used to determine the shapes, sizes, and concentrations of airborne particles. Shapes are observed directly. Sizes are determined by measuring image sizes and dividing by the magnification. Concentrations are calculated from the number of well-defined images on the negative, the area of the negative, and the depth of field of the objective. Counting the particles involves selecting the well-defined images, but experiments with six observers on average counts of 26 to 58 particles gave an average deviation of 20 to 25%. The method is easily applicable to particles of 2 microns and over, and can be used down to 0.3 micron. The technique has been used to investigate ice fogs in Alaska.

279 The Electron Microscopy of Airborne Dusts. J. Cartwright. Brit. J. Appl. Phys., Suppl. 3, S109-S120 (1954).

There is difficulty in reconciling optical and electron microscope assessments of airborne dusts. The work described in the present paper was carried out to examine the relation between the two types of assessment of dusts within the size range of 0.3 to 3 microns. The thermal precipitator was used as the sampling instrument. Samples taken in the membrane-coated grid of the precipitator are not collected under the same conditions as on cover glasses for optical counting, and hence discrepancies may arise. The author has avoided these difficulties by taking samples on membrane-coated cover glasses, by collecting over a longer period, and by shadowing the cover glasses with an alloy of gold and palladium. The methods of preparing the cover glasses and manipulating the electron microscope are described in detail. When the resolving power of the electron microscope was reduced to that of the optical microscope, counts obtained by the two methods showed no serious discrepancy. The author concludes that it is normally desirable to use a combination of the two methods of counting, but because of the shortcomings of the optical microscope, some compromise is necessary in fitting the results. In the discussion of the paper various points of considerable technical significance were raised.

-- Cond. from Bull. Hyg.

280 Effect of Particle Size on the Determination of Quartz by X-Ray Diffraction. R. L. Gordon and G. W. Harris. Nature 175, 1135 (June 25, 1955).

A study has been made of the accuracy with which the determination of the quartz content of airborne dusts, lung residues, and similar materials arising in silicosis research can be made with a Geiger-Mueller counter x-ray diffractometer recently described (to be published in full later). In particular, the effect of the particle size of the quartz on the accuracy of the determination has been studied. The relative diffracted intensities of the 1122 line of quartz (spacing 1.82A) were measured as a function of the effective particle diameter and were shown to fall off on both sides of a maximum at an effective diameter of about 2 microns. The lower intensities for large particle sizes are to be expected as a result of extinction; those at smaller sizes are attributed to the existence of the "amorphous layer" previously reported. Removal of the amorphous layer by etching with hydrofluoric acid results in full intensities of the diffraction lines for particles greater than 0.5 micron in size, but not for smaller particles. In order to make accurate determinations of quartz by x-ray diffraction, it is necessary to know its particle-size distribution, and, possibly, whether it has received treatment equivalent to etching. In the size range 1-20 microns, the error introduced by ignoring these effects is about 12%.