

are without much practical importance, since in daily practice in industry the harmful effect is exercised more frequently by dusts mostly of mixed origin. Besides, what is most important is the physical and chemical constitution of the dusts and consequently their action on the system.

III - WHAT ARE THE PHYSIOLOGICAL EFFECTS PRODUCED BY THE INHALATION OF DUST? - To be harmful from a respiratory viewpoint, dust must be of sufficient fineness to pass through the nasal filters and be retained in the alveoli (minute air sacs) of the lungs. Particles found in autopsied lungs are of the order of one micron (a micron is 1/1000 of a millimeter or about 1/25,000 of an inch) or less in size - about the size of the common bacteria. Some dust particles found in lungs are as large as five or six microns although these sizes are rather exceptional.

There are five distinct types of reaction produced in man as the result of inhaling dust. These reactions may be broadly classified, based on the primary cause, as follows:

- (a) Those which result in lung fibrosis, commonly referred to as pneumoconiosis. These dusts contain free silica, asbestos, etc. However, it is not necessary for fibrous tissue to be formed in order for the disease to be classed as "Pneumoconiosis".
- (b) Those which are toxic and are absorbed into the blood stream such as lead, cadmium, etc.
- (c) Those which result in what is commonly referred to as metal fume fever; such as zinc oxide, etc.
- (d) Those which are allergic in character, such organic dusts as pollen, pulverized wood and flour, etc. The breathing of pulverized wood and flour is frequently associated with tuberculosis.
- (e) Those commonly referred to as "nuisance dusts". These may cause irritation of the respiratory tract or passages and may cause considerable discomfort, also headaches of the dry "nasal" passage or sinus type and exposure to them may be associated with a high incidence of respiratory illness.

The rate and extent of these reactions are dependent upon the resistance of the individual, the exposure period (concentration of particles and length of exposure) temperature and humidity of the air, rate of work, and the percentage of ingredients which are harmful.

Owing to the length of time required to obtain a reaction by inhalation methods, the United States Bureau of Mines and the Public Health Service adopted about twelve years ago, a method of injecting small quantities of the dusts to be studied into the peritoneal cavity of guinea pigs. ("Response of Peritoneal Tissue of Dusts Introduced as Foreign Bodies" by Dr. John W. Miller, Dr. R. R. Sayers and Wm. P. Yant, Jour. Amer. Med. Assoc. Sept. 22, 1934 - Vol. 103, pps. 907-911). It was found that identical reactions occur in each animal injected with the same dust under the same conditions and examined in the same time interval after injection. These reactions were essentially the same microscopically as that produced in the lungs and the gross appearance of the dust nodules was sufficiently differentiated to afford a means of classifying the physiological response to the dusts. There are three types of reaction:

- An absorption or dissolution of the dust.
- A proliferative reaction.
- An inert reaction.