First Progress Report on Asbestosis Experiments at the Saranac Laboratory. May 5, 1937.

To furnish a better understanding of the disease, asbestosis, and to provide standards as a basis for its diagnosis by x-ray films, a group of animal experiments has now been started.

It is expected that anatomical changes will be produced in the lungs of animals inhaling fibrous asbestos which will cast shadows on an x-ray film comparable to those seen in human beings. Since the animals can be killed as seems advisable it will be possible to compare the anatomical changes in their lungs with the shadows seen in the films.

To make certain whether the fibrosis in the lung is due to the chemical composition of asbestos or whether it is the result of a mild irritation in the walls of the air spaces resulting from the action of a fibrous foreign body (i.e. its physical structure) injection experiments are in progress. If no fibrosis results from accumulations of asbestos in other organs it may probably be assumed that chemical stimulation of the tissues is not responsible for the pulmonary fibrosis.

As a further check on the physical vs. the chemical hypothesis, the action of ground serpentine is being compared with that of chrysotile. Since they both have the same chemical composition the comparison should be instructive whatever the result.

To check the effect of mere fibrous structure, a search for other fibrous minerals was made. None other than those classified as asbestos could be discovered which had the same structural composition. However, because of our interest in the action of gypsum, a sample of satin spar (fibrous) and also one of soda tremolite were selected for comparative testing.

Finally, the action of various members of the asbestos group, amphibole, amosite, crocidolite and anthophyllite are all being compared with that of chrysotile.

It is too early to report more than the fact that the experiments have been started. For the inhalation of chrysotile, dust furnished by Mr. Fisher from a plant at Manville, N. J. is being employed. As it was received, the dust was not sufficiently fine for experiments of this type and we were forced to regrind it

in a ball mill. Considerable time was spent in experimenting with a proper type of mill for the purpose. This difficulty was overcome and inhalation was begun on March 22.

In the dusting room we placed 80 guinea pigs, 20 rats, 8 rabbits and 3 cats. More of the latter will be procured as they become available. A dust concentration of approximately 175 million particles per cubic foot of air is now being maintained. This may later be changed. Over 90% of the particles are less than 5 microns in diameter. Since significant results cannot be expected to develop until exposures have been continued for from 1 to 2 years there can be little to report before the expiration of that time.

The various injection experiments are further advanced although it is too early to report any results. For this purpose all dusts have been analysed chemically and petrographically. They were then ground and fractionated by allutriation. Only particles 1 to 3 microns in diameter were used. Their composition was again checked by the same methods of analysis. The various tests are tabulated for your information.

Chrysotile (Thetford)

a. Intravenous Injections.

Have proved difficult. 7 rabbits have died, apparently from mechanical effects, without receiving significant quantities of the dust. Further attempts are in progress.

b. Intraperitoneal Injections - 5 guinea pigs, March 31,1937

One killed after one month. No gross fibrosis.

Amphibole

a. Intravenous Injection. 4 rabbits still in progress. Have each received 11 doses totalling 0.55 grams. No fatalities.

b. Intraperitoneal Injection. 5 guinea pigs. Feb. 5,1937

2 killed after 12 and 30 days respectively. Dust plaques without gross fibrosis.

Amesite

a. Intravenous Injection. 4 rabbits still in progress. Have each received 11 doses totalling 0.55 grams. No fatalities.

b. Intraperitoneal Injection. 5 guinea pigs on Feb.5,1937

2 died of infection.
1 killed after 1 month. Most of the dust absorbed; no fibrosis.

Crocidolite

a. Intravenous Injection. 4 rabbits have each received full dose of one gram in 20 injections. None killed.

b. Intraperitoneal Injection. 7 guinea pigs.

2 died of infection.
1 killed after 1 month. Pigmented dust plaques without fibrosis.

Anthophyllite

a. Intravenous Injection. 4 rabbits have each received full dose of 1 gram in 20 injections.

2 killed after 3 1/2 to 6 months respectively. No evidence of fibrosis in the lungs, spleen, liver or bone marrow.

b. Intraperitoneal Injection. 5 guinea pigs.

3 killed after 1, 4 and 8 months respectively. Disappearing reaction with gross evidence of fibrosis.

Serpentine

a. Intravenous Injection. 4 rabbits have each received full dose of 1 gram in 20 injections. All alive and well.

b. Intraperitoneal Injection. 5 guinea pigs.

2 killed after 1 and 4 months respectively
Soft pigmented dust plaques without fibrosis.

Fibrous Gypsum - Satin Spar

a. Intravenous Injection. 4 rabbits have each received 11 of 20 injections, or a total of 0.55 grams. No fatalities.

b. Intraperitoneal Injections - not made.

Soda Tremolite

a. Intravenous Injection. 4 rabbits have each received total dose of 1 gram in 20 injections. All alive and well.

B. Intraperitoneal Injection. 5 guinea pigs.

1 killed after 1 month. Small pigmented dust plaques without fibrosis.

None of these early results is regarded as significant and no conclusions will be drawn until the observations have been continued for at least one year. It is not yet clear whether the difficulties with intravenous injection of chrysotile are merely a matter of technique or whether this substance is essentially toxic. We are attempting to discover the cause.