



INTERIM REPORT

REGARDING THE BIOLOGICAL ACTIVITY
OF MAYLO DUST

to the
Owens-Illinois Glass Company
Toledo, Ohio

by
The Saranac Laboratory
Saranac Lake, New York

January 1, 1950

(The report has reference to
results of studies up to
November 1, 1949.)

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This interim report is essentially a supplement to the previous report dated April 29, 1949. It is submitted at this time in accordance with a plan to issue reports at intervals of about six months.

In the interest of brevity general statements as to the methods used and purposes of each phase of the experiments under way are omitted and the reader is referred to the preceding report for discussions of these points. It may be stated that the conduct of the experiment has been maintained as it was in earlier stages, and that dust counts during the interval since the last report have averaged 179 million particles per cubic foot of air.

In general, the observations made over the past six months conform to those noted previously. However, only tentative conclusions are warranted at this time. It seems clear that only after all animals have been examined at the end of the full exposure can the results be evaluated.

The results to date are presented in tables as in the previous report. Certain comments concerning each table follow:

Table 1. (Compare with Table 3.) In the interval since the last report, four additional experimental animals on being sacrificed have shown spreading of their lesions while the controls have consistently revealed healing or healed lesions. Others of the experimental group have failed to show evidence of spread. While the observations over this period suggest a slightly adverse influence of the dust on the course of the tuberculous infection, the

evidence is by no means conclusive, and only subsequent developments and a survey of the results in the entire series of animals can provide a basis for a positive statement as to the influence of Kaylo on a simultaneous tuberculous infection.

Table 2. (Compare with Table 3.) Two of the three animals in phase I (in dust 2 months after infection) of the reactivation experiment which were killed after 12 months in the dust room showed gross evidence of spreading disease. This observation remains to be confirmed by microscopic study. In the other two phases (in dust 4 months and 6 months after infection), no spreads have been noted. Here, too, the evidence is obviously incomplete and does not warrant evaluation at this time.

Table 3. (Compare with Tables 1 and 2.) No spreading disease has been noted in the six animals killed since the last report. The course of the infection in the controls is thus seen to be in accord with previous experience.

Table 4. (Compare with Table 5.) The table reveals that the animals sacrificed or dying after dust exposure of eleven or more months have consistently harbored spreading lesions. While some of these are yet to be confirmed microscopically, the consistency of the findings suggests rather strongly that under those conditions (infection initiated after 3 months of dust exposure) Kaylo has a distinctly adverse influence on the course of the disease.

Table 5. (Compare with Table 4.) The control animals again reveal that the infection is following its usual course. One animal, killed at 10 months after infection, showed slight microscopic evidence of spreading disease. As noted in the previous report, it is not uncommon for an occasional control animal to develop progressive disease following this type of infection.

In view of the above findings and for purposes of this report, it seems appropriate to present for comparison the chemical and petrographic analyses of Kaylo and of long fiber asbestos (Table 6).

COMMENT

At the present time the evidence suggests that Kaylo dust may have a slightly adverse effect upon tuberculous infection. This effect is by no means as pronounced as that of quartz, since similar experiments with quartz result in progressive spreading of the lesions in virtually all animals after 8 or more months of exposure. The lesions in animals exposed to quartz dust are usually sufficiently extensive to cause death of some animals in the period from 12 to 15 months.

The future course of the lesions in the present experiment cannot be predicted. They may heal during the next 9 months, but it is felt somewhat more likely that animals to be sacrificed will show an increasing incidence of spreading disease.

Table 1

KAYLO + P₁ SIMULTANEOUS

Animal Number	Mode of Death	Duration	Gross					Microscopic				
			Bron- chial Lungs	Nodes	Spleen	Liver	Hepatic Lymph Nodes	Bron- chial Lungs	Nodes	Spleen	Liver	Hepatic Lymph Nodes
4	D	1-1/2 mo.	pn +	+	0	0	0	Tissue autolyzed				
(1)	K	2 mo.	+	+	0	0	+	+	+	+	+	+
(2)	K	2 mo.	+	+	0	0	+	++	+	+	+	+
6	D	3-3/4 mo.	(pn?)	+	0	0	0	pn	0	0	0	0
(3)	K	4 mo.	+	+	0	0	+	+	0	0	0	0
(5)	K	4 mo.	+	+	0	0	+	+	+	0	0	+
24	D	4-1/2 mo.	(pn?)	+	+++	+	+	pn	+	?	++	++
25	D	5-1/3 mo.	(pn?)	+	0	0	+	pn	0	+	0	+
19	D	6 mo.	pn +	+	0	0	+	Tissue autolyzed				
(7)	K	6 mo.	0	+	0	0	0	0	+	0	0	+
(1)	K	6 mo.	+	+	0	0	0	+	+	0	0	+
20	D	6+ mo.	pn +	?	0	0	0	pn	0	0	0	?
24	D	7 mo.	pn +	+	0	0	0	Tissue autolyzed				
22	D	7-2/3 mo.	pn	?	0	0	0	Tissue autolyzed				
(9)	K	8 mo.	+	+	0	0	+	++	++	+	0	++
(13)	K	8 mo.	+	+	0	0	+	++	+	+	0	+
26	D	8-1/2 mo.	++	+	+	+	+	++	++	+++	++	++
(11)	K	12 mo.	+++	+	+	+	+	+++	+	++	++	+
(12)	K	12 mo.	+	+	0	0	+	+	++	0	0	+
17	D	13-2/3 mo.	0	0	0	0	0					
20	D	14 mo.	pn 0	0	0	0	0					
16	K	15 mo.	+	+	0	0	0					
16	K	15 mo.	++	+	0	0	0					

? remain for subsequent study

D = died
 K = killed for sampling
 pn = intercurrent pneumonia
 0 = no tuberculous lesions seen
 + = healing or healed tubercles
 ++ = scattered isolated spreading tubercles
 +++ = many spreading tubercles
 ++++ = confluent tuberculous

Where microscopic observations are not recorded, histologic
 preparations have not been completed, unless otherwise stated.

Table 1

KATLO 3 MONKEYS • P₁ INFECTION

Animal Number	Sex	Age	Duration of Infection	Gross				Microscopic			
				Pneumonia	Adenitis	Lymph Nodes	Hepatic Nodes	Pneumonia	Adenitis	Lymph Nodes	Hepatic Nodes
107	F	3 mo.	}	No infection							
108	F	3 mo.									
109	F	3 mo.									
110	F	3 mo.									
111	F	3 mo.									
83	M	4 mo.	1 mo.	pn 0	+	0	0	pn 0	+	0	0
autolysed								(20x)			
84	F	5 mo.	2 mo.	pn +	+	0	0	pn +	+	0	0
85	F	5 mo.	2 mo.	+	+	0	0	+	+	0	0
86	F	7 mo.	4 mo.	++	+	0	0	+	+	0	0
87	F	7 mo.	4 mo.	++	+	0	0	+	+	0	0
88	F	8 mo.	6 mo.	++	+	0	0	+	+	0	0
89	F	8 mo.	6 mo.	+	+	0	0	+	+	0	0
112	M	10 mo.	7 mo.	pn ++	+	0	0	pn ++	0	0	0
106	D	10-5/6	7-5/6	pn +	-	0	0	Autolysed			
114	F	11 mo.	8 mo.	+	+	0	0	+	+	0	0
115	F	11 mo.	8 mo.	+	+	0	0	+	+	0	0
90	F	13 mo.	10 mo.	++	+	0	0	++	+	0	0
103	F	13 mo.	10 mo.	++	+	0	0	++	+	0	0
116	D	14-1/2	11-1/2	+++	+	0	0				
99	F	15 mo.	12 mo.	++	+	0	0	++	+	0	0
100	F	15 mo.	12 mo.	++	+	0	0	++	+	0	0

+ 5% lesions healed

D = died
 F = killed for sampling
 pn = intercurrent pneumonia
 0 = no tuberculous lesions seen
 + = healing or healed tubercles
 ++ = scattered isolated spreading tubercles
 +++ = many spreading tubercles
 ++++ = confluent tuberculous

Where microscopic observations are not recorded, histologic preparations have not been completed, unless otherwise stated.

INJECTION CONTROLS TO GROUP IV

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EX:	D = died	+	= healing or healed tubercles
	K = killed for sampling	++	= scattered isolated spreading tubercles
	Pn = intercurrent pneumonia	+++	= many spreading tubercles
	O = no tuberculous lesions seen	++++	= confluent tuberculous

When microscopic observations are not recorded, histologic preparations have not been completed, unless otherwise stated.

Table 3

ANALYSES OF RAYLO

(as received)

<u>Chemical</u>		<u>Petrographic</u>
SiO ₂	45.80%	Most of the material consists of clay-like masses which give a definite x-ray pattern not unlike a hydrous calcium silicate. The quartz content is low (probably less than 1 per cent). About 5 per cent of calcite is present.
Fe ₂ O ₃	1.69	
Al ₂ O ₃	1.97	
TiO ₂	0.12	
MnO	0.09	Approximately 15-20 per cent of the material is chrysotile or serpentinite, which is largely fibrous. The fibers and bundles present are usually several millimeters long and seldom shorter than 0.3 millimeter.
CaO	24.84	
MgO	7.10	
Loss < 105° C.	4.52	
> 105° C.	<u>15.19</u>	
	99.42	

ANALYSES OF LONG-FIBER ASBESTOS

(as received)

<u>Chemical</u>		<u>Petrographic</u>
SiO ₂	36.40%	The material contains about 75 per cent of fibrous asbestos, probably chrysotile, with some serpentinite and small amounts of calcite, magnetite and chloritic or micaceous minerals. Only a trace of quartz was noted. There were strands of non-separated fibers 10 to 50 microns long and 5 to 15 microns wide.
Fe ₂ O ₃	5.32	
Al ₂ O ₃	0.78	
MnO	0.08	
CaO	0.31	
MgO	40.18	
Na ₂ O	0.06	
K ₂ O	0.05	
CO ₂	0.57	
H ₂ O	<u>14.00</u>	
	96.72	

DEFINITION CONTROLS TO GROUPS I AND II

No. of path	Duration	Gross					Microscopic				
		Lungs	Bronchial Nodes	Spleen	Liver	Hepatic Lymph Node	Lungs	Bronchial Nodes	Spleen	Liver	Hepatic Lymph Node
D	1-1/2 mo.	+	+	0	0	0	Tissue autolyzed				
K	2 mo.	+	+	0	0	0	+	+	+	+	+
K	2 mo.	+	+	0	0	0	+	+	+	+	0
K	4 mo.	+	+	0	0	+	+	0	0	0	0
K	4 mo.	+	+	+	0	+	+	++	+	+	+
K	6 mo.	+	+	0	0	0	+	+	0	0	0
K	6 mo.	+	+	0	0	0	+	0	0	0	0
D	6-1/2 mo.	+++	+	+	+	+	+++	++	+++	++	++
D	6-2/3 mo.	pn 7	+	0	0	+	Tissue autolyzed				
K	8 mo.	+	+	0	0	0	+	0	0	0	0
	8 mo.	+	+	0	0	0	+	0	0	0	0
D	9-1/2 mo.	+	+	0	0	0	Tissue autolyzed				
K	10 mo.	0	+	0	0	0	+	0	0	0	0
K	10 mo.	+	+	0	0	+	+	+	+	+	+
D	10-1/2 mo.	+	+	0	0	0	Tissue autolyzed				
K	12 mo.	+	+	0	0	0	+	0	0	0	+
K	12 mo.	+	+	0	0	0	+	0	-	0	0
K	14 mo.	+	+	0	0	+					
K	14 mo.	+	+	0	0	0					
K	15 mo.	+	+	0	0	0					
K	15 mo.	+	+	0	0	0					

D = died

K = killed for sampling
intercurrent pneumonia

0 = no tuberculous lesions seen

+ = healing or healed tubercles |

++ = scattered isolated spreading tubercles

+++ = many spreading tubercles

++++ = confluent tuberculosis

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POST - R₁ REACTIVATION

Mode				Gross						Microscopic									
Animal Number	of Death	Duration		Bronchial		Lymphatic		Hepatic		Bronchial		Lymphatic		Hepatic					
		Infection	Death	Lungs	Nodes	Spleen	Nodes	Lungs	Nodes	Spleen	Nodes	Lungs	Nodes	Spleen	Nodes				
														In dust 2 mo. after infection					
47	D	2-1/4 mo.	1/4 mo.	pn +	+	0	0	0		+	+	+	+	+					
34	D	3-1/3 mo.	1-2/3 mo.	+	+	0	0	0		Tissue autolysis									
{ 31	K	4 mo.	2 mo.	+	+	0	0	+		+	+	0	0	0					
{ 32	K	4 mo.	2 mo.	+	+	0	0	+		+	+	0	0	+					
{ 35	K	6 mo.	4 mo.	+	+	0	0	0		++	+	0		0					
{ 36	K	6 mo.	4 mo.	+	+	0	0	0		+	+	0	0	0					
{ 37	K	10 mo.	8 mo.	+	+	0	0	0		+	+	0	0	0					
{ 38	K	10 mo.	8 mo.	+	0	0	0	0		+	+	0	0						
39	K	14 mo.	12 mo.	+	+	0	0	0											
40	K	14 mo.	12 mo.	++	+	0	0	+											
41	K	14 mo.	12 mo.	++	+	0	0	0											
														In dust 4 mo. after infection					
{ 45	K	8 mo.	4 mo.	+	+	0	0	+		0	0	0	0	+					
{ 46	K	8 mo.	4 mo.	+	+	0	0	+		+	0	0	0	0					
{ 47	K	12 mo.	8 mo.	+	+	0	0	0		+	+	0	0	0					
{ 48	K	12 mo.	8 mo.	+	+	0	0	0		+	+	0	0	0					
														In dust 6 mo. after infection					
51	D	11 mo.	0	0	0	0	0	0		Tissue autolysis									
49	D	10 mo.	4 mo.	+	+	0	0	0		+	+	0	0	0					
{ 50	F	10 mo.	4 mo.	+	+	0	0	+		+	+	0	0	0					
{ 52	K	10 mo.	4 mo.	+	+	+	0	+		+	+	+	+	+					
53	K	14 mo.	8 mo.	+	+	0	0	0											
{ 54	K	14 mo.	8 mo.	+	+	0	0	0											

7 remain for subsequent study

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