

ADDENDUM TO REPORT DATED NOVEMBER 18, 1926,

STUDIES ON THE ABSORPTION OF LEAD FROM ETHYL GASOLINE

by

Robt. A. Kehoe, M. D., Frederick Thamann and Lester Sanders

Dated, March 7, 1928.

ADDENDUM TO REPORT DATED NOVEMBER 18, 1926,

STUDIES ON THE ABSORPTION OF LEAD FROM ETHYL GASOLINE
by
Robt. A. Kehoe, M. D., Frederick Thamann and Lester Sanders

Dated, March 7, 1928.

In November of 1926 report was made on animal experimentation with reference to the possible accumulation of lead as a result of various types of exposure to Ethyl Gasoline. At that time all of the Guinea Pigs and Rabbits which had been under observation had been destroyed and analyzed in order to determine their lead content. It appeared wise to continue the exposure of certain animals to the experimental conditions over very much longer periods of time. The monkeys were selected for the purpose for several reasons. They are likely to live longer than rabbits or guinea pigs, and furthermore their physiological similarity to man makes them the most desirable of all experimental animals for the purpose.

The treatment of the monkeys has continued in exactly the manner described in the previous report. Observations on temperature, weight, red blood corpuscles, leucocytes, haemoglobin, and microscopic blood changes were continued as before. The results of these observations are tabulated below.

Monkey No. 1, male Rhesus, was treated daily, (except Sundays and holidays) with 2 cc. of gasoline containing 0.4 cc. tetraethyl lead to 500 cc. gasoline, the hair on his back being kept closely clipped.

From time to time this animal was observed to behave peculiarly. Occasionally he cried out as though frightened or in pain, held his hand to his head frequently and often bit and pulled at his chain. In March, 1927, his skin was in bad condition and treatments were discontinued for a time.

At this time he was given a careful bathing, and the skin and hair were brushed thoroughly. Two weeks later the bath was repeated. Then the animal was put in a specially constructed cage and his faeces and urine were collected for analysis. On two successive periods of four full days each the excreta were saved. Analysis showed an average daily total lead excretion (urine and faeces) of 0.37 mgs. Treatments were resumed April 28, 1927. In May, 1927, some trouble developed in the hind legs, and after some weeks the animal refused to walk on his hind legs but swung along almost entirely on his fore legs. Or, if he tried to walk on his hind legs, he soon collapsed. The condition was not a paralysis, as all the reflexes were active. Some shortness of breath was apparent, and an anxious facial expression was pronounced. From June 1 to June 24 treatments were discontinued because of skin irritation. No treatment was carried out from August 6 to August 22 for the same reason. Likewise it was necessary to stop treatment from November 10 to December 27. Otherwise the treatments continued regularly until January 10, 1928, the animal having received 720 treatments, all together over a period of almost exactly three years.

The condition of the animal varied somewhat from time to time, but became progressively worse. It finally became apparent that something was wrong in the hip joints. This added to the apparent shortness of breath led to a fear that he might have tuberculosis, though there were no certain signs in the chest. Not wishing to allow contamination of the other monkeys, and feeling that it was only humane to terminate the apparent suffering of the animal, we administered an anaesthetic and extracted blood (for analysis) from the heart, by means of a syringe, until respiration ceased.

Necropsy showed almost entirely normal tissues with the single exception of the skeleton. Here the heads of all the long bones were involved

to a greater or lesser extent (especially the heads of the femur) with a new growth, almost exclusively of cartilage.

Sections showed it to be chondroma, thus the process was an exact duplicate of the multiple chondromatosis seen at times in the human subject. The peculiar behavior of the animal was undoubtedly due to the pain and intoxication associated with the growth of these tumors.

The tissues were carefully preserved (with the exception of small bits for microscopic study) for analysis. Because of a large volume of work being carried out on other materials, the analytical results on these tissues are not available now.

Monkey No. 2, Rhesus female, has been treated daily (except Sundays and holidays) in exactly the same manner as Monkey No. 1, and is being so treated at the present time. During the period of suckling of her first young one (now Monkey No. 6) from May 20, 1926 to December 14, 1926, no treatment was carried out. After that time, daily treatments were resumed, and continued uninterruptedly until July 19, 1927, when her second young one (now Monkey No. 10) was born. This youngster was strong and healthy, the largest to be born in the laboratory, and the mother continued in good condition. Treatment was immediately discontinued on the birth of the young one, to be resumed in February, 1928, when the suckling period was discontinued. (A reason for not attempting treatments of any kind, in addition to the possibility of ingestion of lead on the part of a suckling young one, is that the animals are difficult to handle when they are caring for their young.)

It is plain that this animal has not been injured in any way, by her treatment, although up to the present she has received 561 treatments over a period of three years. During this time she has not only appeared to be healthy

but has given birth to and suckled two strong healthy young.

Monkey No. 3. Common Macacus female, used as a control, was kept under observation. On April 5, 1927 she was washed and brushed as in the case of Monkey No. 1. This was repeated April 19, after which she too was put in a metabolism cage and her excreta were studied on two successive periods of four days each. Her average daily excretion of lead was found to be 2.07 mgs. There is some question about this result, but there has not been an opportunity to continue the study, because of other pressing work. It is of some importance, however, that this animal was the worst offender in the matter of breaking plaster from the wall of the room in which she was housed. (See previous report). This animal, together with two young monkeys, which have never been treated in any way, is being kept in a room completely separate from the monkeys under treatment, nor are there any other lead treated animals in this room. From time to time, however, Monkey No. 5, a common Macacus male, is admitted to her cage for a short time. She was thought to be sterile, but in April, 1927, she gave evidence of being pregnant. On June 26 a healthy young male was born, (our Monkey No. 9). The suckling period was uneventful, and the young one grew normally. At present, March 6, this animal is seen to be pregnant again.

Monkey No. 4. Common Macacus Female, was treated daily with 4 cc. Ethyl Gasoline in the same manner as No. 1 and No. 2, except for a period from February 13, 1926 to December 14, 1926, during which time she was pregnant, gave birth to a normal healthy male young one, and suckled him till he was capable of caring for himself. During this time, as in the case of other animals, no treatment was carried out. She had been treated 75 times prior to

KE 0018078

her pregnancy. On December 14, 1926 treatments began again, and continued regularly until May 12, at which time they were discontinued because of the birth of her second offspring, a healthy female. Both of these young monkeys have grown and thrived. The second is now Monkey No. 8. On January 12, 1928, treatments were resumed, the young one now having been isolated from his mother. They have continued uninterruptedly since, a total of 226 treatments, since November 1925. The animal is apparently healthy in every way.

Monkey No. 5. A Common Macacus Male, has been treated daily with 4 cc. of Ethyl Gasoline (0.4 cc. $\text{Pb}(\text{Et})_4$ to 500 cc. gasoline) since February 25, 1926, with the exception of short periods during which his skin was in bad condition. These periods were, from March 3, to April 18, 1926, and from June 1 to June 24, 1926. Such treatment is being continued at present. To date, March 6th, 1928, he has received 526 such applications of Ethyl Gasoline to his skin. At no time has he been ill in any way. He is the sire of all the baby monkeys born in the laboratory (five in all).

Monkey No. 6. Young male, born May 20, 1926, offspring of test Monkey No. 1, sired by Monkey No. 5. This animal was taken from his mother November 18, 1926, and observed until December 28, in order to make sure that he could get along alone. At this time, at the age of seven months, treatments were begun with 2 cc. of Ethyl Gasoline daily (0.4 cc. $\text{Pb}(\text{Et})_4$ to 500 cc. gasoline.) On March 3, 1927 his skin was irritated and treatments were discontinued until April 1, to allow healing to occur. Treatments were then resumed, and again discontinued for the same reason from May 16 to June 8. Similarly from June 25 to July 15, and from February 7, 1928 to February 14, 1928, no treatments were given. With the above exceptions regular daily ap-

RE 0018079

plications have been made over a period of fourteen months, 278 treatments in all. Notwithstanding these treatments, the young monkey has continued to gain weight, and to develop normally. He has not been ill at any time, except when a few days ago, he aspirated a little cod liver oil into his lung. As compared with Monkey No. 7, born at nearly the same time, but cared for without any treatment with Ethyl Gasoline, his growth and development have been quite normal in every respect.

Monkey No. 7. Young male, born April 3, 1926 from Monkey No. 4, sired by Monkey No. 5. Kept for observation without treatment of any kind, for comparison with Monkey No. 6.

Monkey No. 8. Young female, born May 12, 1927, from Monkey No. 4, sired by Monkey No. 5. Kept for observation without treatment. Ill on February 8, 9 and 10, after being given cod liver oil. Aspirated into lungs. Recovered and is now perfectly well.

Monkey No. 9. Young male, born June 26, 1927, from Monkey No. 3, sired by Monkey No. 5. Kept for observation without treatment. Was being given cod liver oil, in 1 cc. doses, beginning January 28, as were the other baby monkeys. The monkeys dislike cod liver oil very much, and resist taking it. Early in February this animal became ill apparently with respiratory distress, from which he died February 7. At the same time two other baby monkeys were somewhat ill with the same symptoms. Necropsy showed large areas of aspirated cod liver oil in both lungs, without obvious evidence of exudative activity. Bits were saved for section and microscopic study, but have not been examined as yet. There was no other evidence of pathological change

KE 0018080

in the animal's tissues. Since there was no evidence of rickets, it was thought advisable to make no further attempt to feed cod liver oil to the young monkeys.

The entire animal (except for small pieces for microscopic study) was saved for analysis of his tissues. This has not been done as yet.

Monkey No. 10. Young female, born July 19, 1926, the second young one from Monkey No. 3, sired by Monkey No. 5. Strong, healthy, growing rapidly. Kept for observation without treatment. Now separated from mother (Feb. 20) and kept in room with Monkey No. 3 and Monkey No. 7.

KE 0018081

TABLE VI (Continued)

Chart of Experimental Observations
MONKEY NO. 1

D a t e	Weight Lbs.	Temp.F.	Thousand Erythrocytes	Leucocytes	Reading Hb. (Dare)	Stippling per 50 fields
Nov. 19, 1926	6-3/4	102.1	6,590	9,350	57	0
Dec. 3	6-1/2	102.2	5,760	16,150	50	2
16	6-1/2	102.4	5,270	9,200	50	0
31	6-1/2	102.4	4,790	6,100	50	14
Jan. 31, 1927	6-7/16	102.0	4,670	9,350	55	3
Feb. 11	6-10/16	102.1	5,480	8,350	55	0
28	6-9/16	102.2	5,430	9,150	55	0
Mar. 11)Not being	6-13/16	101.3	5,300	11,850	55	0
25)treated at	7	101.4	5,500	5,000	55	0
Apr. 8)this time.	7-1/4	105.0	5,680	9,500	55	0
May 6	7-1/8	101.0	4,480	10,100	55	0
19	6-13/16	102.4	5,780	8,450	60	0
)Not						
June 8)being	7-7/16	101.7	5,270	9,400	55	0
)treated						
24	7-6/16	100.8	4,970	8,950	58	1
July 9	7-1/2	100.8	4,900	9,600	55	1
22	7-6/16	102.2	6,180	13,550	55	0
Aug. 5	7-7/16	102.8	6,070	12,250	-	0
Not being						
treated						
Aug. 22	7-11/16	102.1	5,820	14,550	60	0
Sept. 6	7-14/16	102.1	4,840	13,050	-	0
20	8-1/16	101.6	5,240	14,850	-	0
Oct. 4	8	102.0	5,500	11,250	58	0
18	8-6/16	101.7	4,840	10,700	55	0
Nov. 1	8-10/16	102.1	4,480	10,400	-	0
15	8-14/16	101.6	3,960	11,150	58	0
)Not						
27)being	9	101.3	5,300	13,800	57	0
)treated						
Dec. 13	9-1/4	101.6	4,310	17,900	55	0
27	9-9/16	102.3	3,590	15,750	55	0
Jan. 10, 1928	9-1/4	101.7	4,250	9,750	-	0

Jan. 10, 1928 - Animal killed.

KE 0018082

TABLE VII
Chart of Experimental Observations
MONKEY NO. 2

<u>D A T E</u>	<u>Weight Lbs.</u>	<u>Temp.F.</u>	<u>Thousand Erythrocytes</u>	<u>Leucocytes</u>	<u>Reading Hb. (Dare)</u>	<u>Stippling per 50 fields</u>
May 20, 1926 to Dec. 14, 1926	No	Treatment				
Dec. 14, 1926	10-5/16	102	6,540	18,500	85	0
31	10-1/2	102	5,480	13,650	85	0
Jan. 31, 1927	10-9/16	101.1	5,520	10,900	85	0
Feb. 11	10-1/2	101.4	5,550	12,100	75	0
28	10-3/16	100.8	5,180	17,450	65	0
Mar. 11	10-3/16	100.8	5,400	12,150	70	0
25	10-11/16	101.0	5,870	20,450	75	0
Apr. 8	10-3/4	101	5,710	19,200	70	0
22	11-11/16	100.6	6,190	16,050	70	0
May 6	12-1/4	101.0	5,060	15,500	65	0
19	12-10/16	101.0	5,760	11,650	75	0
19	Animal seen to be pregnant					
June 8	13-10/16	100.7	5,470	10,150	70	1
24	14-11/16	100.4	4,860	15,050	60	2
Blood counts and all other handling discontinued except that treatments were continued up to July 19, 1927.						
July 19	Young one born - not weighed because of mother's excitability. Strong young Female, larger than any previous young at birth. Uneventful period of suckling.					
Feb. 21	11-3/4	102.8	5,450	12,100	60	0
Mar. 6	11	102.0	5,160	11,150	70	0
Experiment being continued.						

KE 0018083

TABLE VIII (Continued)
 Chart of Experimental Observations
MONKEY NO. 3 (Control)

<u>D A T E</u>	<u>Weight Lbs.</u>	<u>Temp.F.</u>	<u>Thousand Erythrocytes</u>	<u>Leucocytes</u>	<u>Reading Hb. (Dare)</u>	<u>Stippling per 50 fields</u>
Dec. 1, 1926	7-1/8	101.0	7,250	18,800	65	0
16	7-1/4	100.2	6,060	16,050	75	0
31	7-6/16	101.4	5,390	15,500	75	15
Jan. 31, 1927	7-11/16	101.0	5,500	18,400	75	0
Feb. 11	8-2/16	101.4	5,610	17,950	80	8
28	8-5/16	101.1	5,450	17,500	75	1
Mar. 11	8-5/16	100.9	6,660	17,800	80	2
25	8-1/2	98.0	5,930	16,500	65	0
Apr. 8	8-15/16	101.0	6,080	13,500	70	1
May 6	8-10/16	99.6	5,010	7,550	70	13
19	9-5/16	100.1	5,580	14,350	70	1
June 8	9-3/4	100.5	6,760	15,550	65	2
26	Young one born. Suckling period.					
Jan. 24,	9-1/2	101.0	4,780	17,550	75	0
Feb. 8	9-5/16	101.5	5,810	22,600	75	0
21	9-3/4	101.6	5,680	17,550	78	0
Mar. 6	Animal now pregnant					
6	9-10/16	102.8	6,040	20,700	70	0

KE 0018084

TABLE IX (Continued)

Chart of Experimental Observations
MONKEY NO. 4 (4 cc. Ethyl Gasoline Daily)

D A T E	Weight Lbs.	Temp.F.	Thousand Erythrocytes	Leucocytes	Reading Hb (Dare)	Stippling per 50 fields
Dec. 14, 1926	8-1/6	101.0	6,120	23,100	80	1
31	8-1/16	101.4	4,780	15,300	75	15
Jan. 31, 1927	8-1/2	101.0	5,070	10,300	75	3
Feb. 11	8-3/4	101	6,060	13,600	75	1
Blood counts and handling discontinued. Animal Pregnant. Treatments continued.						
May 12	Young one born. Treatments discontinued.					
Jan. 12, 1928	Treatment resumed.					
12	9-1/8	101.5	5,620	23,300	-	0
24	8-7/8	100.2	6,010	18,300	78	0
Feb. 8	8-3/4	100.6	5,680	14,050	75	0
21	9	101.5	5,800	17,150	75	1
Mar. 6	9	101.0	6,400	16,400	75	0
Treatments being continued.						

KE 0018085

TABLE X (Continued)

Chart of Experimental Observations
MONKEY NO. 5 (4 cc. Ethyl Gasoline Daily)

D A T E	Weight Lbs.	Temp.F.	Thousand Erythrocytes	Leucocytes	Reading Hb (Dare)	Stippling per 50 fields
Dec. 4, 1926	8-15/16	102	6,460	22,450	80	0
16	8-11/16	101.8	6,130	14,600	80	0
31	8-7/16	102.4	5,150	19,850	80	6
Feb. 1, 1927	8-13/16	101.0	5,690	18,550	75	1
12	8-3/4	102.2	5,520	15,800	75	5
28	9-1/4	101.8	5,110	16,350	75	8
Mar. 11	9-1/4	100.3	5,840	25,500	80	6
25) No treatm't	9-1/16	101.2	5,490	23,500	70	4
Apr. 8	8-15/16	99.0	5,470	18,000	70	10
22	9-1/2	101.4	6,410	21,600	75	2
May 6	9-1/8	101.6	5,330	14,250	80	0
May 19	10-7/16	101.3	5,480	16,850	70	2
June 8) No trtmt	10-9/16	101.0	5,860	19,300	80	2
24	11-1/2	100.6	5,000	17,500	75	26
July 8	11-1/2	101.2	5,760	18,550	80	0
22	11-3/16	101.0	6,310	19,900	75	0
Aug. 5	11-5/16	102.4	6,150	17,400	-	2
22	11-14/16	102.2	5,510	19,750	90	2
Sept. 6	11-13/16	101.8	5,460	19,250	-	0
20	11-11/16	102.3	5,800	27,900	80	8
Oct. 4	12	101.6	6,000	32,050	80	16
18	12-2/16	102.4	5,650	23,950	80	0
Nov. 1	11-5/16	102.1	5,770	26,600	75	2
15	11-13/16	100.3	5,070	17,500	78	1
29	11-1/2	101.2	4,310	30,600	78	6
Dec. 13	11-10/16	101	6,380	20,900	85	2
27	11-11/16	102.1	5,120	18,450	65	1
Jan. 10, 1928	11-11/16	102.0	5,320	13,450	-	0
24	11-3/4	101.2	6,770	22,300	85	0
Feb. 8	11-7/16	101.2	5,980	22,500	80	0
22	11-14/16	103	6,080	22,400	80	1
Mar. 6	11-10/16	101.6	6,020	23,750	80	0

Treatments being continued.

RE 0018086

TABLE XI
Chart of Experimental Observations
MONKEY NO. 6

D A T E	Weight Lbs.	Temp.F.	Thousand Erythrocytes	Leucocytes	Reading Hb (Dare)	Stippling per 50 Fields
Nov. 24, 1926	2-1/2					
Dec. 1	2-9/16	99.6	7,860	17,450	75	0
9	2-3/4	101.1	6,280	18,700	80	0
16	2-13/16	102.0	6,240	20,550	70	0
28	Treatment with 2 cc. Ethyl Gasoline daily begun.					
31	3	102.0	6,550*	14,950	70	0
Jan. 7, 1927	2-13/16	102.0	7,150*	20,500	80	0
29	2-3/4	101.0	5,780*	15,600	75	0
Feb. 5	2-7/8	101.8	5,870	14,150	75	0
12	2-7/8	101.2	6,550	14,250	75	0
18	3	101.0	5,910	13,150	75	0
28	2-14/16	102.0	6,110	16,350	75	0
Mar. 3	Treatment discontinued - Irritated skin.					
7	2-15/16	101.8	5,990	16,250	75	0
11	2-13/16	101.6	6,440	11,550	80	0
18	2-14/16	101.8	6,120	14,800	70	1
25	2-14/16	101.8	6,320	14,050	68	0
Apr. 1	Treatment resumed					
1	2-15/16	101.0	6,340	18,050	75	1
8	2-15/16	101.0	5,800	17,100	70	2
16	3	101.6	5,720	17,600	78	0
22	3	101.7	5,800	14,650	70	1
30	3	101.6	5,790	19,150	70	2
May 6	3	101.7	5,710	15,150	70	0
14	3	102.4	6,180	17,900	70	0
May 16	Treatment discontinued - Sore skin					
20	3-3/16	101.0	5,700	19,200	75	0
June 8	Treatment resumed					
8	3-6/16	101.3	6,250	19,300	70	1
17	3-7/16	101.6	5,940	17,900	70	0
24	3-5/16	101.3	6,530	22,350	70	0
25	Treatment discontinued - Sore skin					
July 1	3-3/16	101.8	6,120	14,500	75	0
8	3-1/2	101.2	6,020	14,150	70	0
15	Treatment resumed					
15	3-9/16	102.0	5,640	16,450	80	4
22	3-7/16	100.8	6,160	16,350	75	3
30	3-1/4	102.4	5,370	19,500	75	2
Aug. 5	3-1/4	101.8	5,580	20,200	-	0
12	3-11/16	101.6	5,670	17,000	-	1

* Changed counting pipettes.

RE 0018087

MONKEY NO. 6 (Cont'd)

<u>D a t e</u>	<u>Weight Lbs.</u>	<u>Temp.F.</u>	<u>Erythrocytes</u>	<u>Leucocytes</u>	<u>Hb.(Dare)</u>	<u>Stippling</u>
Aug. 22, 1927	3-14/16	102.2	5,010	17,550	90	0
Sept. 6	3-1/2	102.0	5,460	14,200	-	0
14	3-7/16	101.0	5,930	15,100	-	0
20	3-7/16	101.0	6,490	16,500	65	2
27	3-1/2	101.0	6,090	18,600	75	0
Oct. 5	3-1/2	101.4	5,580	12,000	75	1
11	3-11/16	101.4	5,470	16,550	70	2
18	3-9/16	101.6	5,780	19,150	65	0
25	3-3/4	102.0	5,810	19,700	70	0
Nov. 1	3-3/16	101.9	5,020	10,150	70	0
8	3-1/2	101.8	5,000	20,950	75	0
15	3-9/16	101.6	5,440	17,650	70	0
23	3-6/16	101.6	5,620	17,250	78	0
29	3-9/16	101.2	4,500	18,550	78	0
Dec. 7	3-9/16	102.0	5,430	13,440	82	0
13	3-1/2	101.6	5,870	12,400	70	0
20	3-10/16	102.5	4,310	15,000	75	0
27	3-7/16	101.5	5,500	13,500	65	0
Jan. 3, 1928	3-1/2	102.6	5,460	17,650	75	0
10	3-1/2	101.8	5,370	15,850	-	0
17	3-1/2	101.5	6,180	17,300	70	0
24	3-9/16	102.0	5,940	15,150	78	0
31	3-7/16	102.4	5,040	16,150	80	0
Feb. 8	3-3/4	101.8	5,980	21,550	68	0
14	3-1/2	102.1	5,290	21,750	75	1
21	3-6/16	102.5	5,790	21,900	78	0
Mar. 1	3-1/2	102	5,670	21,050	67	0
6	3-7/16	102.0	6,480	18,300	78	0

Experiment being continued.

KE 0018088

TABLE XII

Chart of Experimental Observations
 MONKEY NO. 7
 (Control) NO TREATMENT

D A T E	Weight Lbs.	Temp.F.	Thousand Erythrocytes	Leucocytes	Hb Dare	Stippling per 50 fields
Nov. 24, 1926	2-3/16					
Dec. 1	2-5/16	101	7,890	24,200	85	28
9	2-1/2	100.7	7,600	22,200	85	52
16	2-1/2	100.2	7,430	16,650	80	12
31	2-1/2	101.2	6,170	20,750	80	11
Jan. 8, 1927	2-9/16	101.2	7,040	13,250	80	14
29	2-1/2	101.0	6,630	14,800	80	22
Feb. 5	2-1/2	101.4	6,400	13,550	80	14
12	2-11/16	100.6	6,890	17,350	75	17
18	2-11/16	101.3	6,100	15,600	75	3
28	2-11/16	101.3	5,900	22,200	75	1
Mar. 7	2-3/4	101.8	7,200	18,650	78	1
11	2-13/16	101.2	6,500	19,950	75	53
18	2-13/16	101.0	7,480	18,750	78	12
25	2-3/4	101.5	7,310	19,600	70	2
Apr. 1	2-14/16	101.3	7,060	17,100	80	5
8	2-14/16	101.5	6,760	23,300	80	4
16	2-15/16	101.3	6,410	16,600	70	31
22	3	101.4	6,520	17,650	75	0
30	3	101.0	6,820	20,300	75	6
May 6	3-1/16	101.9	6,360	19,300	80	3
14	3-2/16	102.3	7,180	17,750	70	9
21	3-2/16	101.8	7,370	19,350	80	7
June 8	3-6/16	101.3	6,340	28,500	70	31
17	3-5/16	101.3	6,840	27,700	75	21
24	3-11/16	100.3	7,030	28,500	80	17
July 1	3-5/16	102.2	6,100	22,000	73	7
8	3-5/16	101.4	7,260	20,950	70	25
15	3-5/16	102.2	6,680	23,400	70	0
22	3-10/16	102.2	6,950	29,900	70	6
29	3-5/16	102.5	6,850	28,900	65	0
Aug. 5	3-6/16	101.6	5,560	20,000	-	6
12	3-6/16	101.8	6,330	14,250	-	0
22	3-7/16	102.6	5,980	23,100	85	2
Sept. 6	3-10/16	102.3	6,330	16,300	-	1
13	3-14/16	101.8	5,960	15,550	-	20
20	3-14/16	101.0	6,000	20,500	80	26
27	3-14/16	101.6	6,890	21,500	75	2
Oct. 4	3-13/16	101.4	6,390	20,650	80	21
11	3-14/16	101.0	6,070	19,050	80	3
18	3-15/16	101.6	6,350	24,800	75	1

KE 0018089

MONKEY NO. 7 (Control) (Cont'd)

<u>D A T E</u>	<u>Weight Lbs.</u>	<u>Temp.F.</u>	<u>Erythrocytes</u>	<u>Leucocytes</u>	<u>Hb.(Dare)</u>	<u>Stippling</u>
Oct. 25, 1927	3-15/16	102.3	5,980	17,050	75	0
Nov. 1	4	101.4	6,310	15,000	75	0
8	3-13/16	102.4	6,470	17,750	80	0
15	4-2/16	100.8	6,780	21,450	70	0
23	3-14/16	100.6	6,920	16,600	75	0
29	4-1/2	102.0	5,230	17,550	70	5
Dec. 7	4	102.0	5,800	17,300	75	6
13	4	101.9	5,830	22,750	75	0
20	4	102.6	5,560	12,950	75	0
27	3-13/16	102.0	6,560	23,000	70	0
Jan. 3, 1928	3-14/16	101.2	6,040	23,850	80	0
10	4	102.2	6,080	17,700	-	0
17	4	100.5	5,860	15,550	65	0
24	3-15/16	101.2	6,810	16,150	80	0
31	3-15/16	101.4	6,370	21,250	75	3
Feb. 8	4	101.5	6,290	22,400	73	3
14	4	102.5	5,710	17,250	70	5
21	3-15/16	102.0	6,550	30,250	80	0
Mar. 1	4-3/16	102.8	6,230	25,100	80	2
6	4-6/16	102.6	5,820	24,200	78	2

KE 0018090

TABLE XIII

Chart of Experimental Observations
WEIGHTS OF MONKEYS 8, 9 AND 10

MONKEY NO. 8

	<u>Weight</u>
(Birth) May 12, 1927	12/16
26	13/16
Jun 14	1 lb.
27	1-2/16
Jul 12	1-5/16
27	1-7/16
Aug 24	1-11/16
Sep 14	1-3/4
Oct 3	2-1/16
Nov 2	2-1/4
Dec 3	2-7/16
Jan 12, 1928	2-6/16
Feb. 8	2
Feb 22	2-3/16

MONKEY NO. 9

(Birth) Jun 26, 1927	10/16
Jul 1	11/16
12	3/4
27	14/16
Aug 24	1-3/16
Sep 14	1-6/16
Oct 3	1-11/16
Nov 2	1-12/16
Dec 3	1-13/16
Jan 12	2 lbs.

Died Feb. 7

MONKEY NO. 10

(Birth) Jul 19, 1927	14/16
27*	1-1/16
Feb 20, 1928	2-1/2

*Monkey could not be taken from mother for weighing without danger of injury. Attempts therefore abandoned until weaned.

CONCLUSIONS

The further data supplied in this extension to the original report of animal experimentation does not necessitate any modifications of the conclusions found in that report. In fact, the present data only supports those conclusions to a still greater degree. There is only one indication of lead accumulation in the monkeys under observation, and that is the small amount of stippling which is found from time to time in certain of the animals. It has been pointed out previously that the stippling in the animals under treatment never exceeds that which is found in control animals, and, therefore, may not be regarded as having been caused by the treatments with Ethyl Gasoline.

Furthermore, it has been pointed out previously that there was at one time a source of lead exposure other than that due to the treatment, a source which influenced alike both control and test animals. There is no evidence in this data, therefore, that monkeys under conditions of treatment are absorbing and accumulating appreciable quantities of lead in their carcasses as result of their treatment. Furthermore, there is not the slightest evidence of any injury to any of these animals after this prolonged exposure. This is particularly significant in the case of the one animal whose treatment began when he was quite young.

One cannot but conclude on the basis of these experiments that the dangers of absorption of tetraethyl lead from gasoline in the commercial concentrations are exceedingly slight, if indeed any dangers actually exist.

- - - - -