is the increased resorption *and* deposition in acromegaly with high P metabolism. Other less essential glands as the thymus apparently act mainly as supplies and stores of nuclein.

The importance of phosphoric acid for oxidation processes as fermentation is readily correlated on this basis with disturbances of carbohydrate oxidation (diabetes, decreased oxidation with hypofunction and increased with hyperfunction of pituitary and thyroid, and other well known examples). As indicated above, as well as by tartrate production of nephritis, excretion by kidneys and intestine as well as maintenance of blood neutrality are much more than simple mass action and filtration processes.

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The effect of lead on the germ cells of the male rabbit and fowl as indicated by their progeny.[1]

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The experiments of Stockard[2] on guinea pigs and of Cole and Davis[3] on rabbits have shown conclusively that alcohol has a deleterious effect on the germ cells of the male. In the experiments here reported lead, in the form of lead acetate, was substituted for the alcohol, lead being chosen because of its reputed effect upon the offspring of workers, whether male or female, in trades where they are exposed to lead in its various forms. The method of double mating described by Cole and Davis was employed. This consists in breeding a female of a certain type to two males at the same period. The males are of such gametic constitution that the young of each may be identified by color or other characteristics. The experimental animals used were

[1] Papers from the Department of Experimental Breeding of the Wisconsin Agricultural Experiment Station, No. 3.

[2] See especially "The effect on the offspring of intoxicating the male parent and the transmission of the defects to subsequent generations," *Amer. Nat.*, Vol. 47, No. 563, pp. 641–682, 1913.

[3] "The effect of alcohol on the male germ cells, studied by means of double matings," *Science* (N. S.), Vol. 39, No. 1004, pp. 476–477, 1914.

TABLE I.

RESULTS OF BREEDING NORMAL AND POISONED MALES TO NORMAL FEMALES.

(Numbers relating to offspring of poisoned males are in heavy type.)

Series.	Normal Male.	Poisoned Male.	Successful Double Matings.	Unsuccessful Double Matings.	Albino Offspring.			Pigmented Offspring.			Average Wt. at Birth.	
					Total.	No. Dead in 4 Days.	Per Cent. Dead in 4 Days.	Total.	No. Dead in 4 Days.	Per Cent. Dead in 4 Days.	Albino.	Pigmented.
I.....	D.M. 20.2	Alb. 26.8	9	13	**84**	**40**	**47.7**	90	17	18.9	**49.8**	54.7
II.....	Alb. 21.4	D.M. 20.2	5	15	27	8	29.2	**147**	**51**	**34.2**	59.0	**49.1**

rabbits and fowls. The lead acetate was mixed with sugar of milk and fed in gelatin capsules.

A. RABBITS.

Two series of experiments were run. In the first (I) a normal homozygous Dutch-marked male (♂ 20.2) and a poisoned albino male (♂ 26.8) were both bred to a number of albino females. In the other series (II) an albino male (♂ 21.4) was used as the normal or control animal, while the previous control male (Dutch ♂ 20.2) was subjected to the lead treatment. The results from the two series are shown in Table I.

A comparison of the two series shows: (1) The mortality of the albino young within four days after birth dropped from 47.7 per cent. when the albino male (♂ 26.8) was poisoned to 29.2 per cent. in those young which came from the normal albino male (♂ 21.4). (2) The mortality of the pigmented young in the same period rose from 18.9 per cent. in Series I, when the pigmented male (♂ 20.2) was normal, to 34.2 per cent. in Series II, after he had received the lead treatment. (3) Coincident with the lower death-rate in the albinos in Series II over those in Series I, it will be noticed that there is a distinct rise in the average weight of the young at birth—from an average weight of 49.8 grams when the father was poisoned to 59.0 grams when the father was normal. (4) The average weight of the young of the pigmented male before he was given the lead was 54.7 grams; after the treatment the average weight of the young produced dropped to 49.1 grams. In this connection it should be mentioned that both albino males were considerably larger than the Dutch (♂ 20.2), the former varying around about 2,900 grams, while the latter averaged only about 2,100 grams. In spite of this his offspring averaged larger than those of the poisoned albino male.

From the foregoing it seems legitimate to conclude that the offspring produced by male rabbits which have been poisoned by the ingestion of lead acetate into the alimentary tract have a lower vitality and are distinctly smaller in average size than normal offspring of unpoisoned males.

B. FOWLS.

An experiment similar to that with the rabbits has been conducted with fowls. Twelve White Leghorn hens were divided into 3 lots of 4 hens each. Those in the first lot were bred only to a White Leghorn cock which was being fed each day a certain quantity of lead acetate; those in the second lot were bred to a normal Houdan cock alone; while the hens in the third lot were bred on alternate days to the Leghorn and to the Houdan. It will be noted that color, comb and toe characters could all be utilized in distinguishing the chicks of the respective cocks. The results obtained with these three lots are tabulated respectively in Tables II, III, and IV. Hen 122 of the second lot and hen 259 of the third lot are omitted from the tables since the former laid no eggs and the latter laid only 3, all of which were infertile.

Inspection of Table II shows that of the 174 eggs obtained from hens mated to the poisoned Leghorn cock 27 per cent. were infertile, 27.5 per cent. of the embryos in the 127 fertile eggs died before hatching, and of the 92 chicks hatched 13, or 14.1 per cent., died before reaching the age of three weeks. Comparing these results with those from the normal Houdan cock (Table III) we find the percentage of infertile eggs in the latter case is much higher, being 42.3 per cent. as against 27.5. On the other hand the percentage of dead embryos (17.2 per cent.) is not much more than half as great and the percentage of chicks dying within three weeks (3.7 per cent.) is only about one fourth as high as in the case of the poisoned male.

The data from mating both cocks alternately to the hens in the third lot (Table IV) corroborate the results shown in Tables II and III. In all 109 eggs were laid, of which 42.1 per cent. were infertile. In 17 of the fertile eggs the embryos died before hatching. Only 10 of these could be identified, there being 9 Leghorns, from the poisoned cock, and 1 crossbred, of non-poisoned Houdan paternity. Of 46 chicks hatched 31 (67.4 per cent.) were Leghorns, but of these 5 (16.1 per cent.) died within three weeks while all of the crossbreds survived that period. These results are interpreted as indicating that in fowls also poisoning of the male parent with lead results in offspring of a distinctly lower average vitality.

TABLE II.

RESULTS FROM FOUR WHITE LEGHORN HENS BRED TO POISONED LEGHORN COCK.

Hen No.	Total Eggs.	Infertile Eggs.	Per Cent. Eggs Infertile.	Dead Embryos.	Per Cent. Fertile Eggs Dead.	No. Chicks Hatched.	No. Chicks Dead in 3 Wks.	Per Cent. Chicks Dead in 3 Wks.
65	60	8	13.3	16	30.7	36	5	13.9
66	36	18	50.0	8	44.4	10	2	20.0
A23	49	3	6.1	6	13.0	40	5	12.5
162	29	18	62.0	5	45.4	6	1	16.6
Totals.....	174	47	27.0	35	27.5	92	13	14.1

TABLE III.

RESULTS FROM THREE WHITE LEGHORN HENS BRED TO NORMAL HOUDAN COCK.

Hen No.	Total Eggs.	Infertile Eggs.	Per Cent. Eggs Infertile.	Dead Embryos.	Per Cent. Fertile Eggs Dead.	No. Chicks Hatched.	No. Chicks Dead in 3 Wks.	Per Cent. Chicks Dead in 3 Wks.
61	44	14	31.8	6	20.0	24	1	4.1
493	33	13	39.3	3	15.0	17	1	5.8
A272	34	20	58.8	2	14.2	12	0	0.0
Totals.....	111	47	42.3	11	17.2	53	2	3.7

TABLE IV.

RESULTS FROM THREE WHITE LEGHORN HENS BRED ALTERNATELY TO POISONED LEGHORN COCK AND TO NORMAL HOUDAN COCK.

(Numbers relating to offspring from poisoned cock in heavy faced type.)

Hen No.	Total Eggs.	Infertile Eggs.	Per Cent. Eggs Infertile.	Dead Embryos.	Identified.		Chicks Hatched.			Leghorns Dead in 3 Wks.	Per Cent. Leghorns Dead in 3 Wks.	Cross-breds Dead in 3 Wks.	Per Cent. Cross-breds Dead in 3 Wks.
					Leghorn.	Cross-bred.	Leghorn.	Cross-bred.	Per Cent. Leghorns.				
A286	47	18	38.3	6	**3**	0	**17**	6	**73.9**	**2**	**11.7**	0	0.0
483	36	12	33.3	7	**4**	1	**13**	4	**76.4**	**3**	**23.0**	0	0.0
157	26	16	61.5	4	**2**	0	**1**	5	**16.6**	**0**	**0.0**	0	0.0
Totals...	109	46	42.1	17	**9**	1	**31**	15	**67.4**	**5**	**16.1**	0	0.0