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A preliminary survey of the effects of ultra violet light on normal rabbits.

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With no prejudice regarding the results to be obtained we have exposed five series of normal rabbits to the quartz mercury arc lamp daily for periods of three to seven weeks and observed at autopsy the weights of certain endocrine glands in relation to the body weights of the animals. It was expected that this survey might orient us for further studies in the biophysics of ultra violet light. The survey was made possible by the cordial cooperation of Doctors Brown, Pearce, and Van Allen, who placed at our disposal unpublished figures from similar examinations on a large number of normal rabbits covering a period of two years. Many controls are required because of individual and especially seasonal variations in the gland/body weight ratio.

Light colored or albino male rabbits, with ears shaved and backs clipped, in groups of eight (two controls), were exposed to the unfiltered radiations of a quartz mercury arc lamp for 30 minutes daily at a distance of one meter. This arbitrary dosage was probably too large at first and relatively ineffective during the final periods, when pigmentation had occurred. It caused a marked erythema with some desquamation, followed by moderate pigmentation. At the expiration of the chosen periods the rabbits were etherized and bled from the aorta. The following glands were weighed and examined in gross and microscopically: pineal, hypophysis, external parathyroids, thyroid, thymus, adrenals, and testicles. The weights of these glands were recorded in milligrams per kilogram net body weight after removal of the gastro-intestinal tract and its contained food and feces, and the expression of bladder urine.

The changes in weight, per cent, compared with the figures for 15 to 36 normal control rabbits examined at the same season of the year are shown in the accompanying table.

EFFECT OF DAILY EXPOSURE OF NORMAL RABBITS TO ULTRA VIOLET LIGHT ON THE WEIGHTS OF ENDOCRINE TISSUES.

Percentage change from normal. Weights in mg. per kilo of rabbit's net wtg.

Glands	3 weeks	4 weeks	5 weeks	6 weeks	7 weeks
Pineal	+14.0	- 1.4	+13.8	- 2.4	+ 7.0
Hypophysis	+25.0	+20.0	+23.0	+ 5.0	+ 6.0
Parathyroids	+34.6	+51.1	+31.9	+27.7	+14.1
Thyroid	-17.3	-19.5	- 2.4	+13.0	+12.0
Thymus	+13.0	+ 5.4	+ 9.3	-13.3	+14.7
Adrenals	- 3.0	+ 3.0	+17.0	+32.0	+13.5
Testicles	+ 7.0	- 6.5	+22.0	+11.0	+18.0

The findings for the thymus and the testicles may have no significance. The changes are not progressive, and individual variations are so wide in normal rabbits, due to age and other factors, as to include the limit figures of our experiment. The weight of the pineal gland also fluctuated above and below normal during the experimental period. At this season of the year—November to January—the hypophysis normally is decreasing in size. The rayed rabbits also showed a progressive decrease in the size of the hypophysis, but this decrease was delayed in the earlier weeks of the experiment so that the glands were 25 per cent heavier than in the controls. The thyroid and the adrenal glands showed parallel changes, namely, a relative loss in weight during the earlier weeks of exposure, followed by a rise above normal. We shall not discuss the possible significance of these changes at the present time.

Because of the relationship of the parathyroid glands to calcium metabolism on the one hand, and on the other hand the effect of ultra violet light on the absorption and excretion of calcium and the calcium level of the blood, interest centers on the effect of ultra violet light on the parathyroids. The changes in weight of these glands, relative to normal, are shown in the table and indicate a considerable hypertrophy of the parathyroids, especially during the earlier periods of the experiment. We are inclined to attribute the later decrease towards normal to the protection afforded the rabbits by pigmentation. The increases in weight were due to a true hyperplasia of the parenchymatous tissue, as shown by microscopic examination. When the figures for the third and fourth weeks were obtained, blood calcium determinations were made on the subsequent groups. While we have no normal figures for these particular rabbits, the average

blood calcium concentrations for the last three groups at autopsy were 12.7; 12.9, and 12.6 mg. per 100 ml. of serum as compared with an average of 11.9 mg. for 60 normal control rabbits. Rothman and Callenberg¹ have reported rises above normal in the blood calcium level following light baths.

These observations have been substantiated by the results of a second experiment in which a group of rabbits was given increasing exposures of ultra violet light daily over a period of four weeks. This group showed a relative increase of 32 per cent in the parathyroid weight over the normal figures and the blood calcium concentration rose from 11.9 mg. per 100 ml. of serum before exposure to 12.2 mg. on the twelfth day, 13.5 mg. on the twenty-second day, and 12.9 mg. at autopsy.

These preliminary experiments have served to relate the effect of ultra violet light on calcium metabolism to the parathyroid glands. Whether the light acts primarily on the absorption and excretion of calcium and causes a rise in the blood calcium which results in an hypertrophy of the parathyroid glands, or primarily affects the glands themselves, remains to be determined.

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Feeding experiments on rats with plants at different stages of development. Part II.¹

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This investigation was undertaken in order to ascertain the effect of supplementing a basal diet with dried samples of ungerminated, germinated and green corn. The object of the experiments was to see whether any growth-promoting substances were produced in the course of germination and "greening".

Experiments with ten groups of rats on diets: (1) regular (normal); (2) S + "A" + "B"; (3) S + "B"; (4) S + "A"; (5) S + "A" + ungerminated corn; (6) S + "B" + ungermi-

¹ Rothman and Callenberg, *Klin. Wchnschr*, 1923, ii, 1751.

¹ Harrow, B., and Krasnow, F., *J. Metabol. Research.*, 1922, ii, 401,