several cases, not included in this series, the tissue extract from the uninfected lobes has been concentrated to equal an undiluted tissue extract and "S" substance was not demonstrable.

7692 C

Hemoglobin Studies. I. In Rachitic Chickens: Effect of Ultraviolet Irradiations.*

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A study of the effect of ultraviolet irradiation on the amount of hemoglobin of the blood was made on 3 pens of White Leghorn chickens (10 chickens each pen) grown in complete absence of sunshine. The room, 20′ x 30′, received moderate lighting from two 60 watt Mazda lamps. Small brooders supplied with 60 watt carbon filament lamps furnished the brooder heat for individual pens.

Pen 1, the normal controls, received 2 minutes daily irradiation from a quartz mercury arc lamp at 30 inches distance. Pen 2 had no ultraviolet irradiation. Pen 3 received no ultraviolet until after hemoglobin studies on rachitic chickens were made.

The irradiated chickens developed smooth plumage, yellow shanks and bills, and the male birds large red combs. (These organs do not develop until later in the females.) All of these chickens showed every sign of normal growth.

The non-irradiated chickens were less than 2/3 the size of the controls (Table I). Many showed extreme weakness and deformed

TABLE I.
Comparative Size, Hemoglobin and Blood Calcium of Normal Irradiated (Control), Non-irradiated and Rachitic Irradiated (Healing) Chickens.

Pen	Wt. in gm.	Hb 14.5 = 100%	Blood Ca mg. per 100 cc.	Hb later	
				10 days	25 days
I	315	10.3	12.6	10.3	10.9
II	197	8.41	6.73	8.00	dead
III	203	6.52		8.41	11.6

joints and bones due to rickets. The feathers were rough and the shanks and bills were light, almost white, in color.

At 7 weeks of age hemoglobin studies were made. These aver-

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age readings were for the 3 pens, 10.3; 8.41; and 6.52 gm. Hb per 100 cc. blood, respectively. (Determinations were made by the Hellige Solid Plane Hemometer reduced to the standard 14.5 gm. Hb per 100 cc. of blood.)

After these tests were made Pen 3 received daily irradiations (10 minutes each day) from the quartz lamp. At the end of 10 days the comparative Hb readings were 10.3; 8.00; and 8.4. It will be noted that the irradiated rachitic chickens (Pen 3) had already increased their Hb nearly 2 gm. per 100 cc. of blood in 10 days. Two weeks later the chickens in Pen 2 were all dead, due to rickets, while Pens 1 and 3 had the following Hb tests: 10.92 and 11.6 respectively.

Studies made by Cook and Harmon,[1] Dukes and Schwarte,[2] and Hart, Elvehjem, Kemmerer and Halpin[3] show that the hen has a lower hemoglobin content than human beings. Our own studies[4] made on chickens of all ages confirm their results and give figures ranging between 50 and 80% of the average for man.

Rachitic chickens, as might be expected, have a low hemoglobin. The amounts as compared to normal chickens range between 43 and 85%. In a number of tests on very rachitic birds the hemoglobin was as low as 5 gm. per 100 cc. of blood.

Ten days' irradiation caused a definite rise in hemoglobin content in Pen 3, and at the end of 3 weeks it was higher than in the controls. One might interpret this to be due to the indirect effects brought about because of increased physiological activity very evident in many systems, especially the endocrines and the blood-forming cells of the bone marrow.

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[1] Cook, S. F., and Harmon, I. W., *Am. J. Phys.*, 1933, **105**, 407.

[2] Dukes, H. H., and Schwarte, L. H., *Am. J. Phys.*, 1931, **96**, 89.

[3] Hart, E. B., Elvehjem, C. A., Kemmerer, A. R., and Halpin, J. H., *Poultry Science*, 1929, **9**, 92.

[4] Not published.