

lin changes associated with the development of antibodies following scarlet fever in patients with normal convalescence and patients developing rheumatic fever. Increased turbidity was found to closely parallel the rise in antistreptolysin and antistreptokinase titers. These results will be reported in a separate communication.

Summary. 1. When serum with abnormally high gamma globulin concentration is diluted with a solution containing a certain small amount of copper or zinc sulfate, a turbid precipitate forms and the optical density of the suspension is proportional to the concentration of gamma globulin.

2. Such an estimation of increase in gamma globulin really measures the total globulin elevation in pathological sera because hyperglobulinemia is almost always due to an alteration in the gamma globulin fraction of the serum.

3. The test has proved useful for determining alterations in gamma globulin during the course of an acute illness such as infectious hepatitis.

4. It was found to be of particular value in detecting persistent liver disease following infectious hepatitis. In a group of 41 patients with cirrhosis of the liver the reaction was positive in every case.

16044 P

Black Pigmentation in Feathers of Buff Orpington Chicks Caused by Vitamin D Deficiency.*

ANNABELLE DECKER AND JAMES MCGINNIS. (Introduced by A. R. Kemmerer.)

From the Department of Poultry Husbandry, State College of Washington, Pullman, Wash.

Abnormal amounts of black pigment in feathers of New Hampshire chicks fed vitamin D deficient diets were observed by Glazener, Mattingly, and Briggs.¹ Domm² reported that feeding desiccated thyroid caused abnormal black coloring in Brown Leghorn males, females, and capons. Juhn and Barnes,³ working with capons of the same breed, produced similar results. Both the New Hampshires and the Brown Leghorns normally have some black pigment in the feathers. Buff Orpingtons, on the other hand, do not normally have black pigment in the feathers. It was of interest, therefore, to determine whether a deficiency of vitamin D would cause the

black-pigmented feathers in this breed.

Experimental Methods. The percentage composition of the vitamin D deficient basal diet fed in this experiment is as follows: ground yellow corn 30.0, ground wheat 25.5, ground barley 10.0, dehydrated alfalfa 5.0, B-Y riboflavin concentrate (250 μ g riboflavin/g) 0.5, ground limestone 2.0, dicalcium phosphate 1.5, soybean oil meal (expeller) 20.5, fish meal 4.0, salt (iodized) 0.5, and soybean oil 0.5. Manganese was added at a level of 75 p.p.m.

Chicks were examined and weighed at weekly intervals. At 6 weeks the feather color of each chick was given a numerical score, ranging from 0 to 5 depending upon the intensity of black pigment in the back feathers. A score of 0 indicated no black pigment whereas a score of 5 indicated very markedly blackened feathers. Since some of the chicks were extremely slow feathering, it was not possible to score all of them.

At the end of the 6-week period, a few chicks from each vitamin D deficient diet

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¹ Glazener, E. W., Mattingly, J. P., and Briggs, G. M., *Poultry Sci.*, 1946, **25**, 85.

² Domm, L. V., *Anat. Rec.*, 1929, **44**, 227.

³ Juhn, M., and Barnes, B. O., *Am. J. Physiol.*, 1931, **98**, 463.

TABLE I.
Effect of Vitamin D Deficiency on Feather Pigmentation in Buff Orpington Chicks.

Supplement to basal diet	Avg wt at 6 wk g		No. of chicks scored	Feather color			
				% showing black		Color score	
None	312	304*	12	100	100*	3.1	2.9*
	296		13	100		2.6	
Vit. D†	482	470	13	0	0	0	0
	458		11	0		0	
Iodinated casein‡	318	309	11	100	100	2.0	2.7
	295		12	100		3.3	
Iodinated casein + vit. D	422	471	11	0	0	0	0
	520		9	0		0	

* Average of duplicate groups.

† 100 A.O.A.C. units/100 g diet.

‡ 15.0 g/100 lb diet.

were placed on a ration containing adequate vitamin D, and were observed from day to day for several weeks.

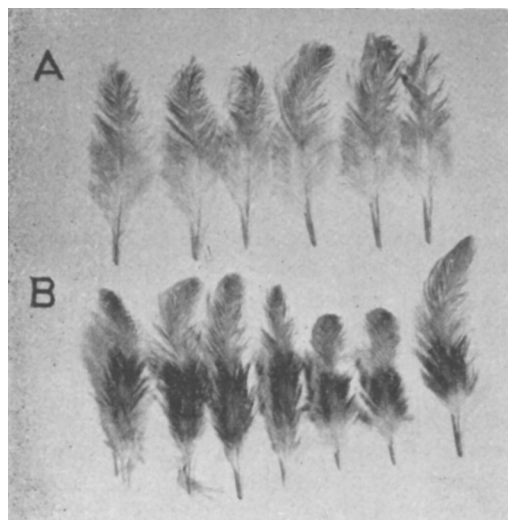


FIG. 1.

Black banded feathers of Buff Orpington chicks fed vitamin D-deficient diets. (A) Normal feathers taken from birds receiving adequate amounts of vitamin D. (B) Abnormal feathers from birds receiving vitamin D-deficient diets. Note banding effect caused by growth of new feathers of normal color after vitamin D supplementation.

Results. The results are presented in Table I and Fig. 1. At 4 weeks of age most of the chicks fed on the vitamin D deficient diets showed varying amounts of gray to black color. At 6 weeks of age intense black was noticeable in the feathers of the humeral tract of the vitamin D deficient birds. The under-color of the back, breast, and leg feathers as well as color at the base of the flight feathers and wing coverts, was black. All of the chicks fed the vitamin D deficient diets grew some feathers with black pigment. The degree and distribution of black pigmentation, however, varied considerably. Without exception, all of the chicks receiving the diets supplemented with vitamin D or vitamin D plus iodinated casein had normal buff colored feathers, free of black pigment. Under the conditions of this experiment, thyroactive iodinated casein did not increase the deposition of black pigment in chicks fed a vitamin D deficient diet or a diet supplemented with this vitamin.

At the end of the experiment, several chicks from each lot were placed on a chick ration containing vitamin D. The immature black feathers of chicks fed the vitamin D deficient diets during the experimental period grew

with a normal buff color at the base following the change in diets. This growth of normal colored feathers was noted at about five days after the diets were changed. Fig. 1 shows the banding effect produced in the feathers.

Summary. In an experiment with Buff Orpington chicks, a breed normally having no black pigment in the feathers, it was found that a deficiency of vitamin D caused a widespread deposition of black pigment in the

feathers. This abnormal blackening was prevented by supplementing the diet with vitamin D.

The feeding of thyroactive iodinated casein failed to increase the deposition of black pigment in chicks fed either a vitamin D deficient or vitamin D supplemental diet.

The iodinated casein was supplied by Cerophyl Laboratories, Inc., Kansas City, Mo.

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Response of Spontaneous Lymphoid Leukemias in Mice to Injection of Adrenal Cortical Extracts.*†

L. W. LAW AND ROBERT SPEIRS. (Introduced by C. C. Little.)

From the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine, and the Department of Zoology, University of Wisconsin, Madison.

Striking alterations in blood elements have been observed to result from injections of pituitary adrenotropic hormone in various species of animals.^{1,2} The blood picture observed within a few hours after injection is as follows: decrease in leukocyte count, an absolute lymphopenia and a corresponding absolute polymorphonuclear leukocytosis. Statistically significant decreases in the weights of lymphoid tissues, excepting the spleen, following injections of adrenotropic hormone, indicate a profound influence on normal maintenance of lymphoid tissue by this hormone.³ Histological studies indicate specific degenerative changes of normal lymphocytes in all lymphatic structures with repair and recovery after definite time inter-

vals.⁴ These changes are mediated through the adrenal cortex and similar alterations, although at possibly different time intervals, occur following injections of adrenal cortical extracts.²

In view of these profound effects on normal lymphocytic tissues, we have undertaken a study of the effects of adrenal cortical extract on the immature elements in spontaneous lymphoid leukemias in mice. Earlier studies have indicated some relationship between the adrenals and the growth of transmitted animal leukemias. Sturm and Murphy⁵ showed that adrenalectomy reduced the natural resistance of rats to a transplantable lymphoid leukemia. The rate of growth of the leukemia was also apparently increased following adrenalectomy. It has been also⁶ shown that desoxycorticosterone acetate and two adrenal cortical extracts decreased the susceptibility of rats to a transplanted leukemia. Complete disappear-

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¹ Dougherty, T. F., and White, A., *Science*, 1943, **98**, 367.

² Dougherty, T. F., and White, A., *Endocrinology*, 1944, **35**, 1.

³ Dougherty, T. F., and White, A., *Proc. Soc. Exp. Biol. and Med.*, 1943, **53**, 132.

⁴ Dougherty, T. F., and White, A., *Am. J. Anat.*, 1945, **77**, 81.

⁵ Sturm, E., and Murphy, J. B., *Cancer Research*, 1944, **4**, 384.

⁶ Murphy, J. B., and Sturm, E., *Science*, 1944, **99**, 303.