α-estradiol dipropionate, gave no response. However, all 5 frogs injected with varying doses of progesterone gave positive ovulatory responses, ranging from 5 to 50%. Of 10 frogs treated with varying doses of testosterone propionate, 8 gave positive responses ranging from 5 to 100%, while 2 failed to respond. The controls of distilled water and sesame oil were completely negative, while the pituitary controls were completely positive.

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Sex Hormones and Lymphomatosis in Fowls.*

DAVID MARINE AND S. H. ROSEN.

From the Laboratory Division, Montefiore Hospital, New York City.

We have previously reported[1] upon the occurrence of lymphomatosis in 26 of 52 white leghorn capons and its absence in 66 slips of the same group of 118 birds. However, only 19 of these slips were older, when sacrificed, than the youngest bird (256 days) that developed the disease. There were 10 cases of diffuse hepato-renal lymphomatosis (big livered series), 7 of lymphosarcoma, 8 of lymphoma of bursa of Fabricius and 1 leukemia. The significant finding is that we have not seen lymphomatosis develop under our conditions in a bird with spontaneous comb growth. These observations suggested that the presence of a functionally active fragment of testis may have inhibited the development of the disease—possibly because of the production of sex hormones.

The relation of sex to the incidence of lymphomatosis has not been studied and for obvious reasons. Oakley[2] is the only author to refer to it but gives no data—merely stating that he has the impression it is more common in females and in the breeds kept for egg laying. Data on the sex incidence of leukosis in mice also are lacking.

The present experiment includes 41 white leghorn male castrates of the same age, divided into 3 groups as follows: (1) 12 birds, each receiving 1 mg estradiol dipropionate weekly, (2) 12, each receiving testosterone dipropionate in variable amounts twice weekly,

* We are indebted to the Ciba Pharmaceutical Products, Inc., for generous supplies of Di-ovocylin and testosterone dipropionate.

1 Marine, D., and Rosen, S. H., *Am. J. Cancer*, 1940, **39**, 315.

2 Oakley, C. L., *Proc. Roy. Soc. Med.*, 1935, **28**, 999.

and (3) 17 controls. Injections of these hormones were started on June 18, 1940, and they are still being given to the survivors. To date (Jan. 15) 4, or 33⅓%, of the androgen group, 7, or 58%, of the estrogen group, and 4, or 23%, of the control group have died of lymphomatosis. The youngest (receiving estradiol dipropionate) was 201 days old and the oldest to date, 319 days.

Routine liver biopsies have shown that this organ may be transformed from the normal (about 40 g) reddish brown color to a huge (300 g) reddish gray organ in 15 days. In only one of the 15 cases (a bird receiving testosterone dipropionate) was a fragment of testis found at autopsy—confirming our observation in the first series.

It is probable that some of the surviving birds in the androgen and estrogen groups are slips but masked by the sex hormones administered (one of the estrogen group frequently crows). Anatomically the 15 cases may be grouped as (1) diffuse hepato-renal (big liver disease) type—8 cases, (2) lymphosarcoma—4 cases, (3) lymphoma of the bursa of Fabricius—2 cases, and (4) neurolymphomatosis—1 case.

The polymorphism of lymphomatosis has always attracted the attention of investigators. This polymorphism exists in all 3 major groups (myeloid, erythro and lymphoid) of leukosis as defined by Ellermann.[3]

Routine blood smears made at monthly intervals or oftener have been constantly negative for leukemia as Ellermann and others had pointed out. The incidence of lymphomatosis in the androgen-treated group may not be significant since the doses of testosterone dipropionate during the first 4 months of the experiment varied from excessive to a submaintenance (of the comb) level. The occurrence of lymphomatosis in 58% of the estrogen group as opposed to 23.5% of the control group suggests that the induced sex hormone imbalance may have been a factor in stimulating or activating the agent responsible for overgrowth of lymphoblastic tissue in this group. The doses of hormone used were insufficient to induce changes in the blood calcium and lipoids and, therefore, may not have induced a sufficient hormone imbalance in some of the birds to activate the latent responsible agent.

[3] Ellermann, V., *Folia Haematol.*, 1923, **29**, 203.