

EFFECT OF STEROID HORMONES ON THE BLOOD CONSTITUENTS OF RANA HEXADACTYLA AND CALOTES VARSICOLOR

THE humoral regulation of red cell production has been the subject of several investigations.^{3,4} Alterations in adrenal cortical functions are accompanied by fluctuations in white blood cell counts of peripheral blood.⁸ Information in this field is mostly restricted amongst the mammalian species. There is very little evidence that administration of exogenous hormones are capable of exerting a significant influence on the blood constituents of non-mammalian vertebrates. The present study was undertaken to determine the effects of exogenous steroid hormones on the blood constituents of poikilothermic animals.

Estrone.—In this set, each animal received a total quantity of 1.25 mg of estrone. In frogs, this hormone has resulted in the statistically significant level of decrease in haemoglobin level as well as RBC count whereas WBC count has slightly increased. In calotes though there is no significant change in RBC and haemoglobin level, there is a significant increase of neutrophil and lymphocytes.

Cortisol.—The animals of this experimental group received a total of 7.5 mg of cortisol. The haemoglobin content of both the animals shows an increase than normal although it is not statistically significant. In frogs, a significant increase of neutrophil and a decrease of eosinophils and basophils were observed. In calotes WBC count significantly increased due to this steroid administration.

TABLE I
Results showing the hormonal actions on the blood constituents of frogs and calotes (+ indicates increase; - indicates decrease; Norm. indicates normal when compared with controls)

		Haemoglobin %	Total RBC million/cu. mm	Total WBC million/cu. mm	Differential count				
					Neutrophil	Lymphocyte	Eosinophil	Basophil	Monocyte
Frog	Testosterone	+++	+++	Norm.	Norm.	+++	--	Norm.	Norm.
	Estrone	---	---	+	"	Norm.	Norm.	"	"
	Cortisol	+	Norm.	Norm.	+++	"	--	--	"
	DOCA	Norm.	---	"	Norm.	"	Norm.	Norm.	"
Calotes	Testosterone	+++	Norm.	Norm.	--	+	Norm.	Norm.	Norm.
	Estrone	Norm.	"	"	+++	+++	"	"	"
	Cortisol	+	"	+++	Norm.	Norm.	"	"	"
	DOCA	---	"	---	"	"	"	--	"

Experiments were conducted with locally available frog, *Rana hexadactyla* (body weight 40-50 g; length 75-80 mm) and garden lizard, *Calotes varicolor* (body weight 55-60 g; length 110-120 mm). They were divided into four groups of five animals each. After two weeks, the experimental animals were sacrificed and blood samples were collected for haemoglobin estimation and total and differential counts¹ of blood corpuscles. To compare with the normal values, Ringer injected control animals were maintained with the experimentals.

Testosterone.—A total of 15 mg was injected in equal dose for 15 days. The haemoglobin content has increased in both the animals studied. In frogs, this hormone results in the significant increase of RBC and lymphocytes and a decrease of eosinophil. In calotes also there is a significant decrease of neutrophil and a slight increase of lymphocytes.

DOCA.—In the last set of experiment, a total of 7.5 mg of DOCA was injected into each animal. A decrease of RBC count was noted in frogs, whereas in calotes this hormone administration has resulted in the significant decrease of haemoglobin content, WBC and basophil counts.

The anabolic action of androgen was established in castrated rats³ by the decrease of haemopoiesis which has increased on androgen administration. In our present study on poikilothermic animals, similar anabolic action was noted due to the increase of haemoglobin and RBC counts. Estrogens have resulted in the decrease of RBC and haemoglobin and increase of WBC in frogs. In calotes, the neutrophils and lymphocytes have increased. A similar effect has been reported in man.² Cortisol administration in the hypophysectomised fishes have resulted in the increase of RBC and WBC.⁶ An increase in total RBC of patients

treated with cortisone has been reported.¹⁰ Eosinophilia after cortisone administration was also reported.¹¹ Moreover, the administration of glucocorticoids decrease circulating eosinophil and basophil and the increase of the number of neutrophil.^{5,8} It has also been stated that cortisol decreases lymphocytes.⁵ Our findings corroborate the earlier report except the lymphocytes have not decreased as in man. DOCA administration has resulted in the decrease of blood constituents of both the animals studied. Thus, the effect of steroid hormones on the blood constituents of *Rana hexadactyla* and *Calotes varicolor* shows almost a similar pattern as it has been reported in mammals.

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GAMMA-RAY INDUCED VARIABILITY IN THE IODINE VALUE OF LINSEED OIL

Of the three objectives of linseed breeding, namely, increasing the seed yield, oil content of the seed and improving the oil quality (iodine value of the oil) the last one is the most important as the linseed oil is the most widely used drying oil in paints and varnishes. The drying quality of the oil is dependent on the quantity of oxygen it absorbs in the pro-

cesses of drying and this is determined by the absorption of iodine (instead of oxygen) per unit quantity of oil. A good drying oil should have a high iodine value between 180-200. The market value of linseed depends upon the iodine value of its oil. The mutation experiments conducted with one of the varieties of linseed (*Linum usitatissimum* L.) showed that the increased variability induced by gamma irradiation could be exploited for evolving strains with high iodine value.

Dry seeds of the linseed variety NPRR 9 were irradiated with 40, 60 and 80 kilo Rads of gamma-rays and the progeny carried through from R_1 to R_4 selfed generation. A few cultures of the R_4 generation selected for their good yield and other desirable agronomic characters were analysed for their seed oil content and iodine value of the oil. The analysis was done as accurately as possible using duplicate and even triplicate sets. The data are given in Table I. Since only a few samples were analysed, the data were not subjected to statistical analysis. As the cultures were in the fourth generation, they are expected to have stabilized with regard to the various characters including the iodine value and breed true to this character in the subsequent generations particularly for the iodine value with which we are mostly concerned here.

It is seen from Table I that the variation in iodine value is more than that of the oil content. The maximum increase in iodine value was 16.1 units over the untreated parental strain while the maximum increase in the oil content was 1.6 units only. This shows that iodine value is more amenable to manipulation by mutation breeding perhaps due to its simple nature of inheritance. Mutation breeding seems to be especially useful in changing simply inherited characters in highly developed genic systems where the standard hybridization methods may disturb the superior combination of genes. Arny¹ found that in crosses, the F_1 resembled the low iodine index parent, segregation occurred in F_2 and a 1:1 ratio was obtained in the back-crosses indicating that a single factor pair was responsible for the main difference in quality. Oil per cent, on the other hand, is not a simple case of one trait being dominant, another recessive, but a condition of quantitative inheritance in which several sets of genes govern the characteristic.

Comstock² raised the oil percentage by 1.5 points in one cross and by 1.9 in another. In