SUMMARY

CHAPTER 1

Changes in the levels of certain metabolites in blood, liver, skeletal muscle, adipose tissue and tail of the lizard, Hemidactylus flaviviridis, during different phases of tail regeneration have been investigated.

1. During wound healing phase, an elevated blood glucose level with a concomitant depletion in glycogen content of liver and muscle is correlated with increased energy demands of the tissues of the tail stump. However, during blastema phase, blood glucose declined to a subnormal level, whereas in liver and muscle, glycogen level remained unchanged. After this phase, i.e. during differentiation phase, blood glucose level reached more or less its preautotomy level, while liver and muscle glycogen took a gradual ascending course reaching their respective preautotomy levels in the animals with almost full grown regenerate.

2. Lipid metabolism in liver did not assume any significant role during the course of tail regeneration. However, adipose tissue lipid content had decreased during differentiation phase which indicates an increased mobilisation of lipids for the proliferative and synthetic

activities of the body during this phase.

3. A decrease in the protein content of liver and concomitant increase in that of the blastema and differentiating tissues of the regenerate are correlated with increase in the proliferative activity of the blastema cells and protein synthesis of the differentiating tail tissues.

CHAPTER 2

Histochemical studies on the activities of OC-GPDH, LDH, SDH and MDH in liver have been carried out during different phases of tail regeneration in the lizard, Hemidactylus flaviviridis. Altered metabolism of the liver in response to regenerative activity of the tail elicits the pattern, wherein during initial phases of regeneration, viz., wound healing and blastema, the energetics of hepatic tissue are anaerobically oriented and in the later phase of regeneration i.e. during growth phase, TCA cycle appears to be predominant.

CHAPTER 3

Levels of ascorbic acid (AA) in kidney (organ of synthesis) and liver (storage organ) of the normal lizards with intact tail and in those with regenerating tail of the lizard, Hemidactylus flaviviridis, have been quantitatively

investigated.

During wound healing phase of the regenerating tail, a two fold increase in AA content of kidney, and a one and a half time increase in that of liver have been noticed. Liver maintains this high level of AA throughout the process of regeneration. During blastema phase, kidney AA level depletes to half its elevated level, whereas during differentiation phase, AA level shows a second peak of two fold increase. Increase in renal and hepatic AA level during wound healing phase could be correlated with increased demand of this vitamin at the broken ends of the tail tissues for their subsequent repair and regeneration. The second peak of two fold increase of AA level in kidney during differentiation may contribute towards the formation of the connective tissue matrix and protein synthesis. Maintenance of more or less the same increased level of AA in the liver may be attributed to the association of the vitamin in carbohydrate and lipid metabolism of this organ during regenerative process.

CHAPTER 4

Involvement of vascular system during tail regeneration in the lizard, Hemidactylus flaviviridis, has been studied by examining changes in blood cell and bone marrow components

during the process.

An augmented lymphocytopoiesis is apparent during wound healing phase which gradually reverts to normal. Role of lymphocytes in healing process has been discussed.

A decline in number of red blood corpuscles (RBC) and haemoglobin content during wound healing phase is correlated with anaerobic mode of metabolism prevailing in the body in general.

Alongwith the changes in different cell components of the blood, concomitant changes in cell population of bone marrow have been studied and plausible explanations for such changes are discussed.

CHAPTER 5

Changes in histophysiology of spleen alongwith the reactivities of acid and alkaline phosphatases have been studied during different phases of tail regeneration in the lizard, Hemidactylus flaviviridis.

Histological observations on spleen during wound healing revealed an increase in the white pulp, indicative of enhanced lymphocyte production. Increase in acid and alkaline phosphatases in the spleen during the same phase has been correlated with cellular proliferative and

phagocytic activities occurring in the organ.

Potential involvement of spleen during the wound healing phase is further substantiated by performing splenectomy during the process where such an operation has delayed the wound healing of the autotomised tail stump. Role of spleen in healing process has been discussed.

CHAPTER 6

Interrelationship between thyroid and gonad and its influence on rate of growth of the regenerating tail in the lizard, Hemidactylus flaviviridis, has been investigated and following observations have been highlighted.

1. Male lizards regenerate their tail faster than the females, probably due to greater anabolic effect of male hormone, testosterone, in the former.

2. Thyroidectomy caused a delay in the growth rate of the tail regenerate in both the sexes, which is more pronounced in the males.

3. A pronounced delay in the rate of growth of the regenerate in thyroidectomised male lizards appears to be due to reduced androgen production as surmised from the

degenerative changes observed in gonads and gonoducts.

Thus, from the present study it can be suggested that thyroid and gonad effectively influence tail regeneration in this lizard.

CHAPTER 7

Effect of administration of male hormone, testosterone, on the rate of growth of the regenerating tail of normal (euthyroidic) and athyroidic lizards, Hemidactylus flaviviridis, of both the sexes has been studied.

1. Administration of testosterone in euthyroidic lizards of both the sexes enhanced the growth of the tail regenerate, though in case of females, the effect was more pronounced. This is believed to be due to greater anabolic effects of testosterone in promoting repair and regeneration. However, in case of males, the effect was not as much as that observed in females which may be attributed to the concept of 'optimum' level of androgen required for regenerative activities.

2. Administration of testosterone in athyroidic lizards of both the sexes rectified the disturbance set in the rate of growth of the regenerate to a certain extent in males and almost totally in case of females.