SUMMARY

CHAPTER 1:

The development of lymphocytopoietic nodules in the liver of healthy adult pigeons Columba livia was studied. It was observed that these nodules were temporary and once the lymphocytes in them become mature they get liberated into the blood stream, and finally the nodule disappears. When needed, the nodules were formed anew in close association with blood vessels in the portal areas of liver lobules. The presence of 'germinal centres' with two zones in the developing nodules, is suggestive of their possible functions, first as a centre of lymphocytopoiesis and later as a site of antibody synthesis.

CHAPTER 2:

The preliminary study carried out on the liver and caeca of developing pigeons revealed that the lymphocytes or the lymphoblasts were present in the liver even in the prehatching period, while in caeca lymphocytes appeared only by 6th day after hatching. From the study it was not possible to

correlate the time of appearance of lymphopoietic nodules to the time of involution of either thymus or bursa. However, it was evident that lymphocytopoiesis in thymus, spleen and liver showed a simultaneous stimulatory response to some common factor(s), especially during moulting. This clearly pointed out that the primary function of lymphocytopoietic nodules is the continuous production of lymphocytes.

CHAPTER 3:

It has been already reported that in pigeon liver many lymphocytopoietic nodules are found. In the present investigation nodular count in the pigeon liver was determined following sublethal haemorrhage, splenectomy and carbon tetrachloride(CCl_4) injection. It was noticed that all these factors caused increase in the number of nodules in the liver indicating increased production of lymphocytes. Repeated injection of 0.2 ml of CCl_4/100g body weight elicited tremendous response in the lymphocyte production which was done by the increased number of lymphocytopoietic nodules in the liver. Thus the

lymphocytes produced in the pigeon liver, may figure greatly in the phagocytic as well as other processes like connective tissue formation etc. that take place around the damaged areas.

CHAPTER 4:

Phagocytic activity of the lymphocytopoietic nodules in the liver of pigeon was studied by injecting haemolyzed blood and causing irreversible injury to a part of liver by applying heavy mechanical pressure. It was found that the nodules of both liver and spleen are capable of ingesting foreign or autochthonous cellular debris. The presence of 'germinal centres' exclusively in many of the 'mature nodules' of the liver, a few days after the injection of haemolysed blood, suggests that they may be producing antibodies also. A similarity in the activities of the lymphocytopoietic nodules in the liver of pigeon with that of the lymph nodes in mammals is considered.

CHAPTER 5:

The histological studies on the infected liver of pigeon showed massive accumulation of

lymphocytes around the infected regions but such accumulation of lymphocytes did not occur in the frog liver. The connective tissue covering formed around the infected parts in pigeon liver is assumed to have been derived from the lymphocytes while that in frog liver from the existing connective tissue there. It is suggested that lymphocytes in pigeon liver play a significant role in the connective tissue formation or in the secretion of collagen, while those in the frog liver do not participate in such activities.

CHAPTER 6:

Wound healing and repair phenomena following mechanically and surgically inflicted injury on the pigeon liver were studied. There was an accumulation of lymphocytes at the wound site by about 10 to 12 hrs after the infliction of the injury. These aggregated lymphocytes not only delimited the injured area but later got transformed into macrophages, cells containing metachromatic granules and fibroblasts. By about 2 to 4 days, collagen fibres were laid at the wound site and simultaneously phagocytosis was also noted to be taking place. By about 6 to 8 days time the formation of wound covering was complete and the

healthy hepatic cells subjacent to the connective tissue covering were found to proliferate. The wound healing as well as repair was completed by about 20 to 25 days after the infliction of the injury.

There was an increase in the lymphocytopoiesis in the liver as well as in the spleen during the processes of wound healing and repair in the liver as evidenced by the increase in the number of lymphocytopoietic nodules per unit area in the organ as well as the increase in the weight of spleen.

It is suggested that in the liver the presence of certain amount of cellular debris or damaged tissue is necessary for initiation of cell division at the wound site. A possible mechanism for the initiation of the proliferative activity is discussed.

CHAPTER 7:

Histochemical studies on the distribution of DNA and RNA in pigeon liver during wound healing and repair revealed that, soon after the infliction of injury, the RNA content in the parenchymal cell subjacent to injured area increased considerably. The lymphocytes and fibroblasts that accumulated near the

injured area showed high content of DNA which is correlated to the collagen synthesis. On completion of wound healing, the DNA content in the parenchymal cells situated around the injured area increased which could be easily correlated to the proliferative activity of these cells.

CHAPTER 8:

The histochemical and quantitative studies on the ascorbic acid near the injured area in the pigeon liver revealed that this vitamin is mobilized from various parts of the liver to the injured area. In this area, ascorbic acid is believed to be aiding the transformation of lymphocytes into fibroblasts as well as in the synthesis of collagen. The presence of this vitamin in the newly formed connective tissue, is considered to be for increasing the tensile strength of the latter tissue.

CHAPTER 9:

Acetyl and Butyryl cholinesterases were studied using histochemical methods in the liver of pigeon during the process of wound healing and repair.

Following injury, it was found that both specific and nonspecific cholinesterases increased at the wound site. The elevated level of acetylcholinesterase was correlated with the mitotic activity of the hepatic cells near the wound. The nonspecific cholinesterase was presumably aiding the lipolytic activity taking place at the wound site. A possible function of nerves in the initiation of proliferative activity at the wound site is also discussed.

CHAPTER 10:

The histochemical studies on acid and alkaline phosphatases were carried on the pigeon liver after inflicting the injury to a part of the organ. There was a significant increase in the acid phosphatase activity in the early phases of wound healing. This rise in the activity is correlated with phagocytic reactions involved at the wound site. The alkaline phosphatase activity began to increase only by 2nd day after the infliction of the injury. Since this enzyme is believed to play an active role in collagen synthesis as well as in the transport of metabolites across cell membranes, the elevated activity of the enzyme in the later phases is

discussed in relation with such activities.

CHAPTER 11:

The present study on the histochemical localizations of fat, glycogen and certain lipolytic, glycolytic and Kreb's cycle enzymes reveals that prior to division of hepatic cells near the injured area, the neutral fat was removed from the site. This removal of neutral fat was aided by active lipase and esterases. Most of the neutral fat was found to be taken up by the lymphocytes and macrophages. Perhaps, these cells are instrumental in removing the neutral fat from the site.

As the wound healing proceeded, the machinery for aerobic metabolism became less and less active while the dividing cells became more and more dependent on anaerobic metabolism. This conclusion was derived from the fact that SDH became inactive during the period when hepatic cells were proliferating while LDH activity increased at the same period along with a concomitant decrease in glycogen content.