SUMMARY

Chapter 1

Fat body of Poicelocera picta two types of fat body cells proper, one with giant nuclei and the others with small nuclei. The cells may be uninucleate or binucleate. Interspersed among the fat body cells are few oenocytes. The fat body cells are rich in glyceride fats, phospholipids, cholesterol and cholesterol esters, alkaline and acid phosphatases, lipase and nucleic acids. Glyceride fats are restricted to the fat globules in the cytoplasm while phospholipids occur in the nuclei,,as well as form an envelope around the nuclei and fat globules. Acid phosphatase is restricted mainly to the chromatin material of the nucleus while alkaline phosphatase is mainly found in the cytoplasm. The oenocytes are poor in RNA.

Chapter 2

Succinic dehydrogenase activity in the whole fat body of the desert locust and three species of grasshoppers has been demonstrated histochemically. The localization of the enzyme has been observed to be confined to the periphery of the cells. Fat solvents like ethyl acetate, ether, 3:1 ether-acetone mixture or acetone alone, have been found to inhibit the enzyme, as was also the case with frozen sections or air dried material. Failure to demonstrate the activity of the enzyme in the latter case may be attributed to the possible release of an inhibitor, as has already been suggested by earlier workers

in the case of homogenization.

Chapter 3

Lipase activity of the fat body homogenate of a few representative Orthoptera was studied manometrically. The fat body coloured varied from creamy white in cockroach to bright yellow in Poicelocera and Schistocerca. A relationship has been found between the degree of pigmentation and lipase activity of the fat body. The lipase activity increased with the degree of pigmentation.

Chapter 4

Some kinetic properties and substrate specificity of the insect fat body lipase was studied manometrically using cockroach fat body homogenate. It has a pH optimum at 7.0 for tributyrin and 6.8 for triacetin as substrates. The enzyme activity increased with the increasing temperature and enzyme concentration. The highest temperature coefficient was found to be between 17-27°C. It acted on tributyrin faster than on triacetin and did not act on triolein, castor oil and olive oil to any appreciable extent. Lipase activity in the fat body homogenate was stable for 30 minutes at 60°C and 18 hours at 37°C. The activity decreased considerably after 72 hours at -4°C. About 50% of the activity was found to be in the soluble part of the homogenate.

Chapter 5

Some biochemical properties of cockroach fat body lipase has been studied manometrically, using tributyrin as substrate at 37°C. Ca^{++} and Mg^{++} slightly activated the enzyme while Na^{+}, K^{+}, Ba^{++}, NH_4 and Co^{++} were mild inhibitors. Cu^{++} and Hg^{++} were highly inhibitory. Versene regular inhibited the enzyme completely between 0.01 to 0.005 M concentration and this inhibition was removed almost completely by Ba and to a lesser extent by Ca, Mg and Co. The enzyme was inhibited by many -SH reagents like Iodine, p-Chloromercuribenzoate, alloxan and N-ethylmaleimide but was quite resistent to Ferricyanide and Iodoacetate. The inhibition caused by p-Chloromercuribenzoate could be reversed to a great extent by l-Cystein but not that caused by other agents. Sodium taurocholate inhibited at all concentrations tried. Quinine and Adrenalin were highly inhibitory while Protamine sulphate and Vitamin A palmitate were moderately inhibitory. Fluoride inhibited only at higher concentrations. Gum arabic, heparin and bovine serum albumin did to affect to any appreciable extent. The fat body homogenate was found to hydrolyse vitamin A palmitate when used as substrate.

Chapter 6

Lipase activity of the fat body of female Periplaneta americana during the period of 30 days starvation was studied quantitatively using manometric technique. The lipase activity increased during the period between the 5th and the 15 th day and at the end of 10th day it was increased by 72%. The activity decreased during the later period of starvation and by the end

of 30th day it was decreased by about 52%. The fat content of the fat body decreased uniformly , though the decrease was more betweem the 5th and the 10th day. The activity was restored within 3 days of refeeding the animals. It has been suggested that lipase is one of the factors responsible for fat depletion from the fat body during starvation.

Chapter 7

Lipase activity of the fat body of Poicelocera picta has been studied quantitatively using manometric method during the period of ovarian development. The activity increased three fold when the terminal oocyte reached about 4.9 mm length and was minimum soon after adult moult and after the first batch of eggs were laid. Changes were also observed in the general condition of thefat body during the period of ovarian development.

Chapter 8

Changes in the ribonucleic acid content of the fat body of Poicelocera picta was studied during the period of ovarian development using Methylgreen-pyronin stain. Giant nuclei occured most often when the terminal oocyte length varied between 4-7 mm. They were found to divide also often at this stage. The nucleolar number increased from 1-2 in the early period to 4-6 in the late period of oocyte development. The RNA level, though was high at all the time,increased very much between the period when the terminal oocyte length was

4-8 mm.The importance of the fat body in supplementing the protein requirements of the growing oocyte has beam discussed.

Chapter 9

Observations have been madeon the median neurosecretory cells of the pars intercerebralis of the brain of Poicelocera picta during ovarian development. Neurosecretory cells have been located in the dorsal part of the pars intercerebralis and three types of cells designated as A, B, and C have been distinguished. Active transport of neurosecretory material was observed during the period when the terminal oocyte length was between 3.3 to 7.0 mm. The neurosecretory cells of the newly moulted adults were active but not of those with mature oocytes.

Chapter 10

The results obtained in the earlier chapters have been discussed and correlated to the metabolism of insects in general. The possible role of enzymes and their hormonal control in maimtaining the dynamic steady state of the fat body tissue is dicussed.