INTRODUCTION
Growth, moulting and reproduction are very important functions of insect physiology. Insects differ widely from other animals in these very specialized behaviours, which might have brought about the evolutionary changes in the life of insects so much so that the insects pass their major time in the form of larvae and pupae. Sometimes the adults are very short-lived. This sort of change in the life has resulted in many important biochemical changes in the body of insects. Obviously these insects show different types of biochemical changes to cope up with these peculiar life processes. The biochemical substances like proteins, lipids and carbohydrates play a very important role in these well-modified processes. It is true that insects have a specialized body fluid - haemolymph in which all the body organs are submerged or bathed. The various metabolite constituents are drained in the haemolymph "en route" to their supply into the various tissues. Obviously the haemolymph becomes the most vital constituent of the body which plays its role, not only in supplying the nutrients but sometimes also in producing the nutrients.

It is very interesting to find out various types of oscillations in the metabolites in the haemolymph during growth, moulting and reproduction, when specially it is
known that proteins are transported to the cuticle (Fox, Seed and Mills, 1972; Koeppe and Gilbert, 1973; Hill and Goldsworthy, 1963). Proteins are also transported to the oocytes for growth (Telfer and Williams, 1953; Engelmann and Penney, 1966; Wilkens, 1969 and many others). Similarly lipids are also transported to various tissues as and when they are required.

In the present study, major attention has been given to the study of proteins and lipids, as they form the very important fluctuating constituents of the body. While selecting the insect types, the author has selected two hemimetabolous and two holometabolous types, showing simple and complex types of metamorphosis.

1. Dysdercus similis
2. Sphaerodema rusticum
3. Danais chrysippus
4. Sarcophaga lineatocollis

The present work has been specially taken up in the light of the fact that in some insects special protein bands of different Rm values appear at a particular moulting period, (Whittaker and West, 1965; Chen and Levenbook, 1966; Fudson, 1966) while there is a group of insects where only the concentration of certain bands vary at a particular moulting period, (Terando and Feir, 1967; Coles, 1965). Obviously it cannot be said that a separate moulting band is present. Similarly in the case of larva and pupa, it has been found that some bands
appear and disappear during the development of each of these two stages. In the present work, a survey of such bands has been made, to find out the specific protein bands at different stages and also to explore the possible protein bands involved in the formation of new cuticle. There is a lot of literature on sex specific and vitellogenic proteins. This study has attracted quite a number of workers but with varied types of conclusion. In some insects, the sex specific proteins are found present, for example, in Leucophasa maderae (Engelmann and Penney, 1966), Paraplaneta americana (Adiyodi and Nayar, 1966; Prabhu and Nayar, 1970, 1972), Sarcophaga bullata (Wilks, 1969; Engelmann et al., 1971), Schistocerca gregaria (Kulkarni and Mehrotra, 1970), while the sex specific protein/proteins are absent in other insect species like Oncopeltus fasciatus (Terando and Feir, 1967), Protoparce quinquemaculata (Hudson, 1966), Rhodnius prolixus (Coles, 1965), and the main proteins themselves are transported as vitellogenic female proteins. In the present study these points have also been explored.

Attempts have also been made to find out the possibility of the presence of the "Common Insect Proteins" of Whittaker and West (1962). Only a very few workers have shown the presence of such "Common Insect Proteins", (Rodnaryk and Morrison, 1966; Tobe and Loughton, 1967, 1970; Adiyodi and Nayar, 1968).
A protein band with a Rm value comparable to human serum albumin had been reported in the insect haemolymph for the first time in *Bombyx mori* (Ducceschi, 1902) and confirmed in the same insect species by Drilhon (1954) and Hidenori (1972). Since then a number of insect species have been found to possess this type of protein (Kulkarni and Mehrotra, 1970; Whittaker and West, 1962; Bodnaryk and Morrison, 1966), while the same is found to be absent in still other insect species (Chen, 1956, 1959; Chen and Levenbook, 1966; Terando and Feir, 1967; Stephen, 1968; Siakotos, 1960 a,b). These controversial evidences make it necessary to extend the observations to find out the presence or absence of such a protein in other insect species also.

The haemolymph protein fractions in female insects undergo well known changes during vitellogenesis. Here, in the present work, attempts have been made to see the oscillations and other peculiarities in the haemolymph proteins in unmated and mated females during vitellogenesis.

Total haemolymph protein concentration has been observed during the growth, molting and reproduction in a number of cases (Hill et al., 1968; Hill, 1962; Slama, 1964; Wilkens, 1969; Engelmann, 1965; Kulkarni and Mehrotra, 1970; Prabhu and Nayar, 1971). In the present study, observations have been made in the four insect species to understand the
changes in the protein concentration of the haemolymph with respect to growth, moulting and maturation of gametes.

Along with the concentration fluctuations of haemolymph proteins, their role, the haemolymph lipids have also been studied in larvae, pupae and adults. In larvae and pupae, the haemolymph lipids have been observed for their role in moulting; while in adults in relation to reproduction. It may also be mentioned that the role of these metabolites has been studied during moult and inter-moult period. In adults, the haemolymph lipids have been studied in the newly hatched adults and maturing adults; specially the females have been studied in the preoviposition, oviposition and post-oviposition period, in both mated and unmated females. The growth of last terminal oocyte has been used as criterion for watching the successful growth of the reproductive cycle. Insects of both sexes of late period of growth – the so called senile insects – have also been selected for watching the variations in these metabolites. Finally an attempt has been made to study the condition and ratio of proteins and lipids and their role in this biochemically successfully adapted physiology of these specialized tiny creatures which are incompatible in their design.