CHAPTER I

INTRODUCTION
The insect tissue remain bathing in a metabolic pool of the haemolymph. Obviously the haemolymph has different composition of metabolites and specially a big concentration of free amino acids. This big concentration of amino acids after deaminification produces useful metabolism to insect tissues sideways, the insect haemolymph has good amount of carbohydrates and lipids. The amino acids in the haemolymph have different types of role as mentioned by Chen (1966) and Wyatt (1961) but a clear cut role of amino acids metabolism in insect also suggested by House (1965) and others is not very conclusive. All the more the variance of amino acids in the haemolymph has been explained in the requirement of different amino acids that leaves a lot of scope to carry out researches.

Nutrition involves chemical and physiological activities which transform food elements into body elements. Insect nutrition is concerned primarily with the chemical substances in food stuff, necessary to set in motion and maintain long series of metabolic process which provide energy and metabolites for growth development and other vital functions.

The importance of insect nutrition lies not only in its close relation to biochemistry but also in many aspects of insect ecology especially where food sources are taken into considerations.

The subject has been reviewed by Trager (1953), Levinson (1955), Lipke and Fraenkel (1956) and House (1961, 1962, 1965a).
Gilmour (1961) dealt with insect biochemistry, many aspects of which involve nutrients. The other authors discussed particularly on amino acids and vitamin requirements, Hinton (1956a); silkworm (Legay, 1958); phytophagous insects, Friend (1958); parasitic insect, House (1958); locusts and grasshoppers, Dadd (1963); aphids, Auclair (1963); nutritional diseases of insects, House (1963); nutritional and humoral control of reproduction in insects, Wigglesworth (1960); nutrition and insect resistance to insecticides, Gordon (1961); the reaction of pests to plant nutrition, Rodriguez (1960); physiology of insects, Shukla (1974); amino acid requirements, Singh (1976); protein metabolism, Singh (1978).

The insects like other animals require a number of vitamins and sources of organic nitrogen in the form of essential amino acids. This in itself is an indication that the metabolic pathways for the inter conversion of fats, carbohydrates and proteins are well developed in many insects. Amino acids are the most important raw materials for such conversion and growth.

Carbohydrates are usually not essential but a few insects cannot develop without it. All carbohydrates are not equally well utilized in the adult and requirement of many differ between species. Some species require much more protein than carbohydrate. There is some evidence that apart from sustaining life in male and female adults, carbohydrates
play an essential role in the female with respect to reproduction.

Vitamins are essential for most of the insects but some insects seemed to have no vitamin requirement. The detailed information of particular vitamin for particular species has been discussed by many authors. The insects require water soluble vitamins but fat soluble vitamins like tocopherol are not required by all insects except few species. Usually vitamin D and K are not required by the insects. House and Barlow (1956) reported that growth of parasitoid, Agria (pseudo Sarcophaga) affinis (fall) using a chemically defined diet was accelerated by addition of lard, and that this effect could be duplicated by a mixture of fatty acids. This raised the question of what fatty acids are needed by insects.

The haemolymph or blood of insects possesses properties that have attracted a major share of the attention of insect physiologists. The high amino acid composition is the characteristic of class insects which in some species may be more than 60 times higher than that in human blood. The work was reviewed by Maluf (1935a), Wigglesworth (1935, 1953), Wellmanby (1935), Timon David (1940, 1945), Rapp (1947), Chauvin (1949a, 1956), Buck (1953), Wyatt (1961) and Chen (1962). The aliphatic amino acids play a dominant part in chemical composition of the haemolymph.

No worker has paid any attention to the analysis of the haemolymph amino acid composition of insects living under
different ecological conditions. The high amino acidemia in the haemolymph is suggested to help in the buffering and in the osmotic regulations of the haemolymph by Florkin and Morgulis (1949), Buck (1953), Florkin (1960), Wyatt (1961), Gilmour (1961), Chen (1966). It has also been observed that the amounts of individual amino acids exhibit the greatest variations (Gilmour, 1961).

The biological importance of the free amino acids in insect blood is largely unknown. Environmental factors such as temperature, starvation and insecticide intoxication influence blood levels of the free amino acids. When the insects were treated with the insecticides there was change in the concentration of free amino acids in the haemolymph. This work was reviewed by Joseph (1958), Winteringham (1959), Mc Allan and Brown (1960) and Roan and Hopkins (1961).

In the present text, attention has been given mostly on the amino acid pool. The need of different types of amino acids in the life and metabolism of insects has been explored. The need of amino acid and vitamins for growth has been examined and special experiments have been done by rearing Dysdercus on different amino acids and metabolites. Further in order to throw light on amino acid metabolism some other Heteroptera from terrestrial and aquatic environment have been investigated. Response to insecticides on the free amino acids variance has been explored. Conclusions have been drawn and the accounts
have been mentioned under the Chapter amino acid requirements, carbohydrate requirements, vitamin requirements and lipid requirements, free amino acids of haemolymph and effect of insecticides on amino acid variance have been done.