INTRODUCTION
The neurones of the animals are peculiar structures which are not replaced, yet they govern the various metabolic processes occurring in the body of the animal, throughout its life. It is a well known and an established fact, that they not only control neural function, but there are many neurones, which are secretory in nature. These specialised neurones, known as the neurosecretory cells, secrete a material, known as the neurosecretory material, which plays an important role in the physiology of an animal.

The knowledge of insect endocrines is quite recent, as compared to the vertebrate endocrinology. It was in 1917, that Kopecky pointed out, that the brain of insect was responsible for almost all the physiological events in the life of insects. The presence of neurosecretory cells in the brain of an insect was first described by Weyer (1935); and Hansstrom (1938). Their role in moulting processes was investigated by Kopecky (1917, 1922) and Wigglesworth (1940).

In the later years a number of workers studied neurosecretion in insects. Scharrer (1955, 1965); Casal (1948); Novak (1951 a, b.); Wigglesworth (1954, 1959, 1964, 1972); Nayar (1955); de Lerma (1956); Johansson (1958); Highnam (1961, 1964); Ewen (1962); Johnson (1962); Saini (1966, and 1970); Dogra and Ewen (1969); Gupta (1967, 1971); Engelman (1970); Steel and Herman (1971); Gillot and Yin (1972) and Steel (1978). The works of all these authors established the presence of the
The neurosecretory cells in the median para-intercerebralis of the brain of the insects.

A great discrepancy exists between the workers, on understanding of the secretory activity of these cells. Dupont-Rasba (1951), Herlant-Maewis and Paquot (1956) and Noisot (1957) consider that a neurosecretory cell full of stainable material, is at the peak of its secretory activity. Highnam (1962 a,b) and Highnam and Lusis (1962) consider the cells to be highly active, when they contain a small amount of secretory granules. Arvy and Gabe (1953 a,b,c) and Nayar (1958) are of the opinion, that the loss of neurosecretory material, from the previously filled cells, is the most active stage in the secretory cycle of the cells. Autoradiographic methods have shown that the neurosecretory cells, full of neurosecretory material are inactive, whereas as the depleted cells are active, (Highnam and Nordue 1970; Steel and Morris (1975).

A neuroendocrine secretory cycle has been studied in *Inhita limbata* (Nayar 1958 a), *Schistocerca gregaria* (Highnam 1942 a) *Adelphocoris lineolatus* (Ewen 1962 b), *Tenebrio molitor* (Nordue 1965 a,b and c), ants (Gavande 1968) *Calliphora erythrocephala* (Vijuwerberg 1970), *Bombus mori* (Nanda and Roy 1973) and *Heliothis armigera* (Gavande et.al. 1978).

The secretory cycle of the neurosecretory cells was correlated with oocyte development in many insects. *Calliphora erythrocephala* (Thoneen 1952), *Inhita limbata* (Nayar 1958 a),
Schistocerca gregaria (Higgin 1962 a.c.); Renabrio solitor (Mordue 1965); Aulacophora foenicollia L., Poecilus pictus and Symoeis ovapsis (Saini, 1966, 1971, and 1978); Dyadactys similis (Gupta 1967); Engelman (1963, 1970); Rhodnius prolisus (Pratt and Davey 1972); and (Bacher 1973); Monarch butterfly (Baker and Herman 1973); Dyadactys accolutus (Jalaja et al. 1973) and Labidura kirarla (Saini 1974).

Considering the importance of the neurosecretory cells in various metabolic processes, it appears that they should be responsible for the physiology of ageing. It is obvious that these neurones change with age and time, and the changes occur in their cytology, biochemistry and physiology.

Several workers like Hallal (1902); Ellis (1919, 1920); Imukai (1928); Andrew (1938, 1939); Gardner (1940); and others have studied the neurones of higher animals during ageing, and have reported that the neurones decrease in number with age. Hodge (1894) studied the ageing neurones of honey bees and compared them with the ageing neurones of man. Smallwood and Phillips (1916) and Pixell Goodrich (1919) also worked on the ageing neurones of honey bees, Miquel (1917) studied the nerve cell degeneration in the brain of senescent Drosophila melanogaster.

On reviewing the literature it was found that, though there are a few papers, found on the ageing neurones, the knowledge on the ageing of neurosecretory neurones of insects is
very scanty. Rockstein et al. (1971) have worked on the age-related neurosecretory changes in *Musca domestica*. The present work was undertaken to explore the effect of ageing on the neurosecretory cells. Two insects were selected for the study. There are *Protoplocerus pictus* Fab. (Cerididae; Orthoptera) and *Evadectus similis* Freeman (Pyrrhocoridae; Gymnoecerata; Heteroptera; Hemiptera). The ageing neurosecretory cells of these two insects were studied.

According to Rockstein (1950), "Whether one considers ageing a genetically predetermined process of involution, or a series of degenerative alterations of systems in response to environmental conditions, its study must involve observations of morphological as well as physiological modifications with age". Thus in the present work, the study of ageing of neurosecretory cells was carried out both morphologically, as well as, physiologically.

Histochemical studies on the neurosecretory cells are few. Rehm (1955) was the pioneer to attempt a histochemical study on the insect neurosecretory cells. Nayar (1955 a) on *Iphita limbatis*; Kobayashi (1957) on *Bombyx mori*; Brousse et al. (1959) on *Elephas fusca*; Fraser (1959 a) on *Lucilia caesar*; Pipe (1961) on *Pediobactes americanus*; Arvey and Gabe (1962) on fifteen different insect species; Ganguly and Basu (1962) on *Bombyx mori*; Chalaye (1965) on *Locusta migratoria*; Schreiner (1966) on *Anacartus fasciatus*; Cirrardie and Cirrardie...
(1967) on *Locusta migratoria*; Kamade (1969) on *Bucea domestica*; Hinks (1971 b) on *Triheena prunus*; Banhary and Anwar (1971) on *Gryllotalpa gryllotalpa*; and many others have performed histochemical studies on the neurosecretory cells of the insects. All these workers have reported the presence of different chemicals like proteins, carbohydrates and lipids etc., in the neurosecretory cells. In the present study an attempt has been made to see the change in protein concentration in the neurosecretory cells with age.

Much work has been done on the cholinesterases in insects. It has been established by many workers that cholinesterase is present in most of the insects: Lakla (1923); Nachmanson (1940); Means (1942); Richards and Guthrie (1945); Tobias et al. (1946); Chadwick and Hill (1947); Hoeder et al. (1946); Augustinsson (1948); Lockstein (1950); Chefurka and Smallman (1955); Van der Sloot (1955); Narar (1955); Chefurka and Smallman (1956); Mehrotra and Smallman (1957); Herr (1958); Wigglesworth (1959); Mehrotra (1960); Falkeld (1961); Benzel et al. (1963); Argell (1964); Chandio et al. (1965); Smith and Treherne (1965); Beaulaton (1967); Narsingh and Smallman (1967 a,b,c); Hall (1968); CullBault et al. (1970); Burchmore (1972); Mehrotra and Chandra (1972); Dhari et al. (1976); Hup (1976); Vijayalakshmi and Babu (1977); are a few of the authors who have worked on the insect cholinesterase.

The effect of ageing on cholinesterase activity in
higher animals (Vertebrates) has been studied by many workers like Welsh and Hedge (1944); Nisn and Kimwish (1959); Honichon (1957); Lubinska and Selena (1966); Maynard (1966); Holmes and Masters (1968 b); Wilson et al. (1969); Skinjeric-Voljar et al. (1973); Wilson (1973); Florini-James (1975) and Tiwari and Bhatnagar (1980).

In insects the works on physiological ageing are few. Sekla (1929) worked on the esterase activity during ageing on _Drosophila melanogaster_. Tahmisian (1943) on eggs of _Helanopus plus differentialis_; Rockstein (1950) on worker honey bee; Salkeld (1961) on _Encopeltus fasciatus_; Hall (1969) and Burcombe (1972) on _Drosophila melanogaster_ have worked on the changes in the enzyme cholinesterase activity during ageing.

Nayar (1955) demonstrated the presence of cholinesterase in the neurosecretory cells of _Punta limbata_. Van der Kloot (1955); Monro (1955); Sawyer et al. (1965) and Man Singh and Smallman (1967) worked on the role of cholinesterase in neurosecretion and insect diapause. Arvy (1962) demonstrated histochemically the presence of cholinesterase in the neurosecretory centres of some homiothermic animals. Smith and Trebeine (1965) and Heavation (1967) established the presence of cholinesterase in the brain of insect using electron microscope. Cosbee et al. (1968) gave evidence to show that insect neurosecretory cells are capable of conducting action potential, thus confirming the presence of choline-
terase in them. Thari et al. (1976) gave evidence of presence of cholinesterase in the neurosecretory cells of Schistocerca gregaria. In the present work an effort has been made to see the change in cholinesterase activity in the brain of insects, with age and to see whether it is related to the change in neurosecretory cells.

The neurosecretory cells, as they are modified neurones, they possess all the properties of a neurone. One of them is cholinesterase. The cholinesterase plays an important role in the nerve physiology. The primary role of cholinesterase in the animal tissue appears to catalyse the hydrolysis of acetylcholine. Arvy (1962) suggested that the enzyme plays an important role in the basic metabolism of the neurosecretory cells, or in the synthesis of the products they elaborate.

In insects, however, there is still a lot of difference of opinion about the role of acetylcholine as nerve transmi-
ter. That the cholinergic system is present in the insect nervous system, is proven by many workers. Colhoun (1960 a) investigated the role of acetylcholinesterase in conduction of nervous activity in Periplaneta and found that by comple-
tely inhibiting the enzyme there was a loss of locomotor activity, culminating in paralysis and death. Positive evi-
dence for central cholinergic transmission in insects is still sparse compared with that for vertebrates (Silver 1974). However O'Connor et al. (1967); Feeder et al (1970) are of the
opinion that, the transmission at the neuromuscular junction is non-cholinergic. Where as Florey (1963) suggests that in most insect groups ACh-CHES system remains one of the principal transmitter system and its biochemical and functional aspects form the model for the concept of chemical synaptic transmission. Wigglesworth (1973) also suggested that the cholinergic system played an important role in the process of synaptic transmission.

It was thought that, as neurosecretory cells are neurones, their metabolism and activity should be, in a way, related to the enzyme activity and protein synthesis etc., Obviously an attempt has been made to see the biochemical picture of the neurosecretory cells, with reference to ageing and their possible correlation with enzyme cholinesterase.