Introduction

The neurosecretory cells of insects were first described in the pars intercerebralis of the honeybee Apis mellifera by Weyer in 1935 (1). However, the study of insect neurosecretion progressed slowly during the years 1930-1950, intensified only after the introduction of Gomori’s methods in 1950, i.e., Gomori’s chrome hematoxylin by Bargman (1949) and paraldehyde fuchsin by Gabe (1953, 1955). Neurosecretory cells have been described in many groups of insects, but most of the observations have been made on the brain, suboesophageal and frontal ganglia and corpora cardiaca. There is relatively little information concerning the neurosecretion in the thoracic and abdominal ganglia of insects.

Neurosecretory cells were described in the suboesophageal and abdominal ganglia of Periplaneta americana L. (2,3), abdominal ganglia of Lucilia caesar (4), ventral nerve cord of Blaberus craniifer and Periplaneta americana L. (5,6), Schistocerca gregaria Forsk. (7,8), Locusta migratoria (9,10), Leuchopaea maderae (11), Clitumnus extradentatus (12,13), Blaps mucronata (14), Anacridium aegyptium (15), Poekilocerus pictus (16) and some Diptera (17,18,19).

Some probable roles of the neurosecretory cells in nerve cord ganglia in controlling some physiological activities are known. This article aims to demonstrate the neurosecretory cells in the thoracic and abdominal ganglia of M. desertus because, up to now, no case has been described in this insect group.

Materials and Methods

Adult M. desertus were collected in the vicinity of İzmir. They were kept in glass cages in laboratory conditions at a temperature of 28±2 °C, with a 45-50% relative humidity under a long-day photoperiod (9:15 hours). The animals were fed on ground chicken-food pellets as well as fresh lettuce and water. Thoracic and abdominal ganglia were dissected out from adult animals into physiological saline solution and fixed in Bouin’s solution. With rutin preparations, 4-5µm paraffin sections were obtained and Gabe 1953, paraldehyde fuchsine (PAF) (20) as well as Koneff 1938, Mallory Heidenhain’s azan (21) staining procedures were applied.
The sections were examined by Jena NF-binocular microscope and Jena MF photomicrography accessory.

Results and Discussion

A-type Neurosecretory cells

Secretory granules in the cytoplasm of the A-type neurosecretory cells stained deep purple with PAF and red with azan (Fig. 1). The granules were also observed along the axons. A-type neurosecretory cells were found in pairs in metathoracic and in all abdominal ganglia except in the last abdominal ganglion of M. desertus. The average cell and nuclear diameters of this type of cells were measured to be 24.6-20.8µm 11.1-8.7µm, respectively.

These cells are similar to the A-type cells in the ventral nerve cord of Clitumnus extradentatus and Carausius morosus (12,22), Poekilocerus pictus (16), in the thoracic and abdominal ganglia of Locusta migratoria migratoriioides (10), and in the subesophageal and prothoracic ganglia of Eristalis tappicus (18,19). The type-I cells of the thoracic and abdominal ganglia of Blaberus craniifer (5), the ventral nerve cord of Periplaneta americana (6), and the first abdominal ganglia of Anacridium aegyptium (15) have been described to show similar location and staining reactions to A-type neurosecretory cells in thoracic and abdominal ganglia of M. desertus. However, these cells differ significantly from type-I cells in their small cell sizes and nuclear diameters. These are histologically identical with the lateral cells of the first five abdominal ganglia of larvae of Lucilia caesar during diapause (4).

B-Type Neurosecretory Cells

B-type neurosecretory cells in the ganglia of M. desertus were PAF negative and stained light pink granules (Fig. 2). They also were stained light blueish-pink with azan (Fig. 3). These cells were present in peripheral regions in the all thoracic and abdominal ganglia of M. desertus. The cell diameters of these cells were measured to be 29.7-24.7µm and the nuclear diameters were 14.6-11.9µm.

Similar phloxinophilic cells have also been described as B-type cells in thoracic and abdominal ganglia of Locusta migratoria (10), Poekilocerus pictus (16), the type-II cells of the thoracic and abdominal ganglia of Blaberus craniifer (5), Anacridium aegyptium (15) and the ventral nerve cord of Periplaneta americana (6). The homologies of these cell types were described with the lateral cells which lack any secretory product and the cytoplasm of which is uniformly phloxinophilic in the abdominal ganglia of Lucilia caesar during diapause (4).

The type-IV cells in thoracic and abdominal ganglia of Blaps mucronata (14) and the B2-type cells of the ventral nerve cord of Clitumnus extradentatus (12,13) seem to be similar to the B-type cells depicted in the present work.
C-Type Neurosecretory Cells

These neurosecretory cells have very small granules distributed uniformly within the cell body which stained deep purple with PAF and reddish blue with azan (Fig. 4). The cell bodies of this type of neurosecretory cells were measured to be 39.1-28.7µm in their average diameters and have ellipsoid nuclei measuring 14.6µm in the longest and 11.5µm in their shortest diameters. These were the most common large neurosecretory cells observed in the all thoracic and abdominal ganglia and were distributed generally throughout the periphery of each ganglia. These cells in their staining reactions are similar to the previously described type-IV cells of the thoracic and abdominal ganglia of Blaberus craniifer and Periplaneta americana (5,6), the D-type cells of Schistocerca gregaria (8), and also the type-III cells of the Anacridium aegyptium (15).

This is the first report to date that describes three types of neurosecretory cells in the thoracic and abdominal ganglia of M. desertus. These light microscopical observations are expected to be invaluable for further detailed studies.

References


