finding that Db-cAMP increases miniature end-plate potentials[19,20].

Studies are now in progress to define whether the Db-cAMP action we found could be eventually mediated by Acetylcholine.

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Riassunto. L'applicazione stereotassica di microdosi di dibutirril-adenosin-3′ 5′ monofosfato nell'area ipotalamica laterale ‹zona incerta› di ratti sazi causa un netto aumento nell'ingestione di acqua. L'aumento è molto simile a quello causato dalla carbamoilcolina posta nella stessa zona.

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On the Intraganglionic Neurohaemal Organs in the Ventral Nerve Cord of *Hydrophilus olivaceus* (Hydrophilidae. Coleoptera)

The existence of neurosecretory cells in the ganglia of the ventral nerve chain of insects is well-known[1]. Many recent investigators have presented cytological evidence to establish the neurosecretory character of the cells in the ventral ganglia[2–5]. These cells were associated with varied important physiological functions such as diapause[6–8], pigment migration[9], oogenesis[10,11] and production of anti-diuretic hormone[12]. The neurosecretory cells, which exhibit cyclical activity, remain relatively constant in their number and topographical situation[1,4].

In the Coleoptera, segmental neurohaemal organs in association with the ventral ganglionic chain have been described by some authors[13–15]. In our histological and histochemical investigations on the ventral nerve cord of the aquatic beetle *Hydrophilus*, certain neurosecretory patches have been found in the various ganglia of the ventral chain. The object of the present report is to give a brief description of these segmental intraganglionic patches and to examine their possible role as neurohaemal organs.

The ventral nerve cord in this insect shows very little concentration of its constituent ganglia. All the ganglia are separate, excepting the first abdominal which is fused with the metathoracic and the last abdominal which is, as usual, a composite structure resulting from fusion of the posterior 4 or 5 ganglia.

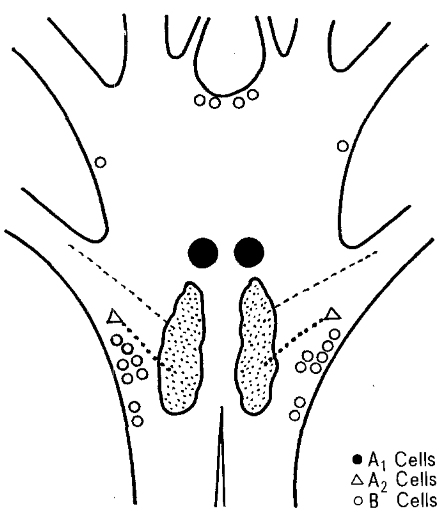

Fig. 1. Diagrammatic representation of the suboesophageal ganglion showing the disposition of the various cell types. Note that the axons of the 'A_2' cells (dotted line) lead into the irregularly-shaped AF-positive patches and some nerve fibres arising from these patches (broken line) join the fibre tracts of the lateral nerves.

The neurosecretory cells of the ventral ganglionic chain are distinguishable into 2 main types, namely the A and B types, on the basis of their staining properties. The A cells stain purple with paraldehyde-fuchsin (AF), violet with chrome haematoxylin-phloxin (CHP) and bluish-green with alcian blue-phloxin (ABP) techniques. The A type cells are further divisible into A_1 and A_2 types, according to the differences in their volume, number and topographical disposition. The A_1 cells are distinctly larger than the A_2 cells and 2 of them occur medio-dorsally only in the suboesophageal ganglion. In all the other ganglia, only the A_2 cells are represented in varied numbers (Figure 1). The B type cells are distinctly phloxinophilic, both in the CHP and ABP techniques, while they are only poorly stainable with AF. They are also represented in all the ganglia in variable numbers. These cells are pear-shaped, often highly vacuolated and have long thick axons which are also strongly phloxinophilic. Both A_1 and A_2 cells contain large amounts of cystine, as revealed by performic acid-alcian blue technique. With Heidenhain's azan, however, all the cell types are stainable, though the B cells stain with lesser intensity than the A type. In all the ganglia the A_2 and B types of cells are located peripherally, surrounding the central neuropile that is composed of several fibre tracts (Figure 2).

Whole preparations, as well as sections of all the ganglia stained with AF, reveal the presence of a variable number of irregularly-shaped patch-like areas within the ganglia

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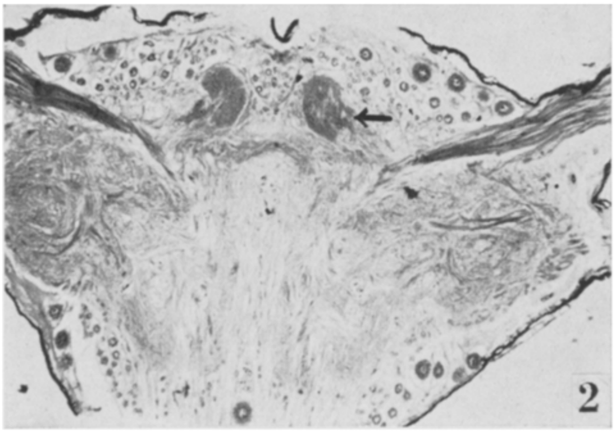

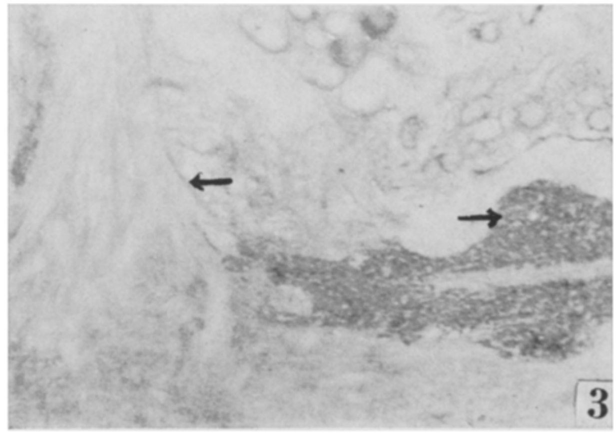

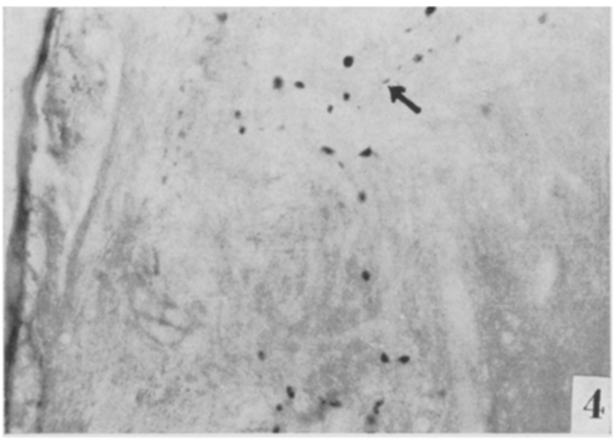

Fig. 2. Section through the prothoracic ganglion showing the disposition of the neurosecretory cells towards the outer borders and the neuropile in the centre. The fibre tracts of the lateral nerves are deeply rooted in the neuropile. Note the neurosecretory patches (→). Bouin/Heidenhain's azan. ×120.

Fig. 3. L. S. through the prothoracic ganglion showing the AF-positive patches of irregular shape (→) and granules in them. Note that some fibres arising in the patches are joining the fibre tracts of the lateral nerves (⩽). Susa/AF. ×480.

Fig. 4. Section of the fourth abdominal ganglion showing the AF-positive clumps along the fibre tracts (→). Bouin/AF. ×480.

(Figures 1–3). Examination of these areas under high magnification showed that numerous fine AF-positive neurosecretory granules occur within these patches (Figure 3). Two such patches occur in the suboesophageal ganglion (Figure 1) and 4 of them are present in all the 4 corners of the thoracic ganglia. Their existence in the abdominal ganglia is not so distinct as in the suboesophageal and thoracic ganglia. The axons of the A_2 cells terminate in these patches (Figure 1). Moreover, the fibre tracts of the lateral segmental nerves which are deeply rooted within the ganglia are joined by some nerve fibres arising within these AF-positive patches (Figures 1 and 3). Along the axons and nerve fibres that enter and leave these patches, AF-positive clumps are detectable so that they appear as moniliform fibres traversing the neuropile (Figure 4). These patches are also stainable with azan technique (Figure 2).

The histochemical behaviour of these patches, and their connection with the A_2 type of neurosecretory cells on the one hand and with the fibre tracts of the paired segmental nerves on the other, indicates that these AF-positive patches in the ganglia may be the neurohaemal organs meant for storage and release of the neurosecretory products, mainly of A_2 type of cells. Furthermore, the amount of the AF-positive material in these patches shows variations at different times and in different individuals. Such segmental neurohaemal organs have been described for Phasmids[16], *Periplaneta*[17] and in some beetles like *Chrysocarabus*[14] and *Dytiscus*[15]. But, in all these cases, the neurohaemal organs are situated external to the ganglia, often associated with the ventral sympathetic nervous system. Here the occurrence of these neurohaemal organs within the ventral ganglia is a notable peculiarity which does not seem to have been reported yet. The incorporation of these storage-release organs within the ganglia might presumably serve to bring about a greater measure of control of the central nervous system over the functional activities of these segmental neurohaemal organs.

Zusammenfassung. Aufgrund von Lage, Grösse und färberischem Verhalten können in der ventralen Ganglienkette des Käfers *Hydrophilus olivaceus* 3 Typen von neurosekretorischen Zellen (A_1, A_2, B) unterschieden werden. Die Axone der in allen Ganglien vorkommenden A_2-Zellen führen im Suboesophagealganglion und in den Thoracalganglien zu paraldehydfuchsinpositiven Bezirken, aus denen umgekehrt perlschnurartig mit Neurosekreten gefüllte Nervenfasern zu den Lateralnerven führen. Die fuchsinophilen Bezirke werden als intraganglionäre Neurohaemalorgane interpretiert.

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