The Relation Between Capillaries and Neurons in the Caudal Neurosecretory System of *Pomatomus saltatrix*[1]

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Summary. The caudal neurosecretory system of *Pomatomus saltatrix* was examined. Particular interest was devoted to the perikarya of the neurosecretory cells. The majority of these cells were characterized by a close association with the capillary network. The cells appeared to ensheath the capillaries thus bringing the nucleus and perinuclear cytoplasm into close association with the capillaries.

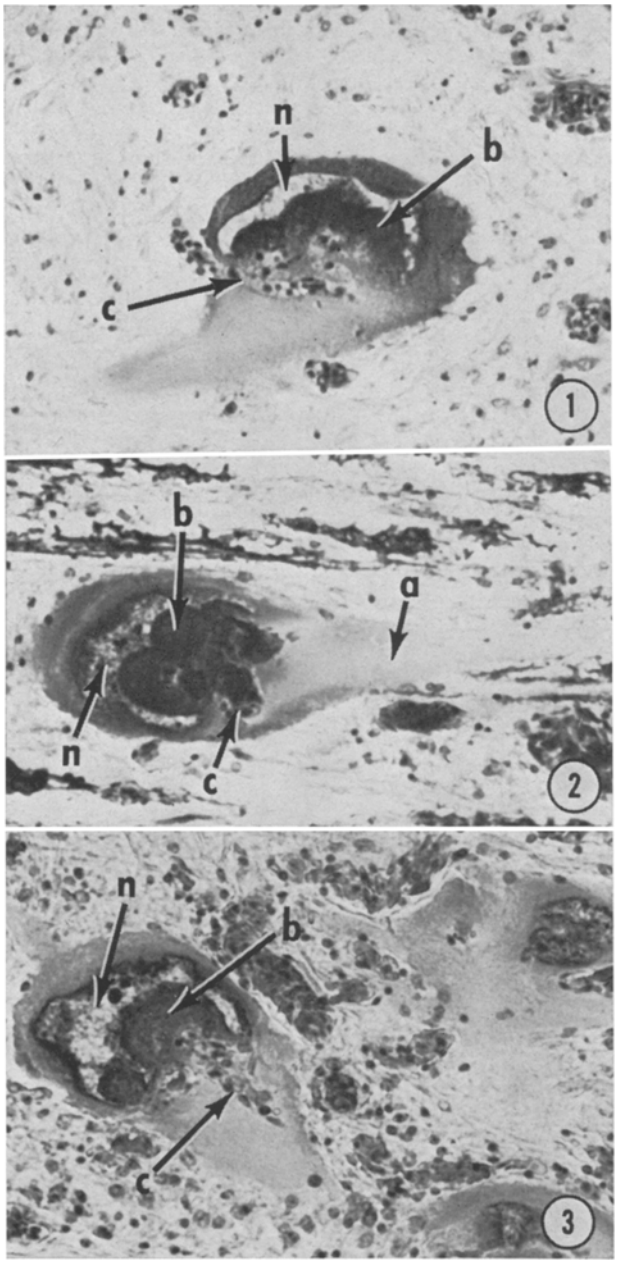

Fig. 1, 2 and 3 indicate some light microscopic features of caudal neurosecretory neurons in the bluefish. The characteristic orientation of capillaries (c), nuclei (n), and darkly stained, basophilic cytoplasm (b) should be noted. An axonal process emerges from the cell in Figure 2. Figures 1 and 2, cresyl violet-luxol blue. × 375. Figure 3, gallocyanin, phloxine, and fast green. × 375.

In 1914 DAHLGREN reported the existence of 'unusually large' cells in the region of the filum terminale of skates (Rajidae)[3]. Since that time many species of fishes have been examined and similar cells with distinctive cytological features have been observed in the caudal spinal cord[4–8]. It is accepted that these cells are neurosecretory in nature[8]. This report describes a phenomenon seen in the neurons of the caudal neurosecretory system of the bluefish (*Pomatomus saltatrix*). This species is utilized at the present time in our studies on neurosecretion[9].

In October 15 bluefish were captured and the terminal 5 cm of their spinal cords were removed and immersed in 4% paraformaldehyde fixative. The tissue was processed for paraffin embedding and 5 μm sections were taken in transverse, parasagittal and horizontal planes. Alternate sections were stained by means of several methods[10,11].

The perikarya of the neurosecretory cells were clustered dorso-lateral to the central canal, and some in apposition to the ependyma. The diameter of the neurosecretory cells ranged from 70 to 120 μm. Cytological features revealed by light microscopy are indicated in Figure 1. Typically, the lobed nucleus formed a cup-like configuration. The concavity of this structure usually was directed toward the emerging axonal process. The cytoplasm contained in the concavity of the nucleus demonstrated an intense basophilia (Figures 1–3).

The relationship of the capillaries, nuclei and areas of intense cytoplasmic basophilia should be noted in Figures 1, 2 and 3. Blood vessels of varying diameter were seen weaving among the neurosecretory neurons. From these vessels, smaller diameter capillaries invaded the cytoplasm of the neurosecretory cells. These capillaries ranged in size from 4 to 6 μm in diameter and were packed with nucleated blood cells. Consistently, the capillaries were positioned in the region of the nucleus. It appeared that

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the endothelial cells did not penetrate the membrane of the neurons. Instead, we believe that the neurosecretory cells ensheath these capillaries. These observations, however, must await confirmation at the ultrastructural level.

Capillaries with similar characteristics have been described in the caudal neurosecretory system in other species of fishes[8,12]. However, in those species this studied phenomenon was reported as an occasional occurrence. The most intriquing finding in the present study of the bluefish was that the majority of the neurons in the caudal neurosecretory system contained capillary networks in close association with the nucleus and cytoplasm.

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Influence of Thalamic Stimulation on Cortical Epileptogenic Focus

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Summary. Single stimuli applied to the non-specific thalamic nuclei do not change the activity of a cortical epileptogenic focus whereas rhythmic stimulation of these structures transforms the interictal activity into an ictal one.

Discharges of an experimental cortical epileptogenic focus could be triggered by various sensory stimuli[1,2], or by electrical stimulation of the nervous system[3–10]. The only structure from which cortical focal discharges could not be triggered was non-specific thalamus[6,7,9]. But rhythmic stimulation of this structure induced generalized epileptic phenomena[11,12]. For this reason we decided to study the influence of stimulation of non-specific thalamic nuclei on a cortical focus.

Experiments were performed on 14 rabbits aged from 2 to 3 months. Animals were without general anaesthesia, locally anaesthetized with Procaine and immobilized by Flaxedil. The concentric stimulation electrode (of 0.4 mm outer diameter) was introduced stereotaxically into the thalamus at coordinates AP 3–3.5, L 3.5, V 6 mm[13]. Localization of the electrode tip was controlled electrophysiologically as well as histologically. An epileptogenic focus was elicited by K-salt of penicillin (PNC) applied on the undamaged dura mater, covering the somatosensory cortical area at the same side at which the thalamic electrode was placed. Activity of somatosensory areas of both hemispheres was registered in reference connections (an indifferent electrode on the stereotaxic frame) using an 8-channel EEG apparatus. The thalamic stimulation started after PNC focus had been stabilized (usually 10 to 20 min). Rectangular pulses of 0.1–0.2 msec duration, frequencies from 0.2 to 40 Hz were applied. Stimulation series of frequencies higher than 2 Hz lasted for 30 sec; minimal interval between 2 stimulations was 3 min. Intensity of stimulation was lightly suprathreshold for the thalamocortical evoked potential.

Results obtained in 10 animals with stimulation electrodes localized in the non-specific thalamic nuclei (lateralis anterior, lateralis posterior, anteroventralis) did not differ and the description relates to all the cases. Stimulation of these nuclei never triggered focal discharges at the 1:1 rate (Figures 1 and 2). Rhythmic stimulation

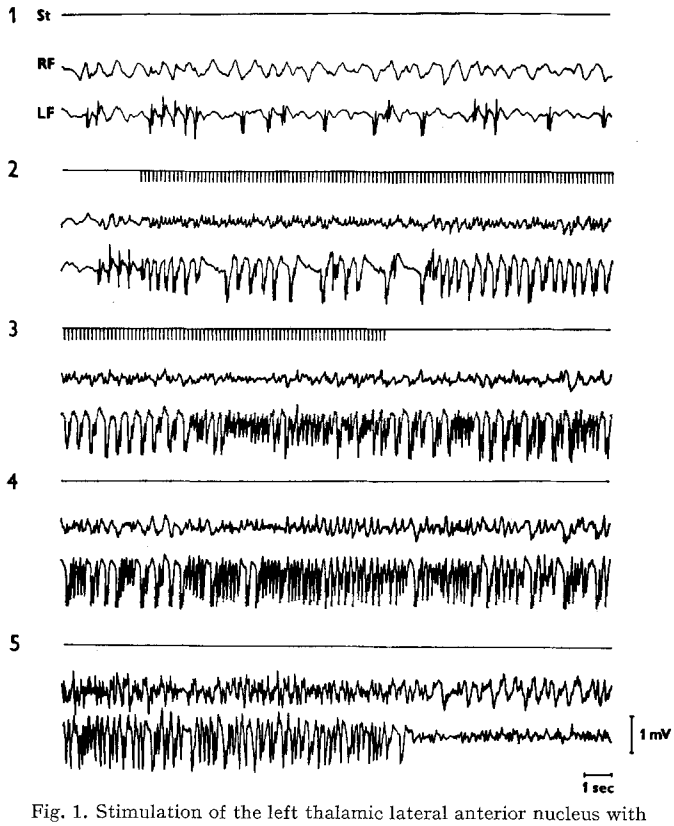

Fig. 1. Stimulation of the left thalamic lateral anterior nucleus with frequency of 7 Hz. From top to bottom: stimulation marks, activity of right and left somatosensory cortical area. 1, 2, 3, 4 and 5 – continuous recordings. Time mark 1 sec, amplitude mark 1 mV.

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