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## HISTOCHEMICAL DISTRIBUTION OF ACID PHOSPHATASE AND ALKALINE PHOSPHATASE ACTIVITIES IN THE CEREBRAL GANGLION OF THE CRAB *POTAMON MAGNUM MAGNUM* (PRETZMAN)

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THIS report is a continuation of our efforts to describe the histochemical nature of the thoracic and cerebral neurosecretory cells of the crab, *Potamon magnum magnum*[1].

Very little is known about the enzyme histochemistry of the crustacean nervous system. The present investigation was undertaken to demonstrate the distribution of acid and alkaline phosphatases in the cerebral ganglion of *P. m. magnum.*

Adult crabs were collected during February 1982 from the suburbs of Mosul city. Paraffin sections 8 $\mu$m thick were obtained after fixing the ganglia in cold acetone at 4°C. Gomori's techniques for acid and alkaline phosphatases were followed[2].

In the alkaline phosphatase preparation, the neural sheath displays a moderate reaction. However, the nuclear membrane, nucleolus and the secretory granules are also stained brownish-black indicating the presence of some enzyme activity (figure 1). The neurosecretory granules are few and they are dispersed throughout the cytoplasm of the cells and in the axons. On the other hand, in the acid phosphatase preparation, the intensity of colour is very weak. All cell components including the secretory material in both types of cell react in the same way (table 1). Nevertheless, the neural sheath exhibits a little stronger reaction in comparison with the cell components. Again, the neurosecretory granules are scarce.

Investigations on the distribution of alkaline phosphatase in both vertebrate and the invertebrate nervous systems have shown that this enzyme displays a peripheral distribution near the cell surface[3–7]

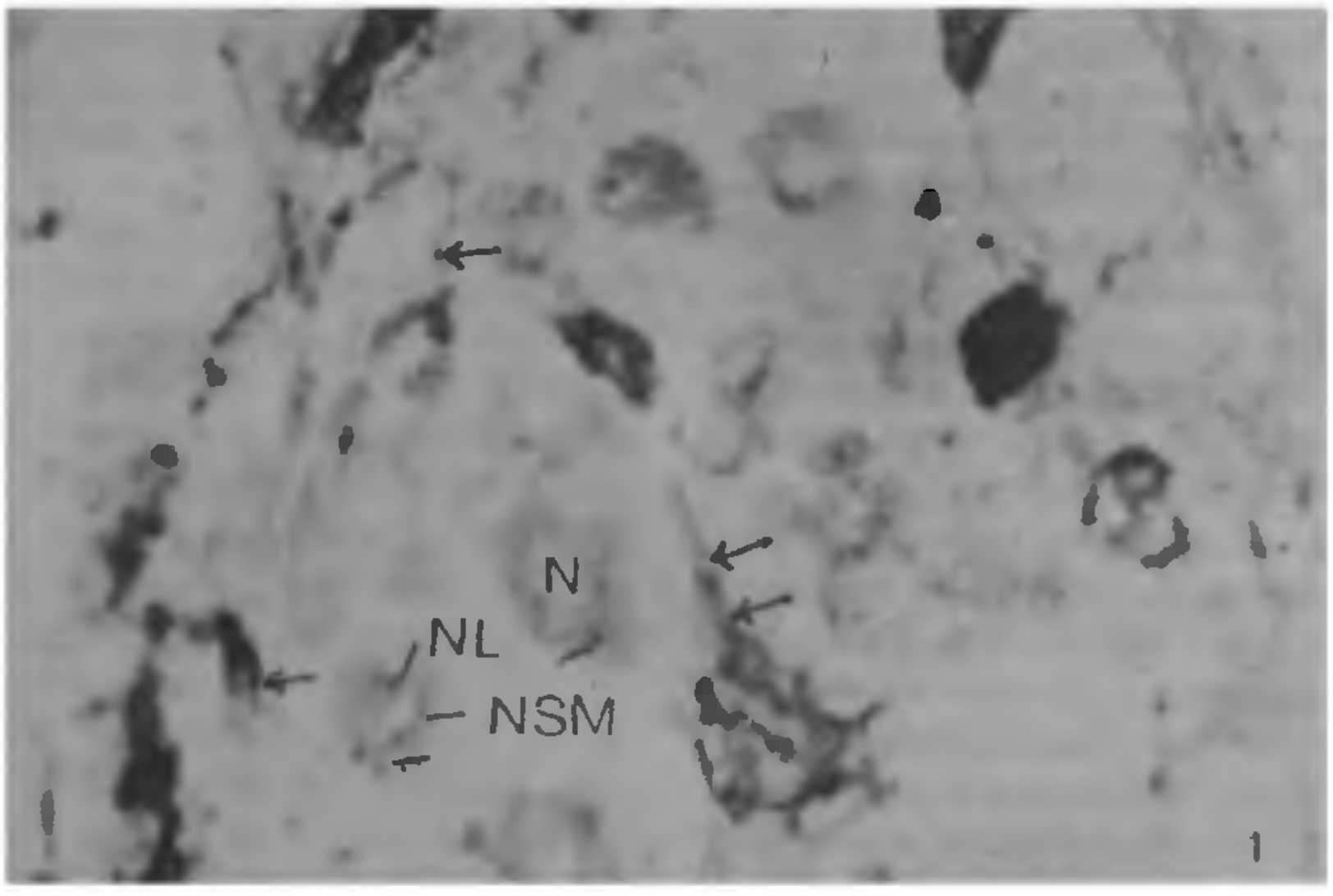


**Figure 1.** Horizontal section through the cerebral ganglion of *Potamon magnum magnum* showing neurosecretory calls. [NSM, neurosecretory material; N, nucleus; NL, nucleolus]. Arrows indicate moderate alkaline phosphatase reaction in the neural sheath. Calcium-cobalt method (×800).

**Table 1** *Histochemical reactions in the cerebral ganglion of the crab, Potamon magnum magnum (Pretzman)*

| | Reaction | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Large cells | | | | Small cells | | | | |
| Technique | Neural sheath | Nuclear membrane | Nucleolus | Secretory granules | Neural sheath | Nuclear membrane | Nucleous | Secretory granules | Significance |
| Calcium-cobalt method | ++ | + | + | + | + | + | + | + | Alkaline phosphatase |
| Lead-nitrate method | + | ± | ± | ± | ± | ± | ± | ± | Acid phosphatase |

± Weakly positive; + Positive; ++ Moderately positive.

In *Periplaneta americana* the alkaline phosphatase activity was localized in the neural lamella and around the giant fibres of the thoracic and abdominal ganglia and in the nerve cord. In both the giant and the B cells of the thoracic ganglion of *P. m. magnum* the neural, nucleolus and secretory granules exhibit strong reaction for alkaline phosphatase[3,4]. Acid phosphatase activity has also been demonstrated in the nervous system of many invertebrates[3-5,8-11].

Previously, localization of acid phosphatase in the cytoplasm was considered as one of the confirmatory indices for the identification of neurosecretory cells[12]. Baranyi[8] reported that acid phosphatase plays a role in the process of catabolism.

The present results indicate that moderate alkaline phosphatase activity is present in the neural sheath. These results suggest some similarity to the *P. americana* nervous system[5,7]. Furthermore, the distribution of this enzyme had the same pattern as in *P. americana*[5] and bat[6], although not examined to the same degree of detail. Thakar and Tewari[5,6] have claimed that phosphatase-splitting enzymes are expected to be on the surface rather than in the interior of cells. This could be true, because the neural sheath of the cells displays a stronger reaction rather than the rest of the cell.

A low intensity of reaction in the test for acid phosphatase was shown by both types of neurosecretory cells. Further, the secretory material is scarce. This may be attributed to the fact that the animals were collected during winter, when most of the metabolic activities are slowed down.

The present results indicate that the presence of alkaline phosphatase activity in the nuclear membrane, nucleolus and secretory material plays a significant role in both secretory and protein synthetic activities. These results are in agreement with results reported earlier[13,14].

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