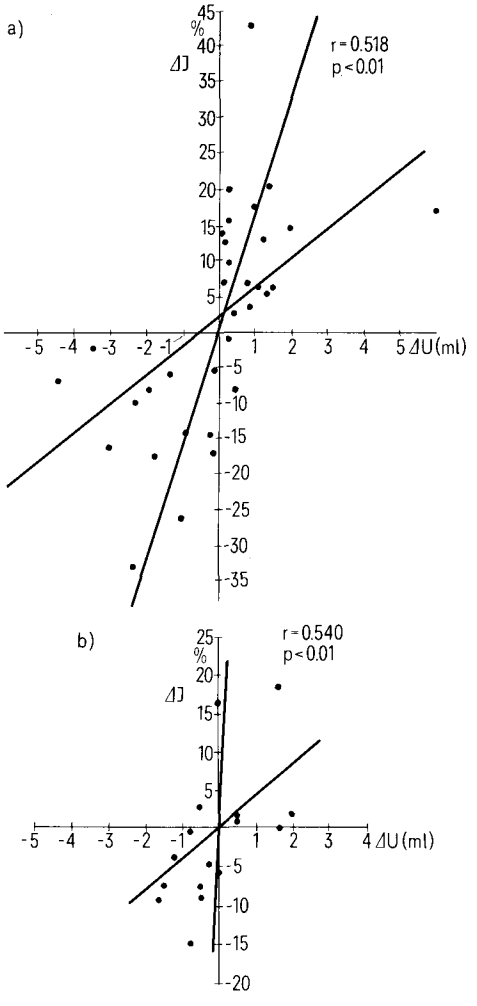
processed on digital computer 'Minsk-32' by correlation and regression analysis.

Results. The clamping of carotid arteries evoked a constriction of the resistance vessels of small intestine and kidney. The capacitance vessels demonstrated both constriction (74.4% of cases in the intestine and 47.6% in kidney) and dilatation (23.0% and 42.9% respectively). In the other cases, there were no responses of capacitance vessels in the organs under investigation.



Correlation of changes of the capacitance vessels of the intestine (a), kidney (b) and the efferent low amplitude impulse rate in the corresponding nerves in pressor sinocarotid reflex after injection of hexonium (2 mg/kg). Abscissa: the vascular blood content changes in ml (△U ml); ordinate: mean impulsation rate in % to control (△J%).

In response to the clamping of the carotid arteries, the efferent impulse rate in the nerves studied within the first sec after clamping increased at the expense of high amplitude impulses. The increase of impulse rate began earlier than the rise of resistance and possibly played the role of a trigger mechanism for the resistance vessel responses.

After an i.v. injection of hexonium (2 mg/kg) in experiments on the small intestine and kidney, as well as on the spleen[1], no reflex responses of the resistance vessels were observed. The sympathetic impulsation was significantly weaker mainly due to reduction of high amplitude potentials (15 μV and higher). The low amplitude impulses (lower than 15 μV) and the reflex responses of the capacitance vessels after hexonium were preserved. The efferent low amplitude impulses in the sympathetic nerve, against the background of the hexonium effect, responded to the clamping of carotid arteries by different changes being in most cases correlated with the capacitance vessel responses. In 52.4% of cases, the vascular blood content of the small intestine was decreased (constriction of the capacitance vessels), impulse rate in the intestinal nerve being increased. In 31% of cases, the vascular blood content of this organ was increased and the impulse rate in the intestinal nerve became slower. Constrictory response of the renal capacitance vessels was observed in 25% simultaneously with the impulse rate increase. In 50% of cases, renal capacitance vessels were dilated on the background of decreased impulse rate.

Mathematical processing of the data obtained has shown correlation between changes of the low amplitude impulse rate in intestinal and renal nerves and the capacitance vessel responses in the intestine and kidney (figure), similar to the results obtained in experiments on the spleen[1]. The data presented confirm the results obtained earlier[1] and are in agreement with the opinion of other authors[2-4] admitting the existence of differentiated sympathetic impulses to pre- and postcapillary portions of the vascular bed. The data obtained suggest that postganglionic sympathetic fibres are not similar both in physiological characteristics and in the functional destination. One of them, conducting high amplitude impulses, seems to be responsible mainly for responses of the resistance vessels, while the others - with low amplitude impulsation - control responses of the capacitance vessels.

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Unequal distribution of calcium and magnesium of snail neuron

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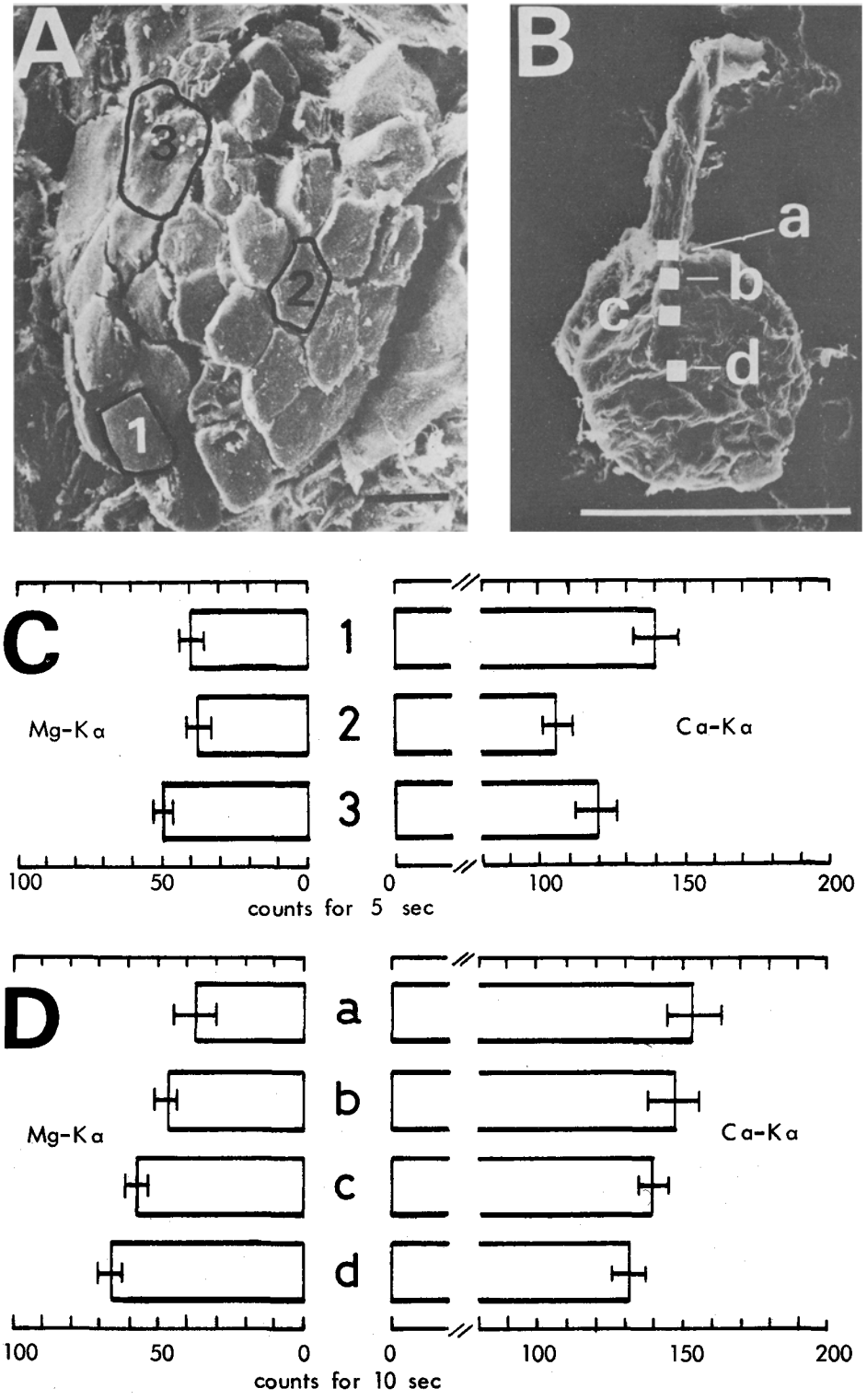
Summary. Ca and Mg contents of snail neuron differ depending on the cell type. Ca and Mg near the cell membrane are not equally distributed in the isolated neuron. Ca is almost twice as dense in the axonhillock region than in the cell body. The Mg distribution pattern is the reverse of that of Ca.

The role of divalent cations, particularly of calcium and magnesium other than as charge carriers, in processes such as regulation of enzymatic activities, secretion of humoral transmitters and initiation of muscle contraction has become of increasing interest. Little is known, however, about the distribution pattern of calcium and magnesium in different types of neurons and in single nerve cells in relation to the cell structure. It is desirable to obtain

information about the relationship between the ionic distribution and functional significance. The electron probe X-ray microanalyser (EPXMA) makes this type of research possible to a certain extent. There is, however, a limitation on preparing specimens for EPXMA: the conventional epon embedding method sometimes leads us to the wrong conclusion because of the redistribution of ions during the preparative procedure; and the freeze dried method is recommended[1,2].

We report here that the content of calcium and magnesium is different depending on the cell type and the calcium and magnesium distribution in the neuron is not even in examinations by EPXMA.

The neurons of the suboesophageal ganglion of the Japanese land snail, *Euhadra peliomphala*[3], were used. The suboesophageal ganglions were dissected and the ganglions were frozen immediately after dissection by dipping in Freon 12 cooled by liquid nitrogen. Freon 12 was almost



A Secondary electron image of an RC-cluster of snail *Euhadra* ganglion; *B* Isolated D neuron. a, b, c and d indicate the analysing spots. a is the spot on the axon-hillock, b is the spot near the axonhillock, c is the spot far from the axonhillock and d is the spot in the cell body. *C* Ca K*α* and Mg K*α* X-ray counts of the 3 identifiable neurons indicated in A. 1: D cell, 2: H cell and 3: I cell according to the classification of Sugaya et al.[3]. Values are the mean±SD of 5 experiments. *D* Ca K*α* and Mg K*α* X-ray counts of a, b, c and d points indicated in B. Values are the mean±SD of 8 experiments. Bar, 100 μm.

solid except for a small volume which was melted by copper block just before dipping the specimen. The frozen ganglion was placed in a specially made ganglion holder and dried by vacuum in a deep freezing box (below −35 °C) without passing through a liquid phase. The completely dried ganglion was dissected with fine forceps under a binocular microscope and the identifiable neurons were selected according to their localization and characteristic orange color. The isolated dried single neuron was placed on a hand-made carbon disk, fitted in the EPXMA holder and coated with carbon in a vacuum chamber. The JEOL 50A X-ray microanalyser was used. The analysis of calcium and magnesium was performed by the spot analysis method using 2 separate X-ray detectors for calcium and for magnesium simultaneously on the same spot. The analysis of whole cell was performed with a spot size of about 50 µm which is smaller than the neuron diameter, and the different type of cells were analysed successively with the same analyser parameters. To obtain the same analysing conditions on a single carbon disk, in the case of analysis of different spots on a single neuron, we used several isolated neurons and analysed them at the four spots mentioned below on a single neuron successively with the same analyser parameters. The analysis was performed with an accelerating voltage of 15 kV and an absorbed current of 10^{-8} A.

Figure A is the secondary electron image of an example of the RC-cluster of *Euhadra*[3]. Figure C shows the calcium Kα and magnesium Kα X-ray counts of each identifiable neuron with the same spot size and the analyser parameters. This clearly demonstrates that the calcium and magnesium content of the neuron is different depending on the cell type.

The D cells are located in the lower part of the cluster and can easily be picked up by fine forceps. Figure B is the secondary electron image of an example of an isolated D neuron in which the cell body and its axonhillock can be recognized; a, b, c and d indicate the localization of the analysis spots. Figure C shows the results of a spot analysis of Ca Kα and Mg Kα by EPXMA. The calcium distribution in the axonhillock region is about twice that in the cell body. Magnesium shows exactly the reverse relationship of calcium distribution, i.e. rich in the cell body and poor in the axonhillock.

The analysing depth of EPXMA was found to be about 5.0–7.5 µm in an examination using copper Kα detection of a copper mesh with ultrathin sectioned epon embedding specimens of various thicknesses. The unequal distribution pattern of divalent cations described above shows changes in the cell membrane and the cytoplasm near the cell membrane. The glial cells which are usually scattered surrounding the neurons were not observed when an isolated single freeze-dried cell was embedded in epoxy resin and examined by transmission electron microscopy. This distribution pattern showed few changes when the ganglion was incubated in a calcium-free medium for 10 min. This means that the above finding, uneven distribution of divalent cations, was not due to the results of surface-attached free calcium in the incubated solution but originated from the cell itself.

In the neurons of *Aplysia* and *Helix pomatia*, synapses are not found on the surface of the cell body but are situated exclusively in the region of the initial part of the axon. The fact that the region of the initial part of the axon is rich in calcium suggests a close relationship between the synaptic region and the calcium-bound cell structure. Hydén demonstrated that the S-100 protein is normally bound to calcium in the synaptic region and conformational changes were proposed with synaptic transmission[4]. Calissano demonstrated 8 calcium binding sites with S-100 brain specific protein[5]. Magnesium is well known as an ion which has antagonistic action on synaptic transmission. In the postsynaptic region, however, the intracellular quantities of calcium and magnesium bound to the membrane structure, or subcellular structure such as the endoplasmic reticulum or mitochondria, are probably always higher and lower respectively than in the other regions.

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Folic acid levels in blood and seminal plasma of normo- and oligospermic patients prior and following folic acid treatment

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Summary. Folic acid was estimated in blood and seminal plasma of normo- and oligospermic men. Following folic acid administration (10 mg TID for 30 days), the levels in blood and semen increased. However, sperm counts, motility and DNA content of spermatozoa were not affected.

Folinic acid, the biologically active form of folic acid, is known to participate in the synthesis of thymine and purine, leading to the formation of DNA.

Since the reports on DNA content in spermatozoa in relation to sperm counts and fertility disorders are inconclusive and often contradictory[1-3], we postulated that in some cases of oligospermia, decreased DNA values[2] may result from folic acid deficiency. With this possibility in mind, we examined the basal levels of folic acid in both the blood and seminal plasma of 40 normo- and oligospermic patients, and their sperm concentrations, sperm motility and DNA contents of spermatozoa. Subsequently, these patients were treated with folic acid, 10 mg TID for 30 days. The above parameters were reexamined on the 14th and 30th days of the treatment and also a month after its completion.

The spermatozoa of the examined semens were counted and the percentage of motile cells was estimated by routine