IMPREGNATION OF THE BRAIN CELLS WITH SILVER BY MEANS OF A CONSTANT CURRENT

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Lavdovsky-Gold's method of chrome-silver impregnation is usually applied in neurosurgical practice to reveal with distinctness the nerve cells of the brain with their very fine axon and dendrite branchings. In order to remove the shortcomings of this rather capricious method various modifications have been suggested. We applied the principle of electrolytic dissociation of silver nitrate under the influence of a constant electrical current; in this process, the silver ions are precipitated on the bodies and branches of the nerve cells, staining them black.

The specimens of brain tissue were at first fixed and then they were not kept in silver nitrate solution for some days, but were subjected to the action of a constant current for 30-60 minutes, as a result of which the brain tissue was impregnated with silver in the same way as with the usual method of Lavdovsky-Gold.

Impregnation of the peripheral nerves with silver (on the basis of the Bilshovsky method with the aid of a constant current) was applied by K. A. Lavrov [1, 2]. This is quite extensively exployed in investigations of the intra-trunk structure of the peripheral nerves according to the method devised by N. I. Odnoralov and described in the literature in the works of I. G. Babenin, N. A. Voronin, E. I. Kuleshov, et al. [3].

The modification of the Lavdovsky-Gold method of chromo-silver impregnation is as follows: after the usual preliminary fixation, according to this method the brain specimens planted on an exposed terminal of an isolated platinium needle joined to the cathode are dipped into a glass vessel filled with 0.75% solution of silver nitrate. The carbon electrodes connected with the anode are also dipped into the vessel. Through this circuit the current is passed at 5 milliamperes for 30-60 minutes, with resulting electrolysis of the silver nitrate within the investigated material. After this, the brain specimens are passed as usual through alcohol of increasing strength and through oil, are enclosed in celluloid and are cut on the microtome. On examination of the sections under the microscope, the nerve cells impregnated with silver stand out clearly with their fine axon collaterals and dendrite branchings covered with nodes. The preparations thus obtained (see Figs. 1, 2) are not inferior to the preparations prepared by the classic method of Lavdovsky-Gold. Our modified method reduces the period of treatment of the material from 12 to 8 days.

It may be that further elaboration of the method will make it possible to more accurately regulate the process of silver impregnation of the nerve cells.

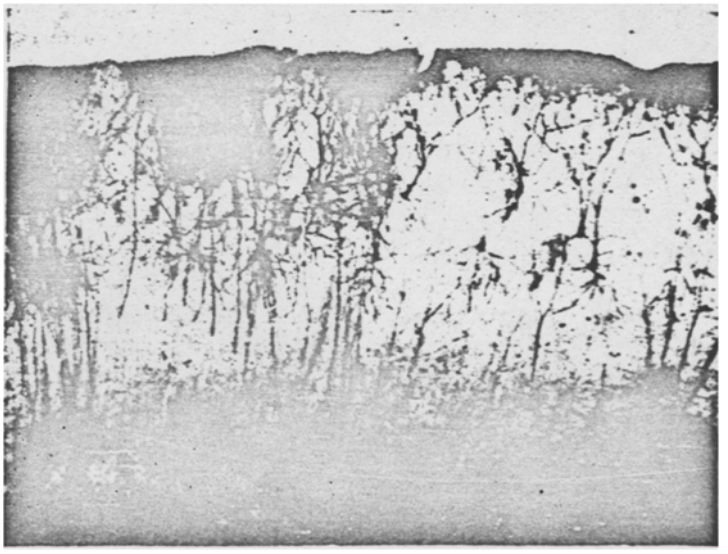

Fig. 1. Cortex of the temporal region of the brain in a normal rat (fields T_1, T_2 – according to Rose; field 6 according to Brodman).
Microphotography. Impregnation with silver by means of a constant current (modification of method of Lavdovsky-Gold).

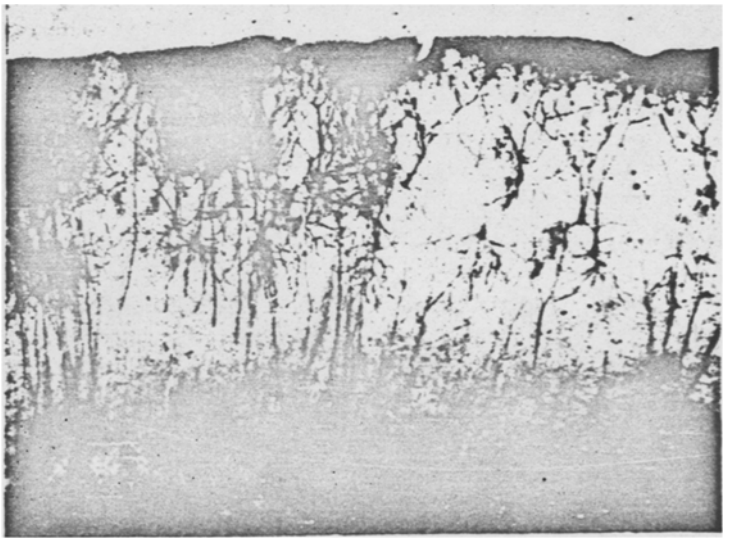

Fig. 2. Cortex of motor region of brain in normal dog (field 4). Impregnation with silver by means of a constant current (modification of method of Lavdovsky-Gold).

LITERATURE CITED

[1] Lavrov, K. A., Proceedings of the First Histological Conference, 1934* (State Biol. Med. Press, 1935), p. 272.

[2] Lavrov, K. A., Terminal Sections of the Peripheral Nervous System* (Rostov-on-Don, 1941).

[3] Collected Works of the Department of Normal Anatomy Dedicated to the 25th Anniversary of Educational and Scientific Activity of Prof. N. I. Odnoralov* (Voronezh, 1949), pp. 111, 133, 138, etc.

* In Russian.