NEW METHODS

ELECTRICAL METHOD FOR THE SIMULTANEOUS STUDY OF CONDITIONED SECRETORY AND MOTOR REFLEXES

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Taking into account the important role of the motor analyzer in the activity of an animal, I. P. Pavlov attached great significance to the simultaneous study of the secretory and motor reactions. However, under the conditions of the secretory chamber, the study of movements is only possible to a slight extent because the animal is restrained by straps and only visual observation is usually possible.

In 1932 V. Ya. Kryazhev [3] and S. A. Kharitonov [7] first carried out an investigation of the secretory and motor components of a single food reaction under conditions of the free movement of the animal with the help of the combined radiomethod suggested by A. A. Yushchenko and L. N. Chernavkin [8]. The advantage of this method was the complete elimination of the transmission system for the registration of saliva; its inadequacies consisted of the impossibility of registering the amount of conditioned and unconditioned secretion (only the fact that salivation occured could be established). This method, in view of its complexity, required considerable experience with radiation on the part of the experimenter. The supplementary apparatus (representing a variation of Ganike's method and fastened to the animal in the same way as the radio transmitter) suggested by the authors together with P. N. Pakhomov [4] could not eliminate the distortion of the indicators of conditioned and unconditioned secretion, as well as an artificial increase in the latent period of up to 8-10 seconds in connection with the increasing friction in the diverse medium. The use of the apparatus requires a great expenditure of labor.

The original secretory-motor method with feeding at two opposing feeders was suggested in 1932 by P. K. Anokhin [1]. With a small range of motion the registration is more exact, but under conditions of the animal's free movement, as a result of the application of a water-air or electrolyte system, an increase in the latent period could take place in connection with the friction and the animal's motions could affect the secretion of electrolyte and, consequently the indicators of secretion.

Under the direction of Professor S. D. Kaminsky, we worked out a method in which we attempted to carry out, as exactly as possible, the direct registration of conditioned and unconditioned secretions without distortions of its size and latent period under conditions of the animal's free movement, to construct the movement chamber in such a way that it would be possible to carry out differentiation under the conditions of a simple labyrinth with good visual observation of the animal's behaviour, to create an apparatus which would be simple in construction and exploitation.

The electrical method we built with the technical assistance of A. Kh. Yakobson consists of a system of registering movements, a system for registering salivation (with a general record on an automatically-recording voltmeter) and a control panel.

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*Deceased.

The motor reactions of the animal take place in a special chamber (Fig. 1), which differs from the usual by the simple labyrinthine construction and the special placement of mirrors for observation. In order to increase the area of the animal's movements and to complicate the problem, the chamber was bent into a U-shape. At the front of its right wing is a door to admit the animal to the platform—"place," at the end of the left wing—the feeder and the registering platform below it.

Above the bar of the U-shaped corridor of the chamber are located slanted mirrors which allow the experimentor to observe the animal whatever part of the chamber it might be in. Above the chamber is a glass cover in the shape of a visor along the right wall.

Such an arrangement, in contrast to the usual movement chambers, can be set up in an ordinary—not elongated—room. The work with animals in this chamber differs little from the usual.

The placement of light stimuli represents a certain peculiarity. We used two screens on which figures of light could be thrown and two electric bulbs of 200 W each, one screen and lamp being placed at the end of the right wing against the platform "place," the other screen and lamp above the feeder.

Under normal working conditions the same stimuli are thrown on the two screens simultaneously, although different stimuli could be given for differentiation—the positive on the right screen (across from the platform "place"), the negative on the other.

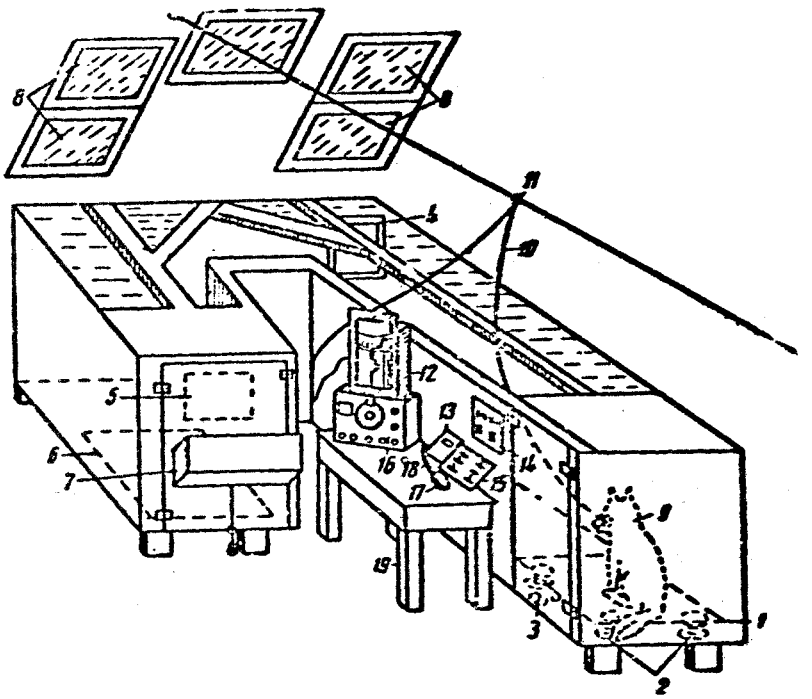

Fig. 1. Secretory-motor chamber. 1) Platform "place;" 2) springs; 3) variable resistance; 4) first light screen; 5) second light screen; 6) platform "at feeder;" 7) feeder; 8) observation mirror; 9) location of the animal before beginning investigation; 10) electrical wires from the drop counter to the registering apparatus; 11) movable ring; 12) automatically-recording voltmeter; 13) numerical drop impulse counter; 14) relay and resistance panel; 15) switches for stimuli; 16) noise generator; 17) bulb for supplying the feeder; 18) switch for starting the ribbon mechanism; 19) master switch for power sources.