PATHOLOGICAL PHYSIOLOGY AND GENERAL PATHOLOGY

AN EXPERIMENTAL NEUROSIS DUE TO LACK OF SLEEP

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As shown by the work of P. S. Kupalov and his co-workers [5], experimental neuroses may arise in animals not only in consequence of over-intensive stimulation, of extremely fine differentiation, or of conflict between excitatory and inhibitory processes, but also by the influence of the most diverse factors directly or indirectly creating difficulties and unfavorable conditions for cortical activity.

It might be expected that "the difficulty of balancing excitatory and inhibitory processes" by prevention of sleep in experimental animals, to which attention has already been drawn by M. K. Petrova [8], may also under certain conditions reach an intensity causing interruption of nervous processes.

There are reports in the literature of the impossibility of preventing sleep in man for long periods of time [7, 11], of changes in the tests of the following movements of the eye after only one period of lost sleep [3], of a "neurosis of the sleep mechanism" [4], and of changes in the cortical dynamics in children whose normal sleep pattern is upset [1].

During the investigation of experimental insomnia in animals, the vital importance of natural sleep was established [6], changes in conditioned reflex activity were discovered [2], and biochemical changes were detected in the central nervous system and the blood [9, 12].

The object of this research was to examine the course of the higher nervous activity in animals deprived of sleep, as far as possible, for a period of 2 days.

EXPERIMENTAL METHOD

The work was carried out on two young male dogs, Pirat and Kazbek, each of which had an external fistula of the parotid ducts. The animals were distinguished from each other by their general behavior: Pirat was lively, but easily inhibited; the younger Kazbek showed signs of being of the impetuous type.

In both animals, positive conditioned reflexes were developed to a bell, a light and to the high tone (+) of a sound generator (1500 cps), and also to a differential low tone (−) (400 cps).

Corresponding to the order of formation of the reflexes, the conditioned stimuli were arranged in the following stereotype: bell, light, high tone, low tone, and, at the end of the experiment, the bell once more. This stereotype of reflexes was firmly consolidated over a period of one year, after which the experimental insomnia was commenced.

The animals were kept under observation throughout the 24 hours, starting with the first hour of the experiment. Pirat behaved quietly during the experiment, reacting only to a new stimulus. Kazbek spent most of the time in moving about, whining and trying to get away from the apparatus.

The animals were placed in the experimental chamber for the usual time required for investigation of the conditioned reflexes. At night, the animals were taken into an illuminated yard where, from time to time they were walked around and harassed, so that they were unable to lay down their head or close their eyes.
Fig. Volume of conditioned secretion of saliva in divisions of the scale; one division was equal to 0.01 cm³.
1) During the first 10 seconds; 2) during the second 10 seconds; 3) total secretion during 20 seconds of isolated action of the signal. I) The day before deprivation of sleep; II) after deprivation of sleep for 24 hours; III) after deprivation of sleep for 48 hours; IV) first day after unlimited sleep; V) second day of natural sleep pattern; VI) tenth day of natural sleep pattern; VII) 17 days after deprivation of sleep; VIII) 1 month 20 days after deprivation of sleep; IX) after an interlude of 2 months in the experiments; X) at the end of a month of work after a rest.