SLEEP

What is sleep? Any one who attempts to secure an answer from treatises on physiology is likely to find the information unsatisfactory. The problem has for the most part been relegated to the psychologists. Pawlow has remarked that when the physiologist leaves the study of the simpler parts of the central nervous system, which he has investigated by observation of reflexes, and proceeds to the higher parts, especially the cerebral cortex, his methods suddenly change; he tends to introduce psychologic ideas derived from his own consciousness. The consequence seems to have been a paucity of knowledge respecting the cause of sleep, a subject to which Kleitman has lately called attention.

Probably the most popular explanation of the mechanism of falling asleep has assumed an anemia of the brain due to fatigue of the vasomotor center at the end of the day’s activities. Innumerable schemes to “draw away blood” from the brain so as to create a cerebral anemia supposedly favorable to sleep are familiar to every physician. Who, indeed, has not now and then attempted to apply the idea in advice to a patient complaining of insomnia? It will be a disappointment to many, therefore, to learn that, contrary to Mosso’s assertion, there is probably a plethora rather than a deficit of blood in the brain during sleep. As for the vasomotor center, furthermore, in Kleitman’s observations at the physiologic laboratory of the University of Chicago it was impossible to detect any loss of tone of the vasomotor center even after 115 hours of wakefulness, or seven times the normal sixteen-hour period. The low blood pressure obtained during the insomnia periods was partly due to a slowed heart, and both the slowed heart and low blood pressure were due to muscular relaxation in the lying position, and were absent when the subject was seated.

Another favorite theory of the genesis of sleep involves the alleged “auto-intoxication with the products of wakefulness.” Chemical compounds supposedly arising as the result of fatigue, fatigue toxins, have lost their popularity of late as sponsors for bodily changes. Kleitman found that a large variety of measurable factors—blood sugar, alkali reserve of the blood and plasma, percentage of hemoglobin, percentage of corpuscles, red and white blood cell count, body weight, basal metabolic rate, appetite, temperature, ability to name letters and to do mental arithmetic—showed no variations from normal during the period of sleeplessness. There is no evidence of an intoxication. Furthermore, while it is true that fatigue will accelerate the onset of sleep, a person can fall asleep when not fatigued at all, and idlers have no difficulty in falling asleep at the usual hour, or at any hour.

The onset of sleep is probably due to complete muscular relaxation, voluntary or involuntary. We have failed, heretofore, to realize the extent to which the impulses pouring into the brain come from the muscles, tendons and joints, proprioceptive impulses as they are often termed, in addition to the visual, auditory and tactile sensations that usually play on the sensorium. Kleitman concludes that when a person lies down the visual sensations soon become monotonous, and muscular relaxation, removing the greater part of the proprioceptive impulses, precipitates what we call sleep.