

other by Amœbiform contraction; conductivity being re-established upon awaking, but rather supports the view that it is, owing primarily to a fatigue of the elements of the central nervous system. Obersteiner and Preyer suppose the production of an acid which accumulating produces fatigue probably lactic. Pflüger supposes the exhaustion of molecular oxygen as the cause. Others have supposed the diminished cerebral circulation to be the cause of sleep rather than the result.

The explanation which the author has been led to give to the plethysmographic curves, described in this paper, has suggested to him a theory of sleep that, in some of its features at least, is new. This theory may be stated briefly as follows: The immediate cause of normal sleep lies in a vascular dilatation (of the skin) that causes a fall of blood pressure in the arteries at the base of the brain, and thereby produces an anæmic condition in the cortex cerebri. This condition of anæmia, in connection with the withdrawal of external stimuli, causes a depression of the psychical processes in the brain cells below the threshold of consciousness. The fall of blood pressure is due, in the first place, to a relaxation of tone in that portion of the vaso-motor centre controlling the skin vessels. The immediate cause of normal awaking, on the contrary, is found in the augmented flow of blood to the brain that follows upon the gradual constriction of the skin vessels as the vaso-motor centre recovers its tone. The periodicity of sleep is, therefore, directly connected with a rhythmic loss and resumption of tone in the vaso-motor centre. Throughout the waking period the vaso-motor centre is under continual stimulation, and is, therefore, in continual activity. Sensory impulses, especially from the skin and the cutaneous sense organs, are at all times falling into the central nervous system in greater or less quantities, and through a reflex pressor action on the vaso-motor centre, these sensory impulses keep up a constant activity of the centre, particularly of that part controlling the skin vessels, as is indicated by the striking effect of such stimuli upon the volume of a limb when measured plethysmographically. Mental activity in all its forms is accompanied by a similar pressor effect upon the vaso-motor centre, which is likewise known to effect the skin circulation. During the waking hours, therefore, the vaso-motor centre is in uninterrupted activity, and the result must be the production of a condition of fatigue in this centre proportionate to the amount of stimulation. If the fatigue is sufficiently pronounced, the centre will relax and sleep ensue in spite of even strong sensory or mental stimuli. If the fatigue is less marked, as is normally the case at the end of a waking period, adequate relaxation takes place only after the