to boil vigorously in all but the mildest winter weather. When this was supplemented by a crescent-shaped pan on the "radiator" (also inside the casing) the evaporation reached twenty-five or more gallons a day—this in a house of perhaps 20,000 cubic feet capacity.

A number of observations of the relative humidity were made with a sling psychrometer in both mild and severe weather. The effect of this considerable evaporation was to raise the humidity perhaps 15 per cent. above the 25 per cent. or 30 per cent. which is its winter value in most houses in this climate. When the value exceeded 40 per cent., however, very annoying condensation effects were noticeable; even the double windows were drenched with water, while, with zero weather outside, the baseboards and furniture of bedrooms which had been cold during the night were wet. At 50 per cent. the condensation became unbearable, even the walls—although built with double air space—being wet. With the humidity at 40 per cent., however—and it seldom exceeded this value with the above mentioned evaporation—no bad effects were noticeable, while it has certainly added very materially to the comfort of indoor living and possibly contributed in securing immunity from colds.

In conclusion it seems to the writer that considerable effort is required to raise the humidity even a few per cent., but that this effort is nevertheless well worth while; also that 40 per cent. is as high a humidity as can be obtained in this climate in winter without annoying condensation effects, even in a house with double walls and double windows, while 70 per cent. would mean the atmosphere of a steam laundry.

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SCIENTIFIC BOOKS

Le problème physiologique du Sommeil. By HENRI PIÉRON. Paris, Masson et Cie. 1913. Pp. xv + 520, six figures in text.

This volume makes a notable contribution to the large literature bearing upon the nature and cause of sleep. That the subject is treated in a comprehensive manner is indicated by the headings of the six parts into which the book is divided, namely, the biology of sleep, under which is included a discussion of related conditions in plants and animals; the physiological phenomena characteristic of sleep, the treatment here being limited to the characteristic sleep in man and the mammalia; states analogous to sleep, including such conditions as coma, narcosis, the action of hypnotics, hypnotic and electrical sleep and hibernation; experimental observations upon the factors of sleep; theories of sleep, and lastly a summary of the present state of the problem together with an outline of his own views upon the subject. The bibliographical and critical part of the book seems to be complete and well done. The author quotes a very extensive literature, and, so far as the reviewer can determine from his own knowledge of the subject, the material referred to has been treated with great fairness to the authors concerned. In fact the impartiality and completeness shown in the presentation of the numerous facts and theories ought to make the book an especially valuable source of information for all who are interested in the subject.

Outside this feature interest attaches chiefly to the experimental contributions made by the author and to the theory which he is led to adopt. His own work, done in collaboration with Legendre, consisted mainly of a study of the toxines produced in dogs kept from sleep during periods varying from 30 to 500 hours. In these animals he obtained evidence of the production of a hypnotoxine which he was able to detect in the blood, brain and cerebrospinal liquid. Incomplete efforts made to isolate this body indicated that it is not dialysable, that it is destroyed by heating to 65° C. and that it is precipitable by alcohol and can be redissolved in water. In the animals subjected to insomnia histological examination demonstrated that there was a distinct degenerative change in the cortex of the prefrontal region. The cells were diminished in

size, the nuclei showed displacement and as regards the Nissl granules there was a condition of chromatolysis or achromatosis more or less complete. When the serum or cerebrospinal liquid from one of these animals was injected into the fourth ventricle of a normal dog this latter animal in a short time gave evidence of somnolence, more or less marked, and upon histological examination showed in the cerebral cortex degenerative changes of the same character as those described for the animal suffering from insomnia. On the basis of these and similar observations the author believes that he has demonstrated the formation during the waking condition of a toxin which may be supposed to have a direct effect in the production of natural sleep. As it accumulates it provokes a condition of fatigue or diminished irritability in the sensory-motor apparatus of the central nervous system, which under the usual conditions may pass into normal sleep. In cases of prolonged insomnia the greater accumulation of the toxine may lead to the production of distinct lesions in the cortical cells and finally to death. When the author comes to apply this idea to an explanation of the mechanism of the daily sleep he encounters a number of theoretical objections which are enumerated and discussed with commendable frankness. The fact that seems to him to be the most difficult to harmonize with his theory is the abruptness with which sleep may appear and disappear. On his view of a gradual intoxication of the nerve cells he admits that there should be a progressive development of somnolence as the toxine gradually depresses the activity of the nerve cells. In view of this difficulty he feels obliged to call upon a secondary hypothesis, suggested by the general views of Brown-Séquard, according to which the hypnotoxine under usual conditions does not paralyze or inhibit the cortical cells directly, but exerts its action indirectly by putting into play an inhibitory nervous mechanism of unknown nature which suspends reflexly the activity of the cells. The reader who follows the author's presentation of the positive results of his experiments, with an increasing conviction that here at last has been discovered a definite factor destined to throw light upon the causation of this mysterious daily rhythm, is conscious of a distinct feeling of disappointment when he is asked to accept this unattractive hypothesis of an intermediary inhibitory apparatus. One can only conclude that the author has made another addition to the long list of unsatisfactory theories of sleep. However, we must feel grateful to M. Piéron for an apparently very reliable presentation of the difficult literature of the subject, and for the experimental results which indicate that during insomnia a definite toxic material is formed in the body. It is to be hoped that his findings in regard to this hypnotoxine will be corroborated and extended by other observers, although it must be confessed that the experimental procedure involved in the production of long-continued insomnia is of such a character that few investigators are likely to be attracted to the work.

W. H. Howell

The Mosquitoes of North and Central America and the West Indies. By Leland O. Howard, Harrison G. Dyar and Frederick Knab. Volumes 1 and 2. Washington, D. C., Carnegie Institution. 1912. Published January and February, 1913.

Nearly thirty years ago I heard Cobbold, the well-known authority on parasitism, lecture on *Filaria sanguinis-hominis* and its relation to the mosquito. It was a good lecture, and created a profound impression; but we who discussed the marvel at that time little imagined what still remained hidden behind the curtain, the merest corner of which had been lifted. In those days the Culicidæ, whether regarded from the medical or entomological point of view, were supposed to be relatively unimportant. To-day it seems astonishing that we could have been so ignorant, and yet all the work that has been done is very far from exhausting the subject. In April, 1902, Dr. L. O. Howard applied to the Carnegie Institution of Washington for a grant "which should enable the preparation