humidities varying from the saturation point to practically nothing. With the exception of the reduction of humidity in warm weather, which the calcium chloride tank does not satisfactorily accomplish, the plant has fulfilled all our requirements. The extreme range in temperature during the day is usually 2° and very rarely over 4° and the extreme range in relative humidity ranges between two and ten per cent. of saturation. The carbon dioxide remains usually below 8 parts per 10,000 when air is supplied and when stagnant conditions are maintained it rises to between 30 and 90 parts depending on the number of occupants in the room and the weather conditions outside which influence inevitable leakage.

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The experimental methods of the New York State Commission on Ventilation.

By **Frederic S. Lee.**

[*From the New York State Commission on Ventilation.*]

Since December 8, 1913, the New York State Commission on Ventilation has been conducting an extended series of experiments on the physiological and psychological action of various atmospheric conditions. For most of the tests human beings have served as subjects; a few lines of observation have been carried out on animals. The rate of the heart beat and the blood pressure have been studied by the usual methods and have subsequently been evaluated according to the Crampton, the Barach and other indices. Bodily temperature has been measured chiefly by clinical thermometers and at times by the constant temperature recorder of Leeds and Northrup. This instrument consists of a self-balancing Wheatstone bridge, is sensitive to one tenth of a degree, and makes on paper a continuous record of rectal temperature. The apparatus proved very prone to get out of order and for this reason could not be used as constantly as was desired. Muscular work was performed by the lifting of dumb-bells to a given height, the number of lifts being recorded by a telephone counter. For more exact determinations of the amount of work performed a Krogh bicycle ergometer was employed and proved very satisfactory.

Respiration was studied by determining its rate and the volume of air respired, the carbon dioxide tension of the alveolar air by the Haldane method, and the volume of the dead space by the method of Douglas and Haldane, while the acidity of the blood was tested by means of both the carbon dioxide tension of the alveolar air and the dissociation curve of the hemoglobin by the method of Barcroft. By the usual methods determinations were made of the respiratory quotient, the amounts of carbohydrate and protein metabolism, the production of heat, and the specific gravity and freezing-point of the urine. Some determinations of the sensitivity of the skin were made by the method devised by Martin.

Appetite was studied by measurements of the number of calories represented in the food actually eaten by each subject from standard luncheons which were served in the observation room. The amount and the quality of mental work which each subject was capable of performing under the different atmospheric conditions were determined by means of a considerable variety of mental tests, such as the naming of colors and their opposites, the cancellation of given letters in a large group, the addition of numbers, mental multiplication, typewriting, the grading according to a given scale of specimens of handwriting, poetry, and English prose composition.

The action of the different atmospheric conditions upon the nasal mucous membrane was observed by means of rhinoscopic observations of the membrane, which were supplemented by the use of the Zwaardemaker plate. The significance of dust in the air in relation to infection was studied by exposing animals for stated periods to air containing dust from various sources, such as metal, hair, coal and mother-of-pearl, and subsequently inoculating the animals with the bacilli of tuberculosis. By means of an apparatus specially devised the amount of dust in the air under different conditions has been determined. The relation of atmospheric conditions to immunity has been studied by determinations of the agglutinins in the blood.