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## SCHOOL-ROOM VENTILATION.

VENTILATION is the supply of fresh air to an apartment, and the removal of impure or vitiated air therefrom. An adequate supply of free oxygen is absolutely necessary to animal life; and, the higher we ascend in the scale of that life, the greater the quantity of oxygen consumed, and the more urgent the necessity for its consumption. In the atmosphere this oxygen exists in a free state - in mechanical solution - and in the form and proportion in which it is most easily assimilable. From the atmosphere, the animal absorbs it by means of its breathing apparatus which provides for its absorption by the blood, and the blood carries it to the tissues. *Pure air* consists of a mechanical mixture of about four-fifths nitrogen and one-fifth oxygen, with traces of ammonia, and about one part in two thousand of carbonic-acid gas ( $\text{CO}_2$ ). These latter (ammonia and  $\text{CO}_2$ ), from their small amount, may be neglected.

Air becomes vitiated for breathing purposes by holding in solution other gases or substances whose presence interferes with the appropriation of oxygen by the animal, or, being them-

selves absorbed, exert a toxic influence upon the vital fluid and tissues of the body. Hence, to secure an adequate supply of fresh air, and the removal of impurities that accumulate therein, are the objects of ventilation. In this paper school-room ventilation only will be considered.

A full-grown person breathes on an average about twenty times per minute, and takes in over twenty cubic inches of air at each inspiration. Boys and girls inspire somewhat less than twenty cubic inches, but breathe more rapidly than an adult - say twenty-five times per minute. In five minutes each will breathe over a cubic foot of air, and in a two hours session nearly twenty-five cubic feet, so that, in a school of forty pupils, one thousand cubic feet will be inhaled every two hours. This is under, rather than above, the average.

Oxygen to the amount of nearly five per cent. of the quantity inhaled disappears at every breath, being absorbed by the blood - or twenty cubic inches per minute for each individual - representing a total of fifty cubic feet for a school of forty pupils during a two hours session. But, in addition to