

another, the blood may be said to be peculiarly the *vital fluid*. But this fluid is continually expending itself. It is supposed that between every two and three minutes the blood completes the circulation of the body. And how are its wasted, exhausted energies repaired? By food and atmospheric air. Here, did our space admit, we should discuss the whole matter of food, both as it regards quality and quantity, as well as the varied digestive processes through which it passes before it reaches the venous system in the shape of a concentrated fluid, namely, mastication, chymification and chylification,—with the agents by which these processes are effected. Suffice it to say, that this food both in point of quality and quantity, should be adapted to the age, the constitution, and the circumstances of the recipient; and that the conditions most conducive to the proper performance of the digestive functions are, temperate habits, regular exercise, and a cheerful mind. These are matters however that belong more directly, in so far as the physical education of the young is concerned, to nurses and parents. It is more to our purpose that we consider as briefly ~~as possible the whole process of respiration. Now, it is a universal~~ ~~fact, that since the days of Harvey, that there~~ are two currents of blood in the animal body—the pulmonic and the systemic, the one being carried by the veins and the other by the arteries. The former conveys the venous blood, which has been gathered up by the capillaries, or the hair-like extremities of the veins all over the body, along with the chyle or the concentrated fluid of the food, to the lungs; and the latter, the vitalized or purified blood, to all parts of the body, diffusing nutriment and strength in its course.—These two fluids,—the blood in the veins and the blood in the arteries,—are diametrically opposed in their nature, the one containing noxious poison, and the other, the very life and nutriment of the physical frame. This change is produced in the lungs, into whose beautiful network the blood is forced by the right lobe of the heart; when, being subjected to the influence of the atmospheric air, it undergoes the change referred to; it passes through a process of assimilation, or becomes part and parcel of ourselves. This air, as is well known, is composed of two essential ingredients, oxygen and nitrogen, in the proportion of 1 to 4 by volume, or of 21 to 79 per cent. This proportion of these two gases is indispensably necessary for producing the desired effect. Let the oxygen—(which really constitutes the life-supporter while the nitrogen is its diluent)—let the oxygen be either increased or diminished, and that instant are the results apparent by a quicker or slower circulation, thereby affecting most materially the whole of our physical and mental framework. Now the quantity of this atmospheric air requisite for purifying the blood can be easily computed. The act of respiration is repeated once in three seconds, or twenty times a minute, and the quantity of air inhaled in every such act by a full grown person is 36 cubic inches, or between 3000 and 4000 gallons every twenty-four hours. By ascertaining, then, the dimensions of any room or apartment and its consequent capacity, we can easily see what number of persons can be accommodated therein, so that all shall be provided with a due supply of this essential, this indispensable element. The food and the drink we consume may be of importance; but what are they in comparison with the pure atmospheric air. The one is at best but the raw material, the other is the vitalizing, the influential power. Men have been known to live three weeks without eating. But exclude the atmospheric air from the

lungs for the space of three minutes, and death generally ensues. Thus life will continue with abstinence from food three thousand times as long as it is safe to protract an atmospheric fast. Take another view of the vast importance of this subject. Men usually eat three times in twenty-four hours.—This is all that is necessary to, or compatible with, the enjoyment of uninterrupted good health. But we involuntarily breathe nearly thirty thousand times in the same length of time. We need, then, fresh supplies of pure air ten thousand times as often as it is necessary to partake of meals. Is it not apparent, then, that man subsists more upon air than upon his food and drink?

But granting that there is a sufficient supply of pure atmospheric air, for a given number of persons, for a certain period of time, in a very short space that air will become contaminated and vitiated; and to what is this owing? It is owing entirely to the chemical change which takes place by means of the assimilative process. As to the exact nature of the change which then takes place neither chemists nor physiologists are agreed. Certain it is, however, that the air which is ~~inhaled~~ ~~is not the same as that~~ ~~which is inspired.~~ A considerable quantity of the oxygen has disappeared and in its stead another gas, called carbonic acid—formed by the combination of the oxygen with the carbon in the venous blood—is thrown off. It appears that about 45,000 cubic inches of oxygen are consumed by an ordinary man in twenty-four hours, and that 40,000 inches of this gas go to form the carbonic acid produced during the same period, the remainder of the oxygen probably combining with other ingredients of the blood. This carbonic acid, need we say, is a potent poison and fatal to animal life, and is therefore discharged from the lungs. But this very circumstance soon vitiates the atmosphere of a well filled or crowded apartment, and sometimes produces the most disastrous results.—What are the languor, the exhaustion and headaches, which occur in churches, theatres and ball-rooms, but so many warnings that ventilation is not properly attended to, that the lungs are insufficiently supplied with oxygen to decarbonize the blood passing through them, and that the system is suffering the evil consequences which such circumstances are fitted to produce. When these warnings are neglected and the same air continues to be breathed again and again, the proportion of carbonic acid at last becomes so large that its presence in the inhaled air prevents its further elimination from the blood. It thus acts as a poison, and extinguishes life. This result occurs very speedily when the quantity of carbonic acid in the air reaches the amount of ten per cent; but a much smaller quantity, especially when combined with animal effluvia, is sufficient to produce fatal effects when its action is prolonged. The most terrible catastrophe known to have arisen from this cause is that which occurred in the Black Hole of Calcutta in 1756. One hundred and forty-six Englishmen were thrust into a wretched prison eighteen feet square, in which there were only two very small windows, by which air could be admitted, but as both of these were on the same side ventilation was utterly impossible. Scarcely was the door shut upon the prisoners, when their sufferings commenced, and in a short time a delirious and mortal struggle ensued to get near the windows. Within four hours those who survived lay in the silence of apoplectic stupor; and at the end of six hours ninety-six were relieved by death! In the morning, when the door was opened, twenty-three only were found alive, many of