Now in respiration there are two processes, *inspiration* and *expiration*. In the former by the contraction of certain muscles the cavity of the chest becomes enlarged. This causes the pressure of the air in the little air sacs of the lungs to become less than that of the air outside the body. As a result there is a rush of air through the windpipe into the lungs until the pressure inside and outside is equalized. On expiration the muscles which previously acted are relaxed, and the natural elasticity of the chest wall and air cells, aided also by the contraction of certain muscles, causes the chest to return to its former size and so forces the air out through the windpipe. The air taken in on inspiration contains oxygen, but the air given out on expiration contains carbonic acid. The process by which the interchange is made is at the same time a very simple and a very interesting one.

The walls of the air sacs of the lungs are surrounded by small blood vessels in such a manner that the blood in these vessels is separated from the air in the air sacs by but a very thin wall. Through this wall the oxygen of the air passes from the air sacs to the blood in the blood vessels, and through this wall also the carbonic acid of the blood passes from the blood in the blood vessels to the air in the air sacs.

We thus see that the air in passing into and out of the lungs is, on the one hand, robbed of a portion of its oxygen, and, on the other, loaded with a certain quantity of carbonic acid. The blood too, as it passes along the blood vessels, arteries and veins, undergoes similar changes. It may be necessary at this point to remember that the blood is made up of a fluid, in which are suspended small discs, some of which are white and some of which are red. These red discs, or red corpuscles, as they are called, have for their function the carrying of oxygen and carbonic acid between the lungs and the tissues. Beginning, say, at the air sacs of the lungs, we found that the oxygen of the air in the air sacs passed through a thin wall so as to get into the blood. In reality the oxygen passes into the red corpuscles of the blood. These when loaded float along in the blood stream in the arteries until they reach a tissue requiring oxygen. Here by a similar process of diffusion their load of oxygen is given up to the tissue which requires it for food, and a load of carbonic acid, or waste matter, is taken up by these same red corpuscles from the tissues. With this return load they float along the blood stream in the veins until the lungs are again reached. Here they unload their carbonic acid as before described, and take up a new load of oxygen, to be similarly disposed of.

Now of course without oxygen the tissues of the body cannot live. The sole source of supply of oxygen is the external atmosphere which we breathe. The method of obtaining the necessary oxygen is as described. But the atmosphere does not consist of pure oxygen. Pure air is a mixture of oxygen, nitrogen, carbonic acid, water vapor, and traces of ammonia, sulphuretted hydrogen, etc. In one hundred volumes of pure air there would be but twenty-one of oxygen. So that it will readily be understood that even in health it is advisable to breathe pure air so that the work of the red blood corpuscles in carrying the requisite amount of oxygen to the tissues may be as easy as possible. Because if the air is not pure it is more difficult for the red blood corpuscles (1) to secure their usual load of oxygen and (2) to unload their cargo of carbonic acid. This is true because if the air which is breathed has been previously loaded with carbonic acid, as is usually the case when the air is impure, it will not take up from the red blood corpuscles their store of that gas, and so they are unable on their return journey to take as much oxygen as would otherwise be possible.

If then the breathing of pure air is advisable under ordinary conditions of health, how much more is it essential in disease of any kind, where there is so much more waste matter to be eliminated and so much more need for oxygen. And how reasonable it seems that pure air should be particularly valuable in disease of the lungs where there is not only all the extra demands made by the disease itself but where also the main mechanism for performing the important function of respiration is itself disabled, and the whole burden becomes thrown on that portion of the lungs which has remained healthy.

The total quantity of air which passes into and out of the lungs of an adult, at rest, in 24 hours, is about 686,000 cubic inches; the average amount for a hard working laborer would be about 1,568,390 cubic inches. The greatest respiratory capacity of the chest is indicated by the quantity of air which a person can expel from the lungs by a forcible expiration after the deepest inspiration. It may be given as about 225 cubic inches. The amount of air, however, which is uniformly changed in each act of breathing is only about 30 cubic inches. In this way we can estimate that about 13 cubic inches of carbonic acid is given off in each respiration, and about 14 cubic inches of oxygen taken in.

And in order that provision may be made for a constant supply of fresh air, and the removal of that which has become impure, not less than 2000 cubic feet per head should be allowed in sleeping apartments, and even with this allowance the air can only be maintained at the proper standard of purity by a system of ventilation which supplies 2000 cubic feet of fresh air per head per hour.

It is desirable therefore not only in health, but also in case of disease of any kind that