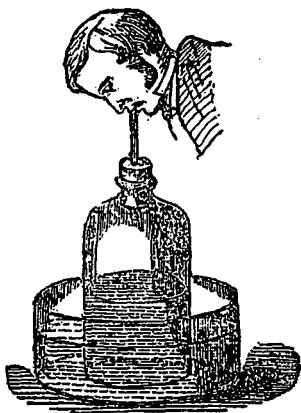
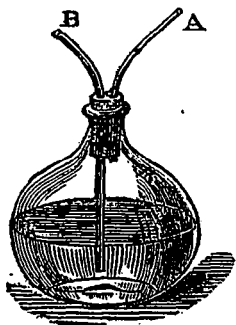


reason. Something or other —namely, my lungs— had taken away the oxygen from the air, and there was no more to supply the combustion of the candle. It is, I think very pretty to see the time it takes before the bad air which I throw into this part of the apparatus has reached the candle. The candle at first goes on burning, but so soon as the air has had time to reach it it goes out. And now I will show you another experiment, because this is an important part of our philosophy. Here is a jar which contains fresh air, as you can see by the circumstance of a candle or gas-light burning in it. I make it close for a little time, and by means of a pipe I get my mouth over it so that I can inhale the air. By putting it over water in the way that you see, I am able to draw up this air, (supposing the cork to be quite tight), take it into my lungs, and throw it back into the jar: we can then examine it, and see the result. You observe, I first take up the air, and then throw it back, as is evident from the ascent and descent of the water, and now, by putting a taper into the air, you will see the state in which it is by the light being extinguished. Even one inspiration, you see, has completely spoiled this air, so that it is no use my trying to breath it a second



time. Now you understand the ground of the impropriety of many of the arrangements among the houses of the poorer classes, by which the air is breathed over and over again, for the want of a supply, by means of proper ventilation, sufficient to produce a good result. You see how bad the air becomes by a single breathing, so that you can easily understand how essential fresh air is to us.

To pursue this a little further, let us see what will happen with lime water. Here is a globe which contains a little lime-water, and it is so arranged as



regards the pipes, as to give access to the air within, so that we can ascertain the effect of respired, or unrespired air upon it. Of course I can either draw in air (through A) and so make the air that feeds my lungs go through the lime-water, or I can force the air out of my lungs through the tube (B) which goes to the bottom, and so show its effect upon the lime-water. You will observe that however long I draw the external air into the lime-water, and then through it to my lungs, I shall produce no effect upon the water—I will not make the lime-water turbid; but if I throw the air *from* my lungs through the lime-water, several times in succession, you see how white and milky the water is getting, showing the effect which expired air has had upon it; and now you begin to know that the atmosphere which we have spoiled by respiration is spoiled by carbonic acid, for you see it here in contact with the lime water

I have here two bottles, one containing lime-water and the other common water and tubes which pass into the bottles and connect them. The apparatus is very rough, but it is useful notwithstanding. If I take these two bottles, inhaling here and exhaling there, the arrangement of the tubes will prevent the air going backwards. The air coming in, will go to my mouth and lungs, and in going out, will pass through the lime water, so that I can go on breathing and making an experiment, very refined in its nature, and very good in its results. You will observe that the good air has done nothing to the lime water; in the other case nothing has come to the lime-water, but my respiration, and you see the difference in the two cases.

Let us now go a little further. What is all this process going on within us which we cannot do without, either day or night, which is so provided for by the Author of all things, that He has arranged



that it shall be independent of all will? If we restrain our respiration, as we can to a certain extent, we should destroy ourselves. When we are asleep, the organs of respiration and the parts that are associated with them, still go on with their action so necessary is this process of respiration to us, this contact of the air with the lungs. I must tell you in the briefest possible manner, what this process is. We consume food: the food goes through that strange set of vessels and organs within us and is brought into various parts of the system, into the digestive parts especially; and alternately the portion which is so changed, is carried through our lungs by one