

LECTURE TO LITTLE FOLK.

MY DEAR BOYS,—

Things which we see every day, and wonders which are close to us we are too apt to overlook, but if you will give me your attention for a short space of time you will begin to find out many extraordinary powers in objects with which you have seemed already familiar.

Let us take for example Air, probably many of you up to the present moment have never given so apparently a common thing as the air we breathe a thought, and yet without it for a few minutes and we cease to live. When people are drowned what causes their death? because the water prevented the air being breathed, that is to say the air could not get into the lungs, which is our breathing apparatus within the chest, and they suffocated. The same thing happens when persons are smothered. But although we die under water-fishes live; and yet air is as necessary to fishes as to us. If any one was to put water from which the air had been expelled by heat into a glass globe where small gold fishes swim so happily, and then cover over the top so as to perfectly exclude the air, the poor fishes would soon become distressed and then die, but I hope none of you will ever be so cruel as to test this experiment. Everything made by God is fitted for its own element, and though our lungs cannot breathe in water, fishes are provided with gills which enable them to do so. I suppose you think the air which you draw into your chest goes out in the same state, but that is not the case. When you breathe it out again it has become poisonous to you and to all animals. A very cruel ruler in India, whose feelings had made him brutal, once proved this in a dreadful way, by shutting up a crowd of English prisoners in a kind of cellar or dungeon, to which there was but a small opening to admit fresh air. It was called the Black Hole, of Calcutta. During the night almost all of these poor prisoners were poisoned by their own breath and died a most frightful death. This was a very horrible thing and will perhaps appear strange to you till you understand it, but give me your attention a little longer and I will explain.

The air, through which I wave my hand and which agitates the particles of dust you see floating in the sun-beam which enters your window and makes the leaves upon the trees in summer dance as it rushes by—the air which drives the ship, which flies your kite—this air without which the birds could not sing or the organ & bells peel forth on Sunday, the air without which you could hear no sound, this transparent air which makes the sky or blue, the leaves so green, which holds up the clouds, and allows the feathery snow to fall so gently, this air is a mixture of two airs, or gases of very different characters. This I now intend to tell you how to find out, and how to move that the air you take into your chest goes out in a poisonous state. I shall leave you to make these experiments because they will be more instructive than if I make them for you and will be retained longer in your memory. To show that the air will not support life after being breathed repeatedly, it is not necessary for us to put an animal cruelly to death; we can prove it without making any poor creature suffer. The same process which goes on in a lamp or fire goes on in your body, and keeps you warm. In breathing a very small portion of your body is consumed, as the candle is, and that heat is produced which keeps you warm.

When you run and jump a great deal you breathe faster, and there is more heat produced in your lungs, and this heat

which is increased by exertion, is diffused all over your body, by the blood, which courses, like hot-water through all the pipes provided for it. Remember then that what you see going on so fiercely in a lamp or fire, is also going on, but very slowly, in your lungs. In place of a breathing animal, we can therefore use a lamp because they are much alike in this respect. If we find that a lamp burns dimly or goes out in air which has been repeatedly breathed, than that air is not fit to support animal life, hence it is a very unhealthy custom to burn a lamp in a sick chamber, a gas-burner consumes as much air as eleven men would do, that is, one gas burner in three quarters of an hour consumes as much air as would answer a man for a whole night.

Now for an experiment. Take a piece of sperm candle (tallow will also answer) about one inch long and place it upright in the middle of a saucer, and after lighting it, cover it over with a clean glass tumbler (which should be first warmed to prevent it from cracking from too sudden heat) and then wait the result. You will see the candle in a minute or two, burn very dull, flicker and then go out. The reason why it will not burn is because it has converted the good air into a kind of gas, which will not support life or fire. That part of the air which was necessary to the burning of the taper has been exhausted, and another kind of gas, called *carbonic acid* has been formed. To prove this I will describe another experiment with the tumbler and saucer.

Having lifted the saucer from the table with the left hand, steady the tumbler by placing your right hand upon it, and then turn the whole apparatus upside down, so that the saucer may bear the top of the tumbler glass. The glass must then be placed upon the table. Take another bit of candle, and having fastened it upon the end of a piece of crooked wire, let it be lighted, and at the same time let the saucer be slowly slid off sideways from the top of the tumbler, it will immediately extinguish the flame. The experiment may be repeated several times. This proves that the air is poisonous, because that which extinguishes flame, if taken into the organs of breathing, the lungs, is fatal to animal life. The same process which produced heat in the candle, produces heat in your body, and that which prevents the process going on in the one, also prevents it taking place in the other. Remember this then, that both you and the candle produce poisonous gas, and if you are denied fresh air, the candle will go out, and you will die. Now, my dear boys, the knowledge which I desire to instil into your young minds from this little experiment, is much greater than you will at first see, and will be useful to you in many different ways. It shows you why it is a bad practice for little boys to sleep with their heads under the bed clothes in cold winter nights, when they do this, they breathe bad air which has already been thrown off from their bodies, and which should be permitted to move away. Many children become ill from this practice, and their skin assumes a sallow cast, their spirits low, and if persisted in will eventually shorten their lives.

The poisonous air or gas which is left in the tumbler, does not fly out at the top when the saucer is removed, it remains settled in the glass. It is therefore heavier than common air. That is the reason why it is apt to accumulate at the bottoms of deep cellars and wells, or other places which are not disturbed by draughts or fresh air. In these places *carbonic acid gas* settles down, just as it settles down in the tumbler, and if ignorant men go down thoughtlessly into such places, they are very likely to be suffocated or poisoned by it. Now you see the advantage of knowledge, knowing this, and I am sure