the consumption of oxygen, the air is further deteriorated by the exhalation of nearly as much carbonic-acid gas (CO_2) as there is oxygen consumed—say forty-five feet in two hours, about one-fortieth of the total amount produced being thrown off by the cutaneous surface of the body. Each cubic foot of carbonic acid gas contains nearly half an ounce of pure carbon, or twenty-three ounces in all, so that, by breathing, forty mouths—like veritable little chimneys—puff off in two hours an amount equal to about a pound and a-half of solid carbon. This is injurious in two ways, each of which will be examined in the proper place.

The air occasionally contains many impurities, but only those usually found in the school-room will here be enumerated. They are carbonic oxide (CO), carbonic-acid gas (CO_2), ammonia (NH_3), sulphur (S), sulphuretted hydrogen (H_3S)—all in the gaseous form; to which must be added aqueous vapor, organic matters, inorganic matters, epithelial cells, and animal exhalations.

The most toxic of all these is undoubtedly carbon monoxide (CO). It is a product of the incomplete combustion of carbon (C), but happily it is not usually found in the school-room in any large amount. A fire is the result of the chemical combination of the carbon of coal or other combustible, with the oxygen (O) of the air; the atoms of the gas rush into combination with those of the carbon, and the arrested motion is transformed into heat—aqueous vapor (H_2O), carbon monoxide (CO), and carbonic acid gas (CO_2), being produced. If a sufficient supply of air has free access to the *lower* portions of the fire, carbonic acid gas is directly formed; but this, in its passage upward through the central portion of the fire, where the temperature is higher, takes up another atom of carbon ($CO_2 + C = CO + CO$) and becomes carbon monoxide or carbonic oxide, as it is commonly called. This carbonic oxide, on reaching the upper surface of the fire, takes up an additional atom of oxygen from the air, and, burning with a bluish flame, becomes carbonic acid gas once more, and makes its escape by the chimney. But usually a portion of the carbonic oxide fails to take up the additional atom of oxygen; and, when the supply of air is limited, the amount is increased, so that more or less carbonic oxide passes up the chimney along with the other gases of combustion. As the products of combustion are much lighter than the surrounding atmosphere—volume for volume—on account of their much higher temperature, and as the expansibility of gases is very great, they exert a pressure upon the sides of the pipe or flue through which they ascend. This being the case, these gases will escape through chinks, holes or defective joints, along their course, like steam through a leaky conduit. Downward air-currents in the flue, and lateral currents from open windows, etc., occasionally blow large quantities of the gases of combustion through the open door of the stove, or through seams or cracks therein; and in these two ways—through stove and flue—sulphur, carbonic oxide and carbonic acid gas may find their way into the room. It is claimed by some physicists that carbonic oxide will make its way through heated iron, and thus escape through the sides of the stove, but the quantity given out in this way—if, indeed, any is given out, of which there is reasonable doubt—must be so small that it is practically of no account, while quantities large enough to be decidedly injurious may issue through the door and other openings. Of course, these remarks apply only to schools heated by stoves; but it must not be forgotten that in rural districts and many cities, all the schools are still heated in this way.

Carbonic oxide is a deadly poison,