

rom it. The momentous consequences from a cause so trifling, and the consideration that they might have been averted off by only a little knowledge of natural causes, furnish melancholy matter for reflection. Many analogous cases, which might be referred to, demonstrate that we are yet but in the infancy of an understanding of the subject of aerial poison.

Putrid matter of all kinds is another conspicuous source of noxious effluvia. The filth collected in ill-regulated towns—ill-managed drains—collections of decaying animal substances placed too near or within private dwellings—are notable for their effects in vitiating the atmosphere and generating disease in those exposed to them. In this case also it is a poison, diffused abroad through the air, which acts so injuriously on the human frame. This was probably the main cause of the plagues which devastated European cities during the middle ages. In those days there were no adequate provisions for public cleaning, and the consequence was, that masses of filth were suffered to accumulate. The noxious air diffused by these means through the narrow streets and confined dwellings would tend to the most fatal effects. In old drains there is generated a gas (sulphuretted hydrogen) which is calculated to produce dreadful consequences in those exposed to its inhalation. It has lately been discovered that it is the presence of this gas, arising from the shores, river deltas, and mangrove jungle of tropical Africa, which causes the peculiar unhealthiness of that region. It is ascertained that small animals, such as birds, die when the air they breathe contains one fifteen hundredth part of sulphuretted hydrogen, and that an infusion six times greater will kill a horse. It follows that we can scarcely attach too much importance to measures for cleaning and improving the sewerage of cities. There are as yet no large towns in Britain kept in a state so clean as is desirable for the welfare of their inhabitants; nor will they be so till the measures now in agitation for improved modes of construction, for adequate supplies of pure water, and for thorough scavenging and sewerage be adopted.

The human subjects tend to vitiate the atmosphere for itself, by the effect which it produces on the air which is breathed. Our breath, when we draw it in, consists of the ingredients formerly mentioned, but it is in a very different state when we part with it. On passing into our lungs, the oxygen, forming the lesser ingredients, enters into combination with the carbon of the venous blood (or blood which has already performed its round through the body); in this process about two-fifths of the oxygen is abstracted and sent into the blood, only the remaining three-fifths being expired along with the nitrogen nearly as it was before. In place of the oxygen consumed, there is expired an equal volume of carbonic acid gas being a result of the the process of combination just alluded to. Now carbonic acid gas, in a larger proportion than that in which it is found in the atmosphere, is noxious. The volume of it expired by the lungs, if free to mingle with the air at large, will do no harm; but if breathed out into a close room,

it will render the air unfit for being again breathed. Suppose an individual to be shut up in an air-tight box; each breath he emits throws a certain quantity of carbonic acid gas into the air filling the box; the air is thus vitiated, and every successive inspiration is composed of worse and worse materials, till at length the oxygen is so much exhausted, that it is insufficient for the support of life. He would then be sensible of a great difficulty in breathing, and in a little time longer he would die.

Most rooms in which human beings live are not strictly close. The chimney and the chinks of the door and windows generally allow a communication to a certain extent with the outer air, so that it rarely happens that great immediate inconvenience is experienced in ordinary apartments from want of fresh air. But it is at the same time quite certain that in all ordinary apartments where human beings are assembled, the air unavoidably becomes considerably vitiated; for in such a situation there cannot be a sufficiently ready or copious supply of oxygen to make up for that which has been consumed, and the carbonic acid gas will be constantly accumulating. This is particularly the case in bed-chambers, and in theatres, assembly-rooms, churches, and schools. An extreme case was that of the celebrated Black Hole of Calcutta, where a hundred and forty-six persons were confined for a night in a room eighteen feet square with two small windows. Here the oxygen, scarcely sufficient for the healthy supply of one person, was called upon to support a large number. The unfortunate prisoners found themselves in a state of unheard-of suffering, and in the morning all were dead but twenty-three, some of whom afterwards sunk under putrid fever, brought on by breathing so long a tainted atmosphere.

Although the vitiation of the air in ordinary apartments and places of public assembly does not generally excite much attention, it nevertheless exercises a certain unfavourable influence on health in all the degrees in which it exists. Perhaps it is in bedrooms that most harm is done. These are generally smaller than other rooms, and they are usually kept close during the whole night. The result of sleeping in such a room is very injurious. A common fire, from the draught which it produces, is very serviceable in ventilating rooms, but it is at best a defective means of doing so. The draught which it creates generally sweeps along near the floor between the door and the fire, leaving all above the level of the chimney-piece unpurified. Yet scarcely any other arrangement is anywhere made for the purpose of changing the air in ordinary apartments. To open the window is a plan occasionally resorted to, but it is not always agreeable in our climate, and sometimes it produces bad consequences of a different kind.

It would nevertheless be easy to produce an effective draught from any room in which a fire is kept. It is only necessary to make an aperture into the flue, near the ceiling of the room, and insert therein a tin tube, with a valve at the exterior, capable of opening inwards, but closing when at rest, or when