

gressed. The disapprobation that would universally fall on the transgressor, would render his life irksome to him. I was once solicited to get a man hanged, as the English put people, even Brahmins, to death in that way for murder, for an infraction of the rule. Serious, indeed, were its consequences. He had unwillingly (I believe) come in travelling into an infected village and slept there, and then came into a Brahmin's in another: it was one of those houses, or accumulation of houses under one roof, where many families dwell. Five young persons of one family, and the mother and two children of another, fell victims to the disease at its outset. The complainant, the widower, and near relative of the others, urged that his guest's conduct had been as criminal as that of a slayer of men, and pathetically mourned the havoc that ensued from it.

I mention this merely to show the strong opinion that is held on the subject; of course I could give no redress, or inflict any punishment. The spread of the disease was speedily arrested by the rapid and extensive introduction of the vaccine; and here I had several opportunities of observing the fact already mentioned, of the two diseases proceeding simultaneously till about the close of the eighth day of the vaccine, when both begin to cease. It was here that the confluent case occurred in the Brahminee young lady mentioned above.

I may mention, that it is of some consequence in vaccinating that the touch should be perfectly sharp; failures are more frequent when it is not; even those sharpened at our own stones do not answer perfectly; they are sharp, but not so smooth as out of the hands of the makers; they do not last well, and they soon rust. It would seem that any roughness in the instrument the poisoned wound is made with, is against the absorption of the poison; the best for the coast are Stoddarts' Wootz, or Indian steel lancets; each of them is worth at least three or four of any other kind; they are so hard that they keep their edge long, and they do not rust near so rapidly. This steel was imitated, but the imitation was faulty; I detected it in use, and made the Stoddarts acquainted with the fact, i.e. of its not being the same, and not at all so good. It would seem, they supposed, they could form an equal compound to the original by combining the various ingredients which chemistry had discovered it to consist of; as this was not the case, they, of course, were to abide by the original. The silver steel does not answer at all well on this coast; it blackens and rusts very fast.

P.S.—It being now proved that vaccinia is only variola, modified by passing through the genus taurus, perhaps, also, the transit into a milder and more rapidly-progressing disease, may not the explanation of the two

running their course together for a time be, that as the modified runs its course so much more speedily than the original, so, having once taken effect, its preventive power is shown in destroying the virulence of the original at the time of its becoming perfect?

Vaccinated in 1828 in the Southern Konkem.

	Males.	Females.	Total.
January	1430	1374	2804
February	1348	1205	2553
March	874	875	1749
April	2196	1039	3235
May	1264	1033	2296
June	813	822	1635
July	642	578	1220
August	1201	1150	2351
September	1635	1531	3166
October	1774	1549	3323
November	1839	1745	3634
December	1860	1756	3616
Total	16,876	14,706	31,582

ON THE
INJURIES TO HEALTH
OCCASIONED BY
BREATHING IMPURE AIR IN CLOSE
APARTMENTS.

By Dr. ELMORE.

NOTWITHSTANDING the various inventions and improvements which distinguish the age we live in, it is lamentable to observe what little attention has been paid to the ventilation of apartments in which we are destined to pass the greater portion of our lives, and in which a constant and well-regulated supply of the element we breathe is so essential to mental enjoyment, as well the sustention and prolongation of life.

This inattention can only be accounted for either by the want of education in the major part of that class of persons who call themselves builders, and who content themselves with executing their work, and getting it off their hands with as little expense and loss of time as possible; or an apprehension, on the part of those who aspire to the more elevated designation of architects, that the introduction of anything new would expose them to the charge of a want of taste, or of that acquaintance with the style of the ancients to which it is the fashion so strictly to adhere, imitation being, in their opinions, more deserving of commendation than originality of design, or a desire to meet the improvements of the age; and fashion, of more importance than health. If they construct our doors and windows in so superior a manner as to exclude every possible par-

ticle of air, they flatter themselves with having attained an advantage to which the inhabitants of ancient Greece and Rome did not aspire; and when they arrive at that degree of perfection which will enable them to exclude this element altogether, they will, no doubt, be entitled to an increased meed of praise from medical practitioners, heirs-at-law, undertakers, &c. They should, however, recollect, in their apparent anxiety for imitation, that the ancient architects of warmer climates did not overlook the necessity of a free admission of air; and also, that a constant supply and free circulation of this element is as necessary for sustaining life, as a given quantity for the combustion of the fuel we require to warm our apartments: our builders, nevertheless, only provide for the latter, as if the former, although the more important, was of minor consideration; or, that they conceived the chimney-draught sufficient for both purposes, when in reality it does not answer that for which it is principally intended; as by far the greater portion of the heat generated in our open fire-places is carried up the chimney, by sharp currents of air from occasional openings of doors, or such crevices as it may force its way through; being, moreover, frequently productive of serious bodily injuries, particularly to those of delicate frames; while it cannot be sufficient for the purposes of wholesome ventilation, this air being colder than that already in the room, is consequently of greater specific gravity, and must form a lower stratum, not unfrequently felt by those placed round the fire, suffering from an undue proportion of heat at one side and of cold at the other.

It should also be borne in mind, that the openings of our fire-places being seldom more than three or four feet from the floor, the upper stratum of air which we breathe is neither removed or purified by this under-current, and must, from being breathed over and over again, be productive of most prejudicial effects, and that the contamination of this atmosphere is considerably augmented at night by the combustion of lights. It has been ascertained that the quantity of air breathed by an ordinary-sized person is about two thousand cubic feet per hour; and that two mould candles consume as much of the oxygen of this air as a human being; and that the nitrogen and carbonic acid gas which remain are peculiarly inimical to animal life, and that when carried up by the currents occasioned by combustion and respiration, they form an upper stratum where they remain, and must be repeatedly inspired before they make their escape into the chimney, the only ventilating flue with which our houses are provided.

It should also be observed, that the heat thus generated is in proportion to the quantity of oxygen abstracted from the atmosphere, which enters into combination with

the carburetted hydrogen of the flame of candles, coal-gas, oil, or other inflammable matter, from which light is produced. That every cubic foot of carburetted hydrogen consumed unites, on an average, with two cubic feet of oxygen (that portion of the atmosphere required to support animal life); and that the product of this combustion is about two and a half inches of water and one of carbonic acid gas, which, when inhaled in its pure state, proves instantly fatal; and the greater the proportion we inhale, in addition to the vapours evolved from the lungs and skin, the more pernicious the effect.

Supposing, for example, that the perfect lighting of an ordinary-sized apartment requires fifteen cubic feet of carburetted hydrogen per hour, this would form about a pint and a half of water, and fifteen cubic feet of carbonic acid gas; for whenever carburetted hydrogen gas is burned with oxygen, or atmospheric air, these are the products of the combustion, whether the carburetted hydrogen is obtained from wax, tallow, oil, or coal. If, therefore, this lighting continues in an unventilated apartment for seven hours one gallon of water is produced, the greater part of which will be deposited on the walls, windows, furniture, polished metal, or other cold surfaces, with which it comes in contact; and to some articles of this nature it is known to prove highly prejudicial, in addition to the injury to health occasioned by an increased quantity of moisture, mixed with the air we breathe. As one of the principal functions performed by this air for the preservation of health, is to carry off with it a considerable quantity of vapour, in order to prevent its undue accumulation in the lungs, it is, therefore, evident, that after it has been already so loaded it cannot properly perform these functions, and that consumption and other complaints are thus frequently induced.

The prejudicial effects of carbonic acid gas (which is the same as the choke-damp of mines) as well as the nitrogen of the air, which is set free by the abstraction of the oxygen (and amounts in quantity to four times that of the oxygen), are well known, and ought by all possible means to be provided against. This has been attended to within the last few years in our public hospitals, and the mortality in consequence considerably decreased; and likewise in several of our manufactories and public establishments, where the diseases generated by the number of persons congregated in such establishments have been proportionably diminished. In the House of Commons, also, where hundreds of members, with hundreds of candles burning at night, tended so much to vitiate the atmosphere, important improvements in lighting, as well as ventilation, have been recently made; but

in our domestic establishments little or no attention has been paid to this important subject, and the foundation of a variety of diseases must be the result, particularly from the foul air breathed at balls, or other crowded assemblies.

The confinement of air in our churches and places of public worship must also be highly prejudicial, as we are frequently exposed to an atmosphere, on entering one of these edifices in the summer months, ten or fifteen degrees below that of the external air, independent of the stagnant state in which it has been allowed to remain during a whole week, often vitiated, in a greater degree, by the gaseous matter evolved from human remains; and even in private houses much inconvenience is experienced from the stagnant state of the atmosphere in close and gloomy weather, as the entire basis of ventilation depends on the possibility of producing a constant circulation as well as supply of this element. Close stoves are also objectionable when made of iron, and heated to a certain temperature, as oxide of iron is produced by the powerful attraction of that metal for oxygen, and the formation of ammoniacal gas by the mixture of the nitrogen which remains, with hydrogen, acting on our bodies and olfactory nerves.

But if stoves were constructed of masonry throughout, as in many other countries, or of fire-tiles, or porcelain plates, imbedded in mortar, with well-regulated flues, they would be far preferable to open fire-places; this substitution of imperfect conductors of heat being not only consistent with the soundest principles of economy in the preservation of heat, and its more uniform distribution through apartments, but more conducive to health than bringing the air in contact with iron stoves or pipes. Our desire, however, for polished metals in almost every department of our domestic appendages, united to the interests of the furnishing ironmongers, to whom these matters are usually left, must operate, in no small degree, in determining the prevailing taste for this commodity. Porcelain stoves may, nevertheless, be made sufficiently ornamental for those who prefer health to fashion; and when apartments are provided with well-regulated apertures and flues through their ceilings into the adjoining chimneys, to carry off the air vitiated by respiration and combustion, a sufficient degree of heat may be obtained with a sufficient supply of that element, without which it is impossible to maintain health.

The healthy appearance of those who pass the greater part of their time in the open air, sufficiently indicate its advantages. Armies are also well known to have greater numbers on the sick list when well housed, and what is considered comfortably settled in quarters, than when exposed in a campaign to the vicissitudes of the season for

weeks and months, without any other covering than the canopy of heaven, or occasionally of a tent or hut, or the shade of a tree. These facts ought to satisfy us that we should admit the air as freely as possible, and provide, at the same time, for its escape through the ceilings of our apartments at all seasons of the year, as the temporary and often imaginary inconvenience of a little cold, when compared with the decided disadvantages of breathing impure air, is by far the lesser evil.

Where ventilation in large establishments or public buildings can only be obtained by artificial means, it is produced by pumping air in, or drawing it out, by a fan worked by steam, or other adequate power, and affording it the means of free circulation, either cooled, heated, or in its natural state, through well-regulated apertures in the floors, walls, or ceilings; and in coal-mines by flues or shafts, in which constant currents of air are maintained by the combustion of fuel or coal-gas. This system might also be easily introduced into houses already built by means of the existing chimneys, but with still greater facility, if our architects and builders were to direct their attention to these points when erecting new ones.

The importance of this subject has been frequently pointed out by scientific men of considerable eminence, without attracting that attention which would have been the means of preventing many persons from being imperceptibly hurried to an untimely end. It is, therefore, to be hoped that the powerful engine of the press will continue to lend its aid in exposing these evils, until it impresses upon the public mind, and more particularly upon our architects and builders, the urgent necessity of providing against them. Is it not possible to make the heat produced in the lighting of apartments available for their perfect ventilation? If any of these gentlemen succeed in so doing, they will be entitled to greater gratitude, for this achievement in the purification of an element so essential to the preservation of our lives, than any claimed by those heroes whose victories have contributed so much to the miseries of the human race, and the destruction of the human species. But we ought not, perhaps, to be so much surprised at the slow march of intellect in this respect, when we find so many centuries to have elapsed before it was so generally admitted, as at present, that pure water, another element bountifully supplied by nature, is preferable to any other beverage for insuring the health and happiness of mankind; and where we have so many temperance societies, and other advocates, for impressing upon the minds of our fellow-subjects the necessity of becoming converts to the imbibing of this element, in its pure state, ought we not with still greater reason to endeavour to make a similar impression as to the advan-

tages of inhaling, with equal purity, the lighter fluid, of which we stand so much more in need, and which we so much more frequently require?

THE MIASMA OF AFRICA.—NIGER EXPEDITION.

At the Royal Institution, on Friday evening last, Professor Daniell read a paper "On the Spontaneous Evolution of Sulphuretted Hydrogen in the Waters on the Western Coast of Africa and elsewhere." He commenced by observing, that this subject was now interesting on two accounts: 1, because it would recall to the members of that institution the experiments of Sir Humphrey Davy on the subject, and which led him to advise the adoption of ship protectors; and, 2, in consequence of the Niger expedition, fitted out to visit and endeavour to introduce civilisation on the western coast of Africa. The effect produced on copper sheathing by the presence of sulphuretted hydrogen in the waters on that coast, was, he premised, well known to every one informed respecting vessels visiting it; and it was a fact that a cruise of nine months on the western coast of Africa injured the copper sheathing of a vessel as much as four years' wear in any other part of the world. The lecturer showed a piece of sheathing taken from the bottom of a Government frigate that had not been many months on the African station, and also a piece from the *Royal George*, sunk at Spithead, and which had been under water sixty years; the former was eaten through in very many places, and so thin all over that he might push his thumb through it, while the latter was tough, and in excellent condition. His attention had been directed to the subject by the Lords of the Admiralty sending him ten bottles of water, from as many different places on that coast, extending from 8 deg. north of the Equator to 8 deg. south, to analyse, and to report on the component parts thereof, and the accompanying table was the result:—

	Sulphuretted Hydrogen.		Saline Matter.
	Feet.	Inches.	Grains.
Sierra Leone, per gallon.....	6	18	1696.0
Volta	6	99	2480.0
Bonny River	1	21	1788.0
Mooney	2104.0
Gaboon	2169.0
Lobez Bay.....	11	69	2576.0
Congo River(mouth)	0	67	188.0
Congo River (35 miles inland)....	8.0
Bango.....	4	35	2736.0
Lagos.....	14	75	1920.0

All the bottles were hermetically sealed, and he had no doubt the water was in every way as good as when taken from the rivers. On drawing the cork, he was immediately struck with the smell of sulphuretted hydrogen, and adopted the general idea that it arose from animal and vegetable decomposition, but it had since appeared to him that such was not entirely the case. The gas extended a distance of 15 or 16 deg., and in some places as far as 40 miles to sea, covering, therefore, a space of 40,000 square miles. Now, what could the origin be? He thought that it arose from the action and reaction of vegetable and animal matter brought from the interior by the rivers upon the sulphates in the sea-water. With this idea he gathered last autumn some leaves from a shrubbery and put them into three jars; into one of which he poured some plain New River water; into the second, some of the same water in which three ounces of common salt had been dissolved; and into the third, the like water, in which some crystallised sulphate of soda was dissolved. To the covers of the jars he fixed inside some litmus paper, and placed them in a cupboard, the temperature of which varied from 70 to 100 or 110 degrees. The effect was, that in the first the litmus paper was perfectly white, and the smell by no means unpleasant; in the second the paper was quite white, and the smell similar to that of a preserve; but in the *third jar, in which a sulphate was present, the paper was nearly black, and the stench was horrible and nauseous in the extreme, as every one knew the smell of sulphuretted hydrogen gas to be.* Now sea-water contained sufficient sulphates to produce this effect under peculiar circumstances. But a more interesting part of the subject was the miasma, so injurious to life, on the marshy shore of Western Africa. Some persons said that if science cannot point out a remedy, it is useless to investigate the causes, but he did not so think; if science could not point out a remedy, still it could point to something as a palliation of the evil. The presence of the injurious gas was easily tested by the roughest hand, so that places in which it abounded could be avoided; and if imperative duty rendered it absolutely necessary to go to those places, then plentiful fumigations of chlorine gas would effectually destroy the sulphuretted hydrogen. The effect of this gas was not only visible on the western coast of Africa, but in many places elsewhere, although not to so great an extent. Might not the jungle-fever of India, the periodical fevers of New York and Charleston, in America, and the minor diseases on the coast of Essex, be traced to be effects of this deleterious gas? It was a well-known fact, that the ships in the mouth of the Medway consumed more copper than other ships. Chlorine gas, then, destroyed