THE ATMOSPHERE OF TOWNS IN ITS SANITARY ASPECT.*

By GEORGE OLIVER, M.B., Redcar.

IN making the following observations on the atmosphere of towns, I am actuated rather by a desire to elicit information than to furnish new facts, or to suggest novel conclusions.

The desirability for some practical and efficient dealing with the condition of town-air is becoming more and more apparent. The town-system is rapidly extending, and all the evils connected with that system are being multiplied in number, and in intensity of operation: in proportion as towns increase in size, and in density of population, the atmosphere—no regard being paid to its purification—becomes more and more contaminated, or removed from the condition of it which nature provides for healthy respiration.

We are led to inquire, to what extent and in what way does the atmosphere of towns affect the public health? And, if injurious effects on the inhabitants of towns from the constant inhalation of town-air be even suspected, then how may these effects be efficiently counteracted? We may, I think, reasonably hold the opinion that the influence of the atmosphere on the general health and mortality of the inhabitants of towns, is beyond suspicion. Efforts are made to purify the atmosphere of towns by encouraging street-ventilation, and the application in all available instances of legislative enactments which obtain the complete combustion of fuel. Ventilation of towns is favoured by opening up confined streets and alleys, by the formation of parks, by removing houses and the like from the margin of rivers which run through, or in the vicinity of towns.

Mr. Haviland, in a paper recently read at the Ladies' Sanitary Association, on "Sea-air and Heart-Disease", of which an abstract was published in the JOURNAL of July 17th, brought forward most instructive evidence to show the healthful influence of the ventilation of towns by means of atmospheric currents admitted along the tract of rivers from the coast: he justly insisted upon the beneficial effects on the public health of sea-winds, and of the diurnal change of air consequent on the tidal ebb and flow which follow the course of rivers, and spread themselves over the adjacent country, and ventilate the streets of towns to which they are admitted; and, as a practical inference from the foregoing, he urged the importance of removing obstructions, situate on the banks of rivers, to the free course of these winds into the crowded streets of large towns and cities. It would certainly form a most interesting subject of inquiry to ascertain the effects—if any—produced by winds upon the public health and mortality of our large towns.

But some meteorological observers have concluded that towns, by virtue of the higher night temperature in them than in the surrounding country, possess the power of attracting currents of cold air from the country during the night. Mr. Mackereth, of the Salford Meteorological Observatory, in his report of last year, states that the difference in one week, during the month of July, was nearly seven degrees Fahrenheit, between the night temperature of Salford and that of Eccles, and he has no doubt it was double that amount in the closest streets of the town. Mr. Mackereth has pointed out the prevalence of diarrhoea, dysentery, and of fevers, in relation, or rather in proportion to the high night temperature of Salford.

We will now briefly consider some points connected with the smoke-nuisance, and the question of the combustion of smoke, or rather the complete combustion of fuel which prevents the production of smoke. Does smoke exert a prejudicial influence on the health of the inhabitants of towns? There is very little if any trustworthy evidence to show that smoke *per se* has any decided local effects on the respiratory organs; but we cannot correctly argue from this, that smoke has no influence whatever on the health, for it may act in other ways than by affecting those parts with which it is directly brought into contact. Smoke disseminated through the atmosphere influences the meteorological condition of the latter, chiefly by obstructing in part the transmission of the sun's rays through it, and by attracting humidity and gaseous effluvia and retaining them within its area. The caloric, actinic, and luminous rays are all absorbed by, or impeded in their passages through the smoke evolved into the atmosphere of towns: the actinic rays are more particularly absorbed by smoke. The sensitive plate of the photographer records with extreme accuracy the degree of chemical power of light, transmitted through the atmosphere; and the opinion of photographers is unanimous as to the absorption, to a very consider-

able degree, of the chemical rays by smoke; and so much is this the case that several eminent photographers, who established themselves in large manufacturing towns, have been compelled to remove to suburban localities, in order to preserve their reputation. The chemical rays of sunlight are perhaps more intimately connected with organic life than the heat or luminous rays; and the absorption of them by smoke may greatly retard hæmatosis, and the construction of tissues during the period of development; and may predispose to various forms of disease intimately connected with imperfect nutrition. Light, deficient in chemical force, may also favour the production of anæmia, so prevalent in our large manufacturing towns. The local effects of smoke on the respiratory organs may be trifling or insignificant, when compared with the influence which smoke probably exerts on the public health, by virtue of the power which it possesses of absorbing the chemical rays of light, and of preventing the diffusion of humidity and of effluvia of organic origin.

Though theoretical grounds on which we might object to the application of the acts providing for the prevention of smoke by complete combustion of fuel, probably do not exist, yet many difficulties of a practical nature stand in the way. It is true that, in merely controlling the emission of smoke from manufactories, by means of legislative enactments, we apply only a partial remedy; still, partial as it is, it is a remedy by which the smoke nuisance is very considerably reduced in some of our large manufacturing towns. The disinterested opinion of sanitarians on this important subject should be freely communicated to the state.

The discovery of some method of general application by which combustion of fuel might be made less wasteful, and less injurious to the public health, than the present, would confer incalculable benefits on the community at large—benefits bearing almost as much on the economy of public and private resources, and on practical sanitation, as the solution of the problem of utilisation of sewage. Attempts made to extend the application of the principle of complete combustion of fuel to private houses, will certainly fail unless some very cheap and simple arrangement, by which smokeless combustion may be efficiently secured, be discovered. The products of combustion might be made to traverse some system of drainage, having outlets away from human habitations; the smoke would in great part be deposited in its course, and it might then be utilised as manure, or in some other remunerative manner.

The absence of ozone from town air, or the presence of it in small quantity, is a significant fact, now well established by several competent authorities. Mr. Mackereth, for instance, failed to discover this state of oxygen in Manchester. Seeing that ozone is most abundant in localities reputed the most healthy, and that it is a natural ingredient of the atmosphere everywhere, *i. e.*, when the latter has not been polluted by human agency, surely we may anticipate the conclusion that the absence of it from the atmosphere of densely populated cities and towns will be attended by definite effects on the public health and mortality. A causal relation between ozone and epidemics has been long suspected; and, if meteorological observations were made in concert with correct returns of sickness and mortality, the disputed question would soon be settled. During last year, at Salford, it was found that "generally, as the amount of ozone decreased, the seizures in measles, scarlatina, typhus, and continued fever increased." But an atmosphere in which ozone exists in small quantity, and hence, probably, an atmosphere which possesses a feeble power of oxidation, may affect the health of residents of towns, otherwise than by favouring the occurrence of epidemics; thus, it may tend to produce or to aggravate various chronic ailments, more especially diseases in which an imperfect condition of the functions connected with nutrition plays an important part, *e. g.*, various forms of scrofula and allied disorders; it may also increase hereditary or other tendencies to degeneration, and the deposition within the body of the products of imperfect oxidation; such, at least, are the cases most benefited by an atmosphere well charged with ozone. The contrast, *quoad* the physical qualities and the physiological effects, between the atmosphere on the north-east coast and that of this large town is striking enough. Cases of scrofula do remarkably well on this coast, and especially at Redcar, where sea-bathing, on a flat sandy beach, is unusually good. For the treatment of such cases, Redcar in the north will perhaps become as well known as Margate in the south.

The atmosphere of large towns possesses an oxidising power over the tissues of the body, inferior to that of the open country, and more inferior still to that of mountainous regions, or of the sea-shore; hence it probably exerts a debilitating influence over the health of the inhabitants, and favours the development of chronic ailments connected with malnutrition, and the prevalence of epidemics.

Relating to the electrical condition of the atmosphere of various localities, we have the observations of Saussure, which show that the

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intensity of the atmospheric electric potential "is much more considerable in elevated and isolated places, than in narrow and confined situations; it is nearly absent in houses, in narrow courts, and alleys, and in enclosed places. In crowded cities it is most intense in the squares and upon the bridges."

We can do little more than guess at the relationship which probably subsists, *ceteris paribus*, between the degree or intensity of the electric condition of the atmosphere, and that with which the functions of organic life are performed. It is indeed highly probable that, in proportion as the atmosphere loses its electricity, as in the ill-ventilated streets of large towns, it becomes less fitted for effecting the complete respiration of the tissues, and, in consequence of this, for sustaining the health in a vigorous condition.

Who can tell how important a due change of electricity in the atmosphere may be to the correct performance of the function of respiration? Who knows the exact position, if any, which the animal tissues hold as conducting media in the circulation between the positive electricity of the atmosphere and the negative electricity of the earth? and how far the health of the body may be affected by the removal of electricity from the atmosphere—the supposed circulation of electricity between the atmosphere and the earth, through the tissues of the body, being either diminished or broken?

As to the carbonic acid evolved into the atmosphere of large towns, I will make one or two remarks. The quantity must be very large; if we take the respiration of the inhabitants alone, we shall be convinced of this. Physiologists tell us that from forty to fifty ounces are excreted from the lungs and skin of an adult within twenty-four hours; if we take twenty ounces as the mean quantity excreted by one person, then calculation shows us that, for instance, the 200,000 inhabitants of Leeds are exhaling no less than 130 tons of carbonic acid gas into the atmosphere. The amount generated by the combustion of fuel must be enormous, and indeed must far exceed that excreted by the inhabitants.

It is not suspected that any accumulation of this noxious gas, likely to affect injuriously the health of residents in towns, takes place; chiefly because of the property of diffusion of gaseous bodies, which the atmosphere possesses in a marked degree, and because of atmospheric currents.

Such statements as these are sufficient to create in us great faith in the protective power of nature, over the health of densely populated towns; but we cannot implicitly trust nature unaided, where—as in crowded towns and cities—great and many are the departures from the practice, which we conceive nature herself dictates for her own guidance; and sanitary physicians, who regard the health of the people as that of one individual, know as well as ordinary physicians that nature will not bear more than a certain strain upon her resources, and that the less she is called upon to counteract the morbid agencies brought to bear upon her, the more secure will be the general health of the people from sudden and unexpected invasions.

SYMPTOMS OF POISONING AFTER EATING SCARLET-RUNNER BEANS.

By GEORGE WELLER, M.R.C.S., etc., Surgeon to the Merchant-Seamen's Asylum, Snaresbrook.

ON the morning of May 10th, at 9.30, I was summoned to the above Asylum in great haste to see a child who was said to be seriously ill from eating scarlet-runner beans. When I arrived, I found a boy, aged 11, suffering to all appearance from symptoms of some irritant poison. He told me that at 7.30 A.M. he ate six of the beans, and would not confess to eating more. At 8 A.M. he partook of his breakfast, which consisted of one-third of a pint of milk and water and eight ounces of stale bread. At 8.30 he was violently sick, and continued to be so for an hour. When I arrived, at 9.30, he was being supported by the nurse, in the water-closet, in a state of collapse from repeated retching, together with excessive diarrhoea. His face was ghastly pale; the pulse imperceptible at the wrist. The matter vomited consisted of undigested food mixed with portions of the beans. The pupils were normal; the surface of the body was cold and clammy. On placing him in the recumbent posture, and giving small and repeated doses of hot brandy and water, he somewhat rallied, but felt much inclined for sleep. I ordered him to have a warm bath, and cataplasms to the calves of the legs, soles of the feet, and over the precordial region, and to drink freely of barley-water; he soon recovered, and was able to leave the ward the next day.

I consider the above case an interesting one. I have referred to two or three works on botany, and have failed in finding any remarks as to

the poisonous action (if any) of the scarlet-runner beans. Balfour, in his *Manual*, remarks that the roots of many species of *Phaseolus* are poisonous, naming the scarlet-runner root as one, but makes no mention of the bean. If the symptoms in the above case be not due to the poisonous nature of the latter, might not such alarming results follow a severe form of dyspepsia consequent on eating the beans?

THERAPEUTICAL MEMORANDA.

PERCHLORIDE OF IRON IN RHEUMATISM.

By THOMAS B. BOTT, M.D., Bury, Lancashire.

THE cases related some time ago by Dr. Russell Reynolds, and also those in the last issue of the JOURNAL by Mr. Buck, in which the tincture of the muriate of iron had proved very effectual in the treatment of acute rheumatism, remind me of a case in which it seemed to be the only medicine which did any good. Elizabeth H., aged 22, employed in a cotton-mill, had previously suffered from slight attacks of rheumatism. I first saw her on December 29th, 1868. She was sitting up in bed, breathing with some difficulty, and could not rest in a recumbent posture. She was suffering from acute rheumatism affecting the joints, complicated with valvular disease of the heart, pneumonia of the left lower lobe, and general bronchitis. The pulse was about 140, and the respiration about 40, during the first fourteen days of treatment. She appeared to be sinking, so that her friends thought it impossible for her to recover. On January 14th, 1869, I prescribed ten minims of tincture of perchloride of iron, with acetate of ammonia and chloric ether, to be taken every three or four hours. For the first time, she expressed herself relieved. The medicine was continued to the end of the month. She was then able to go about again. Since then I have prescribed the tincture of the sesquichloride of iron very extensively, not only in rheumatism, but also in inflammations generally, particularly where there is debility. I generally combine it with acetate of ammonia, which causes it to act better on the skin.

THE LOCAL TREATMENT OF ECZEMA RUBRUM VEL MADIDANS.

By JOHN KENT SPENDER, M.D. Lond., Bath.

THE two main points which require attention are—(a) to apply something which cures as well as soothes; (b) never to put over that application any impervious covering.

Eczema Rubrum is very common on the skin of the leg and of the ankle, and is often connected with varicose veins. The irritation which it causes may be alleviated by dusting the part with dry astringent powders, and by painting on the pharmacopoeial preparations of glycerine; but it is seldom that a cure is effected in either case. Ointments of every kind are hurtful. After many trials of various remedies, I found, some years ago, that the common black wash (lotio hydrargyri of the *Ph. B.*) is a very effective application. I mix with it a tenth or twelfth part of glycerine by measure, and then shake it well. A small quantity of this mixture being poured into a wide shallow vessel (as a saucer), strips of linen rag are soaked in it; and, after being lightly squeezed, are placed evenly and smoothly round the affected part of the limb, a portion of the black oxide of mercury adhering to the linen. Each strip should overlap the one above by nearly a quarter of an inch, so as to present an uniform surface covered by the dressing. A thin calico bandage will secure everything in its place, and keep it so. Between the dressing and the bandage there should not, on any account, intervene any impervious covering, such as oiled silk or a sheet of gutta percha. Such may appear to have the immediate advantage of preserving the moisture of the linen; but the disadvantage is decided and obvious—that the secretion of the diseased skin is prevented from evaporating, and it rapidly decomposes. Hence, not only is the eczema not cured, but fresh tracts of skin are liable to inoculation. A large area of the limb may become red, hot, and spongy, thin serum streaming out at every pore; and probably the limb is enlarged by oedema of the subcutaneous structures. Renew the dressings twice a day, and no harm follows their becoming dry, provided that they are completely saturated with warm water before removal. They are then easily taken off without hurting the patient or damaging the healing skin. Since 1860 I have treated a number of cases by the method now related, and I have been successful in all but three or four. And the defiant behaviour of these few suggested the application of a strong nitrate of silver solution before putting on the linen steeped in black wash; and this plan answered completely.