

THURSDAY, DECEMBER 23, 1880

THE FOGS OF LONDON

LAST week Mr. Scott Moncrieff described in our columns a method of all but entirely eliminating smoke from the atmosphere of London, and thus abolishing that most venerable of our institutions—Fog. And in a recent number Dr. Siemens showed how our existing grates could be made to give out a maximum of heat at a minimum of expense and an entire absence of smoke. It may therefore be of some interest to inquire briefly into the latest theories as to the causes and consequences of this hideous incubus which renders residence in London a terror to so many.

Fogs are supposed to form a constituent part of the climatology of the British Islands from which there is no escape; and in certain strictly local climatologies, such as that of London, where the aggregation of human beings is altogether unprecedented, they now and again acquire an extraordinary intensity and persistency, and are attended with consequences so disastrous and fatal as to press urgently on Parliament the necessity of legislation towards the mitigation of the evil.

In illustration of this, reference may be made to the influence on the mortality of London exercised by the fog which prevailed there from November, 1879, to February, 1880, which was so remarkable both for its denseness and protractedness, as to constitute it one of the most memorable fogs on record. The question has been investigated by Dr. Arthur Mitchell, and the results recently published in the *Journal* of the Scottish Meteorological Society.

The increase in the death-rate was truly enormous, as these figures, giving the whole mortality for each of the seven weeks ending February 21, show—1754, 1730, 1900, 2200, 3376, 2495, and 2016; in other words, several thousand persons fell victims to the disastrous fatality of this great fog. An examination of the figures in the Registrar-General's Reports shows that no approach to so large an increase in the death-rate showed itself in any of the other British large towns, and in none of these did fog of a noteworthy character occur. Of all diseases, asthma was most directly influenced in its fatality by the fog; for as the density of the fog increased so did the deaths from asthma, and as the fog abated, relief came at once to the asthmatic, and the death-rate instantly fell. Thus the mortality rose to 220 per cent. above the average during the week of densest fog, but as the fog gave way the mortality fell to 40 per cent. below the average. Bronchitis, pneumonia, pleurisy, and other lung diseases appeared also with an enormously increased fatality, the mortality from bronchitis rising during the week when the fog was at its worst to 331 per cent. above its average. In the case of these diseases however the relief did not come instantaneously with the cessation of the fog, but injuries of a more permanent nature appear to have been sustained which kept the death-rate at a high figure for some time after the fog had finally disappeared. Whooping-cough exhibited these characteristics in even a still more pronounced manner. The pernicious effects of the fog lingered still longer in the system; so that while the

death-rate rose during the worst week of the fog to 182 per cent. above the average, four weeks thereafter it had fallen no lower than 74 per cent. above the normal mortality of whooping-cough. It is singular, and particularly to the medical profession profoundly interesting, that deaths from croup, diphtheria, and rheumatism did not show any distinct relation to the fog. As regards the other diseases, the deaths from which are registered, they equally did not appear to show any steady connection with the fog's varying denseness and persistency.

This pernicious and deadly character of fog on persons suffering from these diseases is not due to fog as such, but to the noxious qualities imparted to it by our large towns. Dr. Angus Smith has shown that the air of Manchester during an extremely dense fog contained 20·85 per cent. of oxygen, or one-tenth per cent. less than the normal quantity. The pernicious character of fog however is to be traced not so much to this slight diminution of atmospheric oxygen as to the presence of positively deleterious substances.

The smoke which issues from our dwelling-houses contains, in addition to solid soot, also gaseous carbonic acid, sulphurous acid, carbon monoxide, sulphide of ammonia, and sometimes minute traces of arsenic. Moreover the soot does not consist of particles of carbon only, but carbon saturated with tarry matters, sulphur and ammonia compounds, &c. Smoke from manufactories is usually more completely burned than that from dwelling-houses, and is therefore less deleterious. In many cases however manufactories pour out into the air their own specific hurtful gases. Of these gases the more pernicious are mineral acids, especially sulphuric and hydrochloric acids, sulphuretted hydrogen, sulphur dioxide, and oxide of arsenic. Gases rising from decaying animal and vegetable matter in waste heaps and in faulty sewers also lend their aid in the contamination of the atmosphere of towns. In the neighbourhood of various manufactories solid impurities crowd the air, resulting in a denseness of fog in these restricted localities with an accompanying suffering and fatality elsewhere unknown.

In February last we drew attention (*NATURE*, vol. xxi. p. 355) to the question of fogs and the general atmospheric conditions under which they are generated, when the importance in discussing the question of fogs of a careful study of the anticyclone and its accompaniments was adverted to. Indeed it is in the highest degree probable that all our memorable great fogs are intimately connected with the anticyclone, being found towards their outskirts or rather in the debatable region between the cyclone and the anticyclone. They arise from the diffusion of the vapour brought up by the cyclone outwards and through the colder and drier air of those parts of the anticyclone contiguous to it, where it is condensed into immense breadths of fog stretching several hundred miles in length.

The two features of the anticyclone to which more special attention is directed are these: (1) the calmness or comparative calmness of the air; and (2) the *slow downward general movement of the atmosphere over the region covered by the anticyclone*, and a general outward movement in all directions towards surrounding regions as we near its outskirts.

Consider now this feature of the anticyclone in its

relation to the vast quantities of deleterious matters which are vomited into the atmosphere from the chimneys of London. The horizontal movement of the air is at a minimum, and thus altogether insufficient to sweep these noxious matters out into the surrounding country. The impurities therefore ascend into the air over London; and when no longer buoyed up by the warmer air with which they began the ascent, they fall under the influence of the general downward movement of the atmosphere; and this downward movement is accelerated by the solid impurities becoming saturated with condensed aqueous vapour, coal-oil, and tarry substances. Hence the specially noxious fogs of large towns settle near the surface, are no more than a few fathoms in depth, and are at the maximum where chimneys are planted thickest, the situation low-lying and confined, and where consequently the horizontal circulation of the air is absolutely arrested.

If we would then overcome, or in any way mitigate, the terribly fatal effects of our city fogs, it can be done in no other way than by Parliament interposing with a legislation which will not only effectually stop the emanation of deleterious exhalations from manufactories, but also compel the combustion of the smoke arising from ordinary fires in dwelling-houses. As regards the latter, where the real difficulty in legislating lies, it may be stated that we already have appliances for thoroughly burning coal, the use of which would be attended with an immense saving of money to the community, as well as the prevention of the painful recurrence of periods of such widespread sickness and mortality as London passed through in the beginning of the present year. But it is of little use in science showing how this terrible evil may be cured if the authorities make no attempt to put her hardly obtained results into practice; it would cost little to give both Dr. Siemens's and Mr. Moncrieff's methods a fair trial on something more than a miniature scale. But what are some of the obstacles to such a practical course may be seen from our correspondence columns to-day.

WHAT IS CIVILISATION?

The Past in the Present. What is Civilisation? By Arthur Mitchell, M.D., LL.D. 8vo. pp. xvi. and 354. (Edinburgh: David Douglas, 1880.)

THIS interesting volume, as may be inferred from the title, embraces two cognate but at the same time somewhat diverse subjects—the one the survival, or possibly the reintroduction, of objects and customs, which are usually regarded as primitive, among the civilised nations of the present day; the other the nature and origin of civilisation.

As Rhind Lecturer on Archæology Dr. Arthur Mitchell selected these two subjects as the topics on which to enlarge, and devoted six of his lectures to the first and four to the second; and these lectures, illustrated by nearly 150 excellent illustrations, form the body of his book, to which is added a long appendix and a detailed analytical table of contents.

The facts brought forward in the first portion of the work, though for the greater part by no means new to most archæologists, are of considerable general interest,

and will appear sufficiently striking to the ordinary reader. The peregrinations of the author in the remoter districts of Scotland and the neighbouring groups of islands have brought him in frequent contact with those among whom ancient customs are most likely to have survived, whose domestic appliances are often of the same simple character as were those of their ancestors generations and generations ago, and whose ordinary life has also been but little affected by the advance in material civilisation of their fellow-countrymen. To these objects and customs so persistently surviving from the Past into the Present the term "neo-archaic" has been applied by Prof. Rolleston; and it is precisely these objects that a practised archæologist declines to regard as ancient, unless the circumstances of their finding justify him in so doing. Foremost among them is placed the whorl and spindle, an appliance for spinning still in use in parts of Scotland, as it is throughout the whole of the continent of Europe; and which indeed is never likely to be entirely supplanted by the spinning-wheel or other machinery, so long as the use of the spindle can be combined with an out-of-doors occupation, such as tending sheep or cows. All will agree with Dr. Mitchell that the mental power of those Scotch women who still use the spindle and whorl need not be a whit inferior to that of those who do not use it, and some will go farther, and place the shepherdess who spins in a higher rank than the one whose hands are idle all the day long. That a spindle should be made of a form to do without a whorl, or that a potato should be substituted for the latter, are regarded by the author as signs of the art of spinning by hand having reached a state of degradation; but if producing the greatest effect with the least possible trouble is any sign of progress, such an opinion is questionable.

In all such cases the external circumstances of a family or group of families must be taken into consideration; and if it be cheaper or more easy to employ articles of the simplest and rudest character than to purchase, it may be from a distance, the appliances of modern art, the simple methods and appliances will survive. Netting and knitting by hand will thrive by the side of netting and knitting by machinery, as the long hours of a winter's evening, which might otherwise be wasted, can thus be utilised at practically no cost; and it seems more remarkable that the simple form of narrow loom for webbing, of which Dr. Mitchell gives a figure, should have become almost extinct, than that it should have survived.

A flint for striking a light may be cheaper and in some respects more convenient than lucifers; and the "knockin'-stane" and mallet are not less effective for their purpose than the most expensive pestle and mortar. The earthenware "craggans" are as cheap and as well adapted for the ends they serve as pots thrown on the wheel; and in countries where carriage is difficult or extensive water power scarce, the quern or hand-mill and the little Norse-mill may still hold their own; as they did in St. Alban's in the fourteenth century, when they competed with the high charges for multure at the Abbey mills. The survival of the black houses and beehive houses in the Hebrides may also probably be reduced to a question of cost. Perforated or grooved stones are cheaper than plummets of lead as sinkers for nets and lines; and for working in water a pivot and socket of