egg were disintegrated; they were in a stage of advanced decomposition. B (chloride of aluminium): very foetid and turbid, rather less so than A. Every drop examined swarmed with small monads and bacteria. The egg-cubes were broken up, and presented signs of advanced decomposition. C (sulphurous acid). Fluid presented no foetus; was perfectly transparent. The cubes of egg appeared to preserve their shape and condition exactly as when first introduced. On microscopic examination, many fields presented no trace of motile organisms; but occasionally a few active bacteria were met with. D (carbolic acid). Fluid appeared almost clear, and the egg-cubes distinct. Very few bacteria presented themselves, usually five or six in a field; they were of unusual length. Decomposition was almost, but not entirely, arrested.

The evidence which I have adduced, I think, fully shows that the presence of certain volatile or gaseous antiseptic agents in the air is sufficient to poison the lowest forms of organisms, to prevent the appearance and development of fungi, and to arrest the putrefaction of organic material. I hope it will be allowed that we who counsel the employment of gaseous or volatile antiseptics for the disinfection of air do so with the clear understanding of a purpose to fulfil, and a train of analogical evidence that the means are adequate to the end. We believe the subtle poisons of disease to be minute particles of living matter; and that these, given off from a diseased person, can be contained in and wafted by the air. We do not pretend that they are equally numerous with the harmless germs of living things which the air normally contains; but they are with them and among them. We show that the presence of antiseptic agents in the air destroys the harmless germs; and we contend that it is probable that it also destroys the disease-germs, which have strong analogical relations with the former, which certainly do not exceed them in bulk, and are probably far more minute than those which are obviously destroyed. As regards the nature of an efficient air-disinfectant, we find that it must be volatile or gaseous, and therefore capable of equable diffusion throughout the air. The non-volatile agents are inert. It is not the action of a chemical agent upon an organic chemical compound which constitutes disinfection, according to our view; but the action of a diffused poison upon the living particles which are suspended in the atmosphere. The agents which I myself believe to be most efficient are sulphurous acid, iodine, and carbolic acid. Future experience will point probably to many others, but we have these at present to rely upon.

A few words as to the methods of practically employing these various agents.

1. *Sulphurous Acid*.—If the chamber to be disinfected is (a) *uninhabited*, all articles capable of being bleached should be removed; orifices communicating with the external air should be closed, and crevices pasted over with paper. A vessel containing burning sulphur should then be introduced, and the door closed. For the sake of safety from the chance of fire by the overflow of the molten sulphur, it should be kindled upon an iron plate, and floated upon a large vessel containing water. It is convenient to place glowing embers on the plate, and then dust over them flowers of sulphur. If the room is (b) *inhabited*, the sulphurous acid must be disengaged in less proportion. Dr. Hjaltelin, who has employed it in small-pox wards, considers that its power of exciting bronchial irritation has been exaggerated, and that patients may be accustomed to it in a high degree. It may be employed in the manner before described; the flame of the burning sulphur being extinguished by submersion of the iron plate in the water, if the fumes become too powerful. Or, as employed by Dr. A. W. Foot, flowers of sulphur may be dropped upon a heated shovel, and carried about the room. The generation of the gas should be repeated three or four times in the day. It is certain, however, that some people feel it difficult to tolerate the sulphur fumes.

2. *Iodine* may be used as an air-disinfectant in a very simple manner—first suggested, I believe, by Dr. B. W. Richardson. Solid iodine is merely exposed in glass or porcelain vessels in different parts of the room. The iodine vapour is given off at ordinary temperatures. This is a very efficient mode of attaining a constant disinfection.

3. *Carbolic Acid*.—To employ this agent when the room is (a) *unoccupied*—communication with the external air being closed—a quantity of the crude acid should be poured into a strongly heated metal cup, or upon hot bricks, and left to vaporise. Subsequently, the floors, ceiling, and, if practicable, the walls, should be irrigated or sprayed with an aqueous solution; and the floor scrubbed with carbolic acid or coal-tar soap. Or Savory and Moore's excellent vaporiser may be employed, whereby large volumes of carbolic acid vapour will be disengaged. If the chamber is (b) *occupied* by the sick, the vaporiser just mentioned, which is so constructed that the liquefied acid falls drop by drop upon a heated plate, should be put in action at

intervals twice or thrice in the day. The objectionable odour of the carbolic acid may be greatly masked by its admixture with oil of wild thyme. It is obvious that this method gives off the carbolic acid too powerfully for continuous use. The agent, however, is so volatile as to render itself readily available for maintaining a constant antiseptic atmosphere. It has frequently been used in combination with inert powders for strewing about the room, or has been sprinkled upon cloths or other absorbent materials which have afforded surfaces for its volatilisation. These measures, however, have their inconveniences and even dangers; for the strong acid is irritant and caustic, and may inflict serious injury on those who inadvertently touch it. To obviate the difficulty, I have requested Messrs. Savory and Moore to construct for me an instrument consisting of a piece of canvas in the form of an endless band stretched between two rollers, and dipping into a tin trough to be charged with the acid. By turning a handle at the top, the roller is drawn through the trough, and thus moistened in its whole extent. After it has become partially dry from evaporation, a turn of the handle lifts up a fresh moistened surface. I have used this in several cases, and have found it to act most satisfactorily. I believe, from the data we possess, that in carbolic acid we have the most efficient and the most manageable of all agents for the disinfection of air.

THE GEOGRAPHICAL DISTRIBUTION OF PHTHISIS.

By ALFRED HAVILAND, ESQ.,

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THE doubts raised by Mr. Armstrong in his recent communication to the JOURNAL call for discussion. Mr. Armstrong has used Dr. Crisp's figures, and not mine, in comparing the mortality from phthisis in the Great Ouseburn district during the "decade (?) 1861 to 1871," with that which occurred during the previous decennial period 1851-60. In January and February last year, I published my lectures on the Geographical Distribution of Phthisis, which I delivered at St. Thomas's Hospital during the winter session 1870-71; and I beg to refer your correspondent to them. They will be found at pp. 5, 6, 57, 58, 140, and 141, of the JOURNAL for 1871, vol. i, accompanied by a photolithograph map of the distribution of phthisis in England and Wales, reduced to one-eighth the size of the original, in which, of course, the lettering is too small for practical purposes; the names, however, of the districts can be read by the aid of a magnifying glass; and the colouring will give a general idea of the distribution of phthisis, if the reader will bear in mind that *red* indicates the low, and the different shades of *black* the high mortality districts, a guide to which will be found at p. 5. The black tints represent the *blue* in the map used for my lectures.

On referring to the above map, it will be found that Great Ouseburn belongs to the sixth or lowest degree of mortality, which ranges from below 17 to 20 deaths annually to every 10,000 females living. Although, however, this is the case, this district is far from being so exempt as Dr. Crisp states—viz., 1 in 88, or the lowest in the phthisis death-rate scale. In fact, the figures of the Registrar-General, who gives the annual average rate of mortality from phthisis to every 100 living, show at least ten districts which have a lower mortality from phthisis than Great Ouseburn; and, if we arrange them in the order of their low mortality, beginning with the healthiest district as regards this terrible cause of death, we shall have the following list, the numbers after the name being the annual death-rate to every 10,000 living: Ongar, 12.3; Easington, 15; Atherstone, 15.2; Belford, 15.4; Scarborough, 15.8; Tenbury, 15.9; Guisborough, 16.3; Sleaford, 16.3; Meriden, 16.4; Wheatenhurst, 16.4; Helmsley, 16.7; Great Ouseburn, 17.6; and *Whitchurch*, 20.8. We therefore see that, out of a dozen of the lowest mortality districts, Great Ouseburn exhibits the *highest*, instead of, as Dr. Crisp states, the *lowest* mortality. I have introduced Whitchurch in order to show how the discrepancy has arisen. This district, too, occupies in Dr. Crisp's list an unmeritedly distinguished position; its mortality from phthisis being represented as 1 in 62, which would make it rank above Meriden, 1 in 60; Wheatenhurst, 1 in 60; Guisborough, 1 in 61; Helmsley, 1 in 61; Sleaford, 1 in 61; and equal to Scarborough, 1 in 62. The Registrar-General's figures, however, have spoken for themselves. The fact is, Dr. Crisp has assumed that the number of deaths from phthisis placed to the account of Great Ouseburn and Whitchurch was the aggregate for the *ten* years 1851-60; whereas he will find, on referring to the Registrar-General's supplement to his Twenty-fifth Annual Report, pp. xciii and cv, that the figures in the first district represented only six and a half, and in the second seven and three-

quarters years' deaths, instead of ten, as in all the other districts. In the case of Great Ouseburn, had the death-rate during the first three and a half years been uniform with the last six and half, the total number of deaths would have been nearer 206 than 134; and the numbers in Dr. Crisp's list would have been 1 in 57, instead of 1 in 88; and then Mr. Armstrong would not have been so startled at the great increase in the mortality from phthisis; for the difference between the two periods, if his figures be correct for the last one, would only be 14, instead of more than half, 45. I would also ask Mr. Armstrong if he includes both the years "1861" and "1871" in the "decade" he has examined; for, if so, his deaths are those of *eleven*, and not of *ten* years; in which case a still further reduction would be the result, and, instead of the mortality having increased, as he says, it would have actually decreased, with the population of this district, in which the census returns for 1871 show a decrease of 413, when compared with those of 1861; the number of inhabited houses was also less in 1871 by 119 than it was in 1861.

In such a cause of death as pulmonary consumption, fluctuations in the mortuary returns must be looked for; and we naturally expect them, knowing as we do how this disease is influenced by weather; and I hold the opinion that maps showing even the annual distribution should be published, in order that it might be studied side by side with the winds and other meteorological characteristics of the year in which the deaths occur. Nay, more; no trouble should be spared by Government to show, even season by season, how each locality is affected, as regards this fearful scourge, by the ever-varying phases of our Protean climate. I therefore cannot endorse Mr. Armstrong's opinion that maps of the distribution of disease are of little permanent value if founded on data, however *inconstant* they may be. It is this very inconstancy which renders the periodical publication of such maps of the highest value, for thereby the progress of disease would be watched, its natural history revealed, whose lessons, perchance, would teach us what weapons to use in our defence, if by a timely forewarning we are placed on our guard by being shown where danger lurks and whence attack may be expected. Through Dr. Buchanan's world-wide known investigations, which I always think of with admiration, many of the secret hiding-places of phthisis have been shown up; and, after a careful study of the vast array of facts which he has brought to bear upon this subject, this eminent physician has by the most philosophical reasoning deduced what kind of arms to use when doing battle with this fearful destroyer of our youth. Like all true discoveries, Dr. Buchanan's is characterised by simplicity. He found *damp soil* to be one grand exciting cause of phthisis, and he suggested *drainage* as the grand means of counteracting its effects.

Now let us suppose that, owing to his wise counsel being followed in the high mortality districts where this cause predominates, the death-rate from phthisis should decrease in any one year or in any series of years, and this improvement shown on a disease-chart, it would not only tend to prove the correctness of his views, but would do more—it would show, perhaps in the progress of years, how health could be cultured, as it were, in these hitherto doomed localities; and eventually it would be seen, supposing the means recommended be still persevered in with increasing vigour, to how high an extent of healthiness any district might be brought; then would a standard become possible and useful ever afterwards as a basis for comparison. Possessing such a standard, how eagerly should we note, year after year, the colouring of the disease-map! How instantly would our eye perceive at a glance the slightest backsliding; and how at once we should set to work to see where the cause of the decline from the high standard, once attained, lurked; whether it was to be found in the exceptional weather of the year, or in some freshly imported social cause, or in the neglect of those means which in a former year had happily created the standard.

I hope Dr. Crisp will kindly excuse my referring to him, and pointing out the errors which has misled your correspondent. I can assure him that I am actuated by no other but the best feeling towards him, for I am deeply sensible of the value of his researches, from which the little oversight I have explained will in no way detract. I hope, therefore, he will forgive me for having drawn attention to it. As to Dr. Buchanan's opinions, we know that they have been confirmed in America by Dr. Bowditch; and in my lectures I have ever acknowledged how fully my own facts are in harmony with his. No maps faithfully portraying the geography of phthisis or any other disease will ever grow out of date: their usefulness will increase rather with their age, as standards of comparison; their inconstant data will ever prove a source of national interest as well as of national anxiety. In these maps each district will have its health-history recorded; and those who preside over the public health must ever remember that, whether good or bad, whatever has occurred once may occur again; that any district which has happily attained a high position in the health-scale by fol-

lowing wise sanitary regulations, may rapidly decline by neglecting them; but, alas! not so rapidly regain its lost position.

"Facilis descensus Averno;
Sed revocare gradum, superasque evadere ad auras,
Hoc opus, hic labor est."

CLINICAL OBSERVATIONS ON THE DENGUE FEVER OF INDIA.

By WILLIAM W. DUNKLEY, L.R.C.P. Edin., Stoke-on-Trent.

THE dengue fever having attracted some attention in England, I have thought that as I have been present in India during the recent epidemic, and have had many cases of the disease under my care, a short account of it might be interesting to some of your readers.

The term "dengue" appears to be a corruption of the word "dandy". The disease was formerly known as the dandy fever by the natives of certain parts of the East Indies, because persons suffering from it assume a peculiar stiff gait when the subjects of the painful joints so common in the disease. The disease often begins suddenly, with little or no warning. A man may be at work, perhaps in the sun, and he feels a pain in some part of his body, and he goes to the doctor, who discovers that he is going to have an attack of dengue; or he may complain of not feeling well for some hours, with slight aching pains in his hands or feet before he is compelled to lay up and go to bed. In the majority of cases, however, he is attacked suddenly, and the doctor has little difficulty in making out the nature of the case on his first visit. This is very easy if the primary rash be present, which frequently happens within an hour or two of the commencement of the illness. It generally appears as an erythematous eruption of a bright red colour, sometimes only on the face, and sometimes almost or completely covering the body. It very much resembles the rash of scarlatina. If you press it with the finger, the colour fades for a moment where the pressure was made, but returns immediately the pressure is removed. It is not constant, and the fact of its being absent does not by any means prove that the case is not one of dengue.

The state of the tongue is a valuable symptom in dengue. It generally has a silvery whiteness—not the heavy creamy coated tongue met with in some other diseases, but a thin silvery white coating, and frequently a very red tip and edge. There is occasionally a sore throat; but this is not at all a constant symptom.

The terminal rash appears about the third or fourth day. It is said to assume a variety of forms; but the forms which I have seen myself have resembled respectively measles, scarlatina, and urticaria, and in one case the eruption consisted of a number of boils mixed up with an urticarial rash. This rash is not met with in every case. In several cases I have seen myself it has been absent. It is very fugitive; and whether from this reason I have omitted seeing it or not I cannot say. It is said to come on suddenly at times, and disappear in two or three hours. I have not seen the rash remain longer than twenty-four hours.

The pulse in dengue is peculiar, the rapidity not being increased in the same proportion to the urgency of the other symptoms as in other fevers. The pain suffered, the eruption, and the other urgent symptoms, would lead you to expect a very quick pulse; but the pulse is often comparatively little higher than the normal standard, being often 95 or 98, and seldom rising much higher than 100, although Dr. Charles of Calcutta* has counted it over 140 per minute, and says that in fatal cases it is so quick that you can scarcely count it. One peculiarity of the rash of dengue is that there is little, or sometimes no, elevation in the temperature of the body at the time it commences. This fact would serve to aid in its diagnosis from measles or scarlatina, in each of which there is a considerable elevation of the temperature when the rash first makes its appearance.

The pains in dengue are various in character. Like the pains in acute rheumatism, they fly from one part to another, and often in a remarkably short space of time. The patient will complain of severe pain in the head, and this is the most constant pain—*i.e.*, it has the least tendency to leave the head and go elsewhere. He will sometimes complain of "pain in all his bones", and when you next visit him the pain will be confined to his feet and shoulders. At times the pain is in the knees, and on your next visit it will have left the knees and gone into the feet or arms. Pain, like certain other symptoms, is not

* I must acknowledge a great deal of information concerning the disease given to me by Dr. Charles, Professor of Midwifery in the University of Calcutta, who first suggested to me that I should write an account of the disease for some of the medical papers. Dr. Charles has published a Clinical Lecture on Dengue, delivered before the students at the University of Calcutta, and it is well worth perusing.