hand, the lowest readings are nearly always in the warm and dry summer months.

From these facts, as I have before ventured to observe,* it appears probable that a large amount of aqueous vapour in the air greatly facilitates the formation and action of the scarlatina poison; and I believe, also, that this is especially the case when there are sudden fluctuations in the pressure of the atmosphere, as shown by the barometer; a diminished pressure being favourable to the disease.

Small-pox also displays two distinct epidemic waves; the first occupying the early part of 1863, and attaining a maximum in the week ending June 6th; the second occurring in the winter of 1864, and continuing throughout the first half of 1865: its highest point was in the week ending November 19th, 1864. There was also a general increase in the prevalence of this complaint in 1869 and 1870. This disease does not appear to be subject to any atmospheric influence. We can only say that, during the ten years observed, it was never high in the autumn.

Measles is essentially a disease of winter and spring—never very high in the summer, except in the year 1868, when it reaches its maximum in the week ending June 27th. It is also much less regular in its progress than the two diseases first described. Dr. Mühy has recorded his opinion that measles in the temperate zone experiences no change with the temperature. Dr. Donnelly and Wilde remark its prevalence in spring; and, on the other hand, Sydenham classed it amongst epidemics which set in early in January, and reach their height in March, then decline and disappear as midsummer approaches. This statement is thus in accordance with our statistics. (*Medical Observations.*)

Whooping-cough apparently visited this city every two years with great regularity in winter and in spring; the epidemic of the winter of 1863 alone being less distinct than those of 1861, 1865, 1867, and 1869. This exemption of the winter 1863 may, perhaps, be accounted for by its unusual mildness; but the same observation does not apply to the winter of 1866, which was unusually cold, and in which there was no epidemic of whooping cough. From observations upon the weekly returns of the General Board of Health I ventured in 1860 (*op. cit.*) to remark that whooping-cough seemed to be much influenced by extremes of heat and cold, the curve, on the whole, rising with the fall, and sinking with the rise of temperature. The two years' cycle observed by this disease is very singular and needs explanation. It is almost perfectly regular. There were very few cases in the winters of 1860, 1862, 1864, 1866, and 1868; but in the intervening cold seasons the cases were abundant, showing that, although climate may have some influence, there was something quite apart from weather producing it.

Continued Fever.—It was not until the year 1867 that the different kinds of this disease were separated at the wish of a Committee of this Association. Until then, the heading even included febricula, in order to avoid any danger of error in the reporting; and, in consequence of this fact, it was necessary to carry the combination on through the whole period. Typhus is now, however, given separately; and its variations closely tally with those of "continued fever, all kinds", showing that probably a large proportion of the unclassified cases were also cases of this disease. It is not very easy, however, to connect the variation of these diseases with any one of the meteorological elements. The number of cases is always comparatively low in early summer; and no better description can now be given than that of Sydenham two hundred years ago—"it takes birth when spring passes into summer, and it rises towards maturity as the year advances (with the decline of the year it declines also)." Finally, the frosts of winter transform the atmosphere into a state unpropitious to its existence.

In the course of the ten years period, there were two distinct epidemics, each extending over about two years, the first culminating in January 1866, the second in the autumn of 1868; this last most violent invasion of disease was followed in the winter and spring of 1869 by a large prevalence of the fever, almost amounting to an epidemic. Besides these great waves of disease, the culminating points of the lesser undulations occur in each year in the months of September, October, and November. And yet it seems impossible to trace any direct connection between this disease and the variations in either humidity or temperature. It seems most probable that a certain degree of both moisture and warmth are favourable to the spread of the poison—that, like a deadly vegetable growth, it flourishes best when there is a fitting soil, and when the other conditions of organised life, heat and humidity, are present.

Unfortunately, in our large towns, materials for it to feed upon are never absent; and many of the fever haunts of Manchester which are still allowed to exist, are true forcing houses, from which the disease sends its branches far and wide through the town.

It may be remarked that there has been comparatively little typhoid

fever in Manchester itself. It rose to the highest pitch about September 5th, 1868, when there were 30 cases reported; but, as a rule, it is not so general in the town as in the country. This fact must probably be connected with the better drainage of the town, and perhaps with the excellent water-supply.

It may be interesting to note the remarkable absence of any epidemic disease towards the close of the year 1866. Perhaps this fact may be placed in relation to the heavy rainfall of that year, the most copious in Manchester for seventy-two years.

I have now mentioned some of the interesting questions which are opened up by a series of medical archives such as we have in these volumes, but others remain behind. We have yet to learn the very nature of the poison which is produced in such abundance at one time, and which is almost absent at another. We do not know in what way it is developed, nor the mode in which it is able to spread simultaneously in detached places. The recent discussions upon the presence of disease-germs in the air show that we are, perhaps, approaching to a knowledge of some of these questions. Professor Lister's observations on the filtering powers of the lungs points to, at least, one mode in which the poison may enter the system. From my own observations upon the microscopic contents of respired air, it seems probable that much that is breathed into the lungs with the air is retained by the bronchial mucus, and only gradually makes its way out along to our tubes. Whatever be the nature of the poison, whether fluid or solid, organised or not, it is obvious that this sojourn in the system cannot but give it ample opportunity for mischief.

I do not venture now to discuss these questions; the answers to them must be drawn from careful observation and a wide induction from well observed facts. They are too difficult to be solved quickly: as Sir Thomas Browne puts it,—“Flat and flexible truths are beat out by every hammer, but Vulcan and his whole forge sweat to work out Achilles his armour.” This much, however, may safely be asserted that, even if the actual nature of the poison were ascertained, there would still be a necessity for our statistics before its habits and its choicest hunting grounds could be clearly made out. We must still sum up in the words of Sydenham,—“We are only guides and pioneers to surer observers than ourselves, who may better be able to investigate the history and cure of diseases. And, in truth, so varying, manifold, and (if I may use the term) so delicate is nature, and so much does she sport in the production of diseases that it is not the work of one man's lifetime (long as it may be) to graphically depict their varied phenomena and their appropriate cures.”

THE ADMINISTRATION OF SULPHUROUS ACID IN TYPHOID FEVER.*

By G. WILKS, M.B., Ashford, Kent.

ABOUT a year and a half ago, we began to meet with sporadic cases of typhoid fever in Ashford and its neighbourhood. The cases occurred in detached houses in different localities. The cases soon began to multiply, and to form themselves, to some extent, into small groups in limited areas: then, constantly on the increase, the fever during the summer, after a clearly proven fouling of the water-supply, attacked such a large percentage of the population as to cause quite a panic among the inhabitants and in the country round.

So long as the cases were sparsely dotted about the district, we found them amenable to ordinary treatment: that is to say, the diarrhoea could be controlled by sulphuric acid, opium, logwood, catechu, chalk-mixture, and the like; the strength could be sustained by quinine, strychnine, etc.; and there was little or no tendency to die from the mere poison of the fever. But, as the cases multiplied, and by their localisation began to indicate foci of contagion, the treatment became more difficult; for the diarrhoea became more unmanageable, the prostration more marked, and an alarming tendency to die became manifest in some instances.

At length, in September of last year (1869), I began to use creasote, which I had heard much praised in connexion with typhoid fever; and certainly it was beneficial. But it had one great drawback: it nauseated the patients, so much so, that the only patient we lost at that time persisted in attributing his death to the creasote. I therefore set to work to find something which should possess the good without the bad qualities of creasote.

The patient to whom I just now alluded was a spare, strong, healthy man, active and temperate. Yet within seven days of my seeing him

* Paper on the Influence of Atmospheric Changes on Disease. (*Manchester Literary and Philosophical Society's Transactions.*)

* Read before the East Kent District Meeting of the South Eastern Branch, at Canterbury, on November 10th, 1870.

first he was dead; and, within twenty-four hours after his death, putrefaction had advanced so far that the room in which the body was laid had to be hermetically sealed from the rest of the house; and at the funeral, sixty hours after death, it was scarcely possible for the mourners to follow at the ordinary distance, so rapid had been the decomposition. Accordingly, I determined that the agent I wanted must be an antiseptic or antiputrescent; and, having in view the different theories concerning fever-poisons, that it should also be antagonistic to the development of low vegetable organisms.

Of course, the first remedy which suggested itself to me was chlorine; for who does not know its wonderful efficacy in scarlet fever? It is, too, a potent antiseptic, and certainly hostile to the growth of germs. But still I could not but think that, inasmuch as the poison of one fever is without doubt totally distinct from that of any other, so the agent which should be most active in arresting the development of the poison in each fever should be different also. The notion is a crude one—perhaps open to the charge of being unscientific. At any rate, it has been by me only crudely and empirically tested.

My next thought was to try carbolic acid; but I feared to risk its depressing influence where the prostration was already so marked.

I therefore made up my mind to try sulphurous acid, which I had once or twice used in cases of sarcoma ventriculi, and which, I knew, could be made palatable, and was not depressing. The first patient upon whom I tried it was a daughter of the gentleman who had attributed his death to the creasote. She was very ill before I saw her—alarmingly prostrate both in body and mind, vomiting and purging, with the abdomen tympanitic and painful to the touch, and distinct gurgling about the ileo-cæcal valve on palpation. The pulse was 120, and very feeble; the temperature 103 deg. With some fear as to the issue of the case, I began to administer the sulphurous acid freely. After twelve hours, I saw her again. The vomiting had ceased; the purging was fast abating; the tympanitis was much reduced; the feeble pulse had not grown feebler; but the parched tongue was moister, and the thirst less. She said that the medicine, each time she took it, relieved her within a few minutes of the indescribably miserable feeling in her bowels, and of the nausea which had before oppressed her. She could now take the nourishment ordered without fear of retching; and the whole aspect of the case, from the first a severe one, was more hopeful. To cut a long story short, she recovered, though she had entirely resigned all hopes.

Plentiful opportunities for using the acid came to hand; and the more we tried it, the better we liked it, and the more firmly we became convinced of its efficacy. This summer we have used the acid in more than a hundred and seventy cases with signal results; of them all, one only died, and he was an habitual drunkard, and would not take his medicine. In one case only did we withhold the acid; the patient, a female, died. But the circumstances were exceptional, and probably more to blame for the death than the want of sulphurous acid was.

I will now quote from my note-book a few of the more remarkable cases.

CASE I.—Mary W., aged 73, almost a pauper, had been ill a fortnight, and confined to bed three days. She had vomiting and purging, with yellow blood-streaked fluid stools. The abdomen was tympanitic. She was unconscious, save when strongly roused. Pulse 130, fluttering; respiration 30. The tongue was white at the edges, brown in the centre, and dry as a chip. The diagnosis was easy, for the rash was developed. The prognosis was very unfavourable; but she took the acid, and has since married.

CASE II.—Annie P., aged 4, was the child of wretchedly poor parents. Her mother, far advanced in pregnancy, was herself suffering from the fever in a mild form. This child had been ill in bed for ten days, and was, it was thought, moribund when I was sent for. She was continuously delirious, purging incessantly, so that the whole house stank of her offensive motions. The rash was copious; the pulse uncountable; the tympanitis extreme; the vomiting so persistent that the attendants had for hours ceased to give her food. Could any case in itself, and in all its collateral circumstances, be more unpromising? With the utmost difficulty, and by dint of the sternest resolution, I forced the grandmother, who nursed the two patients, to give the child the medicine regularly, and feed it every ten minutes. For four days it lay seemingly at the very point of death, so that every time I entered the house I was taunted with harassing the last moments of a dying child. She took the medicine, and recovered.

CASE III.—Annie F., aged 2, an only child of poor but not poverty-stricken parents, had all the above mentioned symptoms. You will doubtless agree with me that an only child is a more troublesome patient than one of a more numerous family; yet this child too recovered under sulphurous acid treatment.

CASE IV.—Edith M., aged 3 months, the child of well-to-do trades-

people, did not have the rash, but the vomiting, purging, and all the other symptoms, as badly as any case; but she too recovered.

CASE V.—Thomas H., aged 54, a well-to-do mechanic, had been under the hands of a skilful medical man for some weeks with such symptoms as I have before described; but, so often as the diarrhoea was checked, the burning heat and vomiting were greatly increased, and *vice versa*, till at last he was told he could not live the night, and was beyond human help. He then sent for me. When I saw him, I found him in a state of most alarming prostration. His pulse was too fast and feeble to be counted. He had vomiting; the abdomen was tympanitic; and he had purging, the bowels having acted thirty-four times in the last twenty hours. I could not discover any rash; but his state was such as to preclude any very searching examination. I prescribed the acid. In the next sixteen hours his bowels acted twice; he was not once sick. He recovered. This case seems to me to say volumes for this medicine, for there is no doubt that the man had taken all the drugs ordinarily used without deriving permanent benefit or arresting the disease; and yet from the moment he swallowed the first dose of sulphurous acid he began a recovery in which he never faltered afterwards.

The acid should be given in doses of from two and a half to twenty minims, according to age, repeated every four hours, and continued for a week, ten days, or even more, until the patient complains of tasting, smelling, or feeling like sulphur or lucifer-matches; or, in the case of infants, until they actually emit an odour of the gas from their skin and breath. I have never pressed its use beyond this, under the belief that the system must by that time be supersaturated; nor have I ever seen reason to regret stopping it at that point.

Where I have seen the case early, before the diarrhoea has become severe, I have given simply the sulphurous acid flavoured with syrup of orange-peel in water. Where the diarrhoea was troublesome, I have added sulphuric acid and laudanum, according to the age of the patients. Thus my usual formulæ for adults have been the following.

R. Acidi sulphurosi ℥ij; syrupi aurantii ℥iij; aquam ad ℥vj; or
R. Acidi sulphurosi ℥ij; acidi sulphurici diluti ℥ij; tincturæ opii ℥xx; syrupi aurantii ℥iij; aquam ad ℥vj.

For infants:

R. Acidi sulphurosi ℥xv; syrupi aurantii ℥iij; aquam ad ℥j; or
R. Acidi sulphurosi ℥xv; acidi sulphurici diluti ℥xv; tincturæ opii ℥ij; syrupi aurantii ℥iv; aquam ad ℥j.

A sixth part of either of these mixtures is to be taken every four hours.

In one case only can I recollect diarrhoea *setting in* during the sulphurous acid treatment, and without having previously existed; but the patient had old standing renal disease, from which she still suffers, though she has almost forgotten fever.

Lest I should be misunderstood, I will state distinctly what I claim for the sulphurous acid in typhoid fever: that it arrests the further development of the fever-poison, and, by continuing this arrest long enough, exterminates the fever. Briefly, it is an antidote.

In some of my early cases, I left off the acid after a few days' use, because the patients seemed better. In almost all such cases, they had a relapse, which was again immediately arrested by the resumption of the acid.

I believe that, where we get the cases soon enough, we may stamp out the disease then and there. For instance, in one thirty-six hours I was sent for to see four children belonging to two different families visiting in the town. I had no doubt as to what their symptoms denoted, and at once gave the acid. At my visit next morning, I was met in each house with smiling faces and the assurance that I had been mistaken in my diagnosis, for the little patients were much better. Of these children, three remained under my care, took the acid for a week, and made complete recoveries, without relapse. The fourth seemed to ail so little that the parents would not heed my advice, but carried her home after two days of the acid. Shortly afterwards, I learned that, three days after reaching home, she had been attacked by typhoid fever, and hardly escaped with life. I make no doubt that, had the other three also discontinued the acid so soon as they seemed well, they too would have had a return of all their symptoms, and have suffered the ordinary course of typhoid fever.

Very possibly I have failed to convince you of the advantages of using this drug; but let me again remind you of the plain fact that, of one hundred and seventy-three cases of this fever occurring in our practice during the past fourteen months, two only died, and those two did not take the acid: for the one it was not prescribed; the other was a drunkard, and would take nothing. Of the hundred and seventy-one who took sulphurous acid, not one lost his life; and there were but few who were not convalescent within fifteen days of commencing the treatment. Surely such a result will induce you to try the medicine for yourselves when opportunity offers.