IN MEMORIAM.

THOMAS WILLIAM THOMPSON.

The earlier pages of this volume contain a paper from the pen of Thomas William Thompson, the later pages must contain the record of his death. To his friends his loss is irreparable; he can never be forgotten by those who knew and loved his manly qualities, his generous sympathies, and his splendid abilities. To the Society his death is a calamity, for few are endowed with the power to read nature which gave to Thompson's work a value of its own.

But not less necessary for this work, upon which Thompson and the Society were alike engaged, was his ability to consider his subject from every view-point; to state in exact proportion the evidence which told in favour of, or against, a hypothesis that had to be examined. There has passed into the hands of the Society an unfinished piece of his work, a mere fragment, probably never intended to be published, but rather to guide his own mind to a sound conclusion on a difficult problem. It serves to illustrate Thompson's method and Thompson's work, and finds a fitting place in these Transactions.

A Critical Examination of the Objections urged against the Doctrine of the Aerial Convection of Small-Pox from Hospitals.

Some twelve years have now elapsed since the publication of Mr. W. H. Power's well-known Report on "The Influence of the Fulham Small-Pox Hospital on the neighbourhood surrounding it". The time has therefore perhaps arrived when a comprehensive review of the facts and arguments since brought forward against the aerial convection hypothesis, adopted by Mr. Power in that and subsequent Reports, as needful for the explanation of the observed distribution of small-pox around hospitals, may usefully be made. And the fact that the subject has recently been discussed at different medical societies—renewed attention having, no doubt, been directed to the matter by the increased prevalence of small-pox in the
country during the past two years—seems to afford a further ground for regarding the present as an opportune time for undertaking such an inquiry as that now proposed.

Now, the facts and arguments which we have to consider divide themselves naturally into two classes:—

A. Those cited for the purpose of showing that, apart from the occasional accidents met with in connection with all infectious diseases and due to gross hospital mal-administration, small-pox does not possess any appreciable tendency to spread from hospitals: a view which, of course, excludes the aerial convection hypothesis and the notion of special danger attaching to small-pox hospitals.

B. Those cited to show that the excessive spread of small-pox (as compared with other fevers) from hospitals, which is admitted, is due to direct or indirect infection of the commonly recognised sorts, consequent, doubtless, upon defective hospital and ambulance administration, and not to the atmospheric transmission of small-pox virus over long distances—a view which endorses the alleged danger of small-pox hospitals to surrounding populations, but differs from the aerial hypothesis as to the explanation of that danger, and therefore, of course, as to the measures necessary for averting it.

Considering first objections of the class A, they are found to be based mainly upon alleged negative evidence. Instances are adduced in which, during particular years, or even during a succession of years, cases of small-pox have been treated in particular hospitals within more or less close proximity to dwellings or public institutions, without, as it is affirmed, any extension of the disease beyond the limits of the hospitals in question.

Now, evidence of this kind must be received with very great caution, and that for several reasons. In the first place, the admission that their hospital has been spreading small-pox is an unpleasant one for a Sanitary Authority to have to make even to themselves, much less to the general public; and it is to be feared that a conscious or unconscious refuge in the suppressio veri must be held responsible for some share of the negative evidence in question. Where this source of error has not operated, however, much of the negative evidence, consisting as it does of mere general statements founded upon general impression, is of little worth. Further inquiry would, no doubt, show that in many of these so-called negative instances there had been some small-pox around the hospital, and that such small-pox, when mathematically examined as regards its amount
and graduated distribution, much more nearly coincided with the Fulham experience than had been for a moment suspected. A notable error of this kind was made in the Report of the Royal Commission on Small-Pox and Fever Hospitals in 1882. The Commissioners, influenced apparently by a general impression that the amount of small-pox which had occurred in certain public institutions adjacent to small-pox hospitals was insignificant in amount, committed themselves to a statement to that effect without testing it mathematically. When, however, the percentages were subsequently calculated by Mr. Power, it was seen that the incidence of small-pox on the institutions in question, according to the figures before the Commissioners, had been very much what would have been anticipated from the positions of those institutions in relation to the hospitals, even on the basis of the Fulham experience. The fact probably is that the absence of a serious and conspicuous outburst of small-pox around a small-pox hospital has been frequently regarded as evidence of the harmlessness of such hospitals, and therefore no adequate attempt has been made to trace the hospital influence by a mathematical study of the amount and distribution of known small-pox in its relation to the hospital.

But when all allowance has been made for errors of the kind above referred to, it doubtless remains true that a certain amount of the negative evidence is left intact—that is to say, in certain times and places, hospitals containing small-pox patients have not to any appreciable extent acted as disseminators of the disease. But what is the value of such evidence against the opposite facts positively observed elsewhere? Practically nothing. To regard it as valid is to assume that the alleged extension of small-pox from hospitals is due to a single unaided cause which is always uniform in its operation, and uninfluenced by any concurrent or coexisting factors.

Such, however, is obviously not the case. At the very least the phenomenon must be a resultant of three factors, viz., the small-pox virus, susceptibility of persons residing in the neighbourhood of the hospital, and the presence of circumstances inducing contact between the two. It will, however, be readily seen that the two latter factors are capable of further analysis into a variety of component factors, varying in amount at different times and places, though this may not at once be admitted as regards the first. By many persons, and especially by those who rely upon the negative evidence now under consideration, the
small-pox virus is no doubt habitually but hazily thought of as a simple factor in the sense of every case of the disease possessing the same quantity of a virus of fixed and uniform pathogenicity. But is this view supported by what we know of pathogenicity generally. The variation from time to time in the spreading power of the same infectious disease constitutes one of the most conspicuous features of maladies of that class; and although it is often hastily assumed that such variations are mainly due to variations in the susceptibility of recipients, and in the opportunities of infection, probably no one would be so bold, after due reflection, as to attribute them exclusively to those causes.

Such a view, even if regarded as adequate to account for the more or less regularly recurring outbreaks of certain indigenous diseases in particular localities, such as measles, would afford no explanation of such phenomena as the influenza pandemic, except, indeed, by those prepared to assert that England was ten years ago destitute of persons susceptible to that disease and of the means for its dissemination. It is true that the variations in question, in so far as they are not due to conditions of recipients and facilities for disease transmission, might be accounted for (and no doubt in great part correctly accounted for) by multiplication of virus apart from increase in pathogenicity—but the one by no means necessarily excludes the other. And while the progressive increases and decreases in the virulence of a given epidemic of disease, both as regards time and place, which is so frequently observed, is highly suggestive of variations of pathogenicity, variations in the pathogenicity of viruses have been proved by laboratory experiments to be easily inducible. It is doubtless true that the viruses of some diseases are more uniform in their operation than those of others, and that of small-pox may pretty safely be regarded as relatively stable. It is, however, equally safe to conclude that none of them are absolutely stable; and, as a matter of fact, the variations in pathogenicity, which have been induced in the bacteriological cabinet, have mostly been in viruses remarkable for the certainty of their operation, such as those of rabies and anthrax.

From what has been said, it will, I think, be clear that the dissemination of small-pox from a hospital must be due to a combination of causes consisting probably of some or all of the following, viz.: a small-pox virus; a particular amount and quality of such virus; the presence of persons
susceptible either naturally or due to neglected or defective vaccination; the conditions necessary for conveying the virus to and from hospital to susceptible persons, including defective hospital and ambulance administration, conditions of atmosphere, etc. Obviously, an effect dependent upon a combination of causes can only be expected to occur when all the needful contributory causes are in operation. It is therefore unreasonable to maintain that hospitals never spread small-pox because they do not always do so. It might as reasonably be argued that scarlet fever is not infectious because, when introduced into a household, it occasionally fails to attack more than one of a family of children unprotected by previous attack.