shown by the intestinal oncometer. As in the case of the potassium salt, the previous administration of atropine has no effect on the action of ammonium chloride. The tracing in Fig. 4 shows the effect of an injection in an animal under the influence of atropine. The previous administration of nicotine has also no effect on the results.

Fig. 4.—This shows the effect in a cat of the injection of 5 c.c.m. of a 1 per cent. solution of ammonium chloride. The general character of the fall of pressure is very like that produced by choline, but differs from it in occurring after atropinization. The above tracing was taken in an animal under the influence of atropine: in the same animal in this condition the injection of choline produced a rise of pressure exactly similar to that shown in Fig. 3.

Bile Salts.

Sodium glycocholate and sodium taurocholate both produce a fall of blood pressure; but this fall is an insignificant one, even if the solutions used are of 1 per cent. strength, a concentration far beyond physiological limits. The effect of the taurocholate is rather more marked than that of the glycocholate. (See Figs. 5 and 6.) Any effect noted on intestinal

Fig. 5.—This shows the effect in a rabbit of the injection of 5 c.c.m. of a 1 per cent. solution of sodium glycocholate.

Fig. 6.—This shows the effect in a cat of the injection of 5 c.c.m. of a 1 per cent. solution of sodium taurocholate.

volume was in the direction of dilatation, but this was, as a rule, too slight to be measurable. These results are unaltered by the previous injection of atropine or of nicotine.

Some years ago in this laboratory Dr. R. A. Young, who was at the time interested in the question of jaundice, commenced an investigation of the influence of bile salts on the circulatory system. The results he obtained were never published, and the reason why he did not continue the work was that the effect on blood pressure was found to be so slight; even with 5 per cent. solutions the fall presented was hardly greater than that shown in the accompanying figures. (Figs. 5 and 6.)

CONCLUSION.

From these experiments it will be seen that the physiological actions of potassium chloride, ammonium chloride, and bile salts are in many points fundamentally different from those of choline.

REFERENCES.

- ¹ *American Journ. of Med. Science*, 1902, p. 150. ² Donath's latest paper dealing with Mansfeld's criticisms appeared in *Zeitsch. f. Physiol. Chem.*, xlii, p. 563. 1904. ³ *Pflüger's Archiv*, clii, p. 476. 1904. ⁴ *Edin. Med. and Surg. Journ.*, 1839. ⁵ *American Journ. of Physiology*, xi, p. 370. 1904.

THE SANATORIUM TREATMENT OF PHTHISIS. IS IT WORTH WHILE? *

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It is now six years since, at a meeting held at Marlborough House, the mind of the people of England was first strongly drawn to the prevalence and possible prevention of consumption, and especially to its treatment by the so-called "open-air" method in sanatoriums. At that meeting the leaders of medicine of Great Britain and Ireland testified to the gravity of the plague and to their faith in the new principles. These views, though well known to a limited number of English medical men, came as a complete novelty to the general public and a considerable section of our profession, but in the course of the next two years spread widely and obtained many converts both medical and lay.

Since then sanatoriums for the well-to-do have multiplied abundantly; a few for the poor have been at work for two or three years, while others are being projected. But, as the wave of enthusiasm was great and expectations were lifted high, it is useless to deny that some depression has followed, that we are now in a vale of criticism which asks, Were these expectations justified and is this costly movement worth the cost?

These are questions which cannot be shirked and which we who advise the public in matters medical are bound to do our best to answer. Is the "sanatorium," or "open-air," treatment of phthisis markedly superior to older methods? If so, can it be carried on in this country as well as abroad, and, even if it can, is it equally applicable to the poor as to the rich?

That abundance of fresh air makes for strength and that the atmosphere of close, crowded, though comfortably warm, rooms makes for weakness, is a belief now generally professed (though rarely practised) by doctors and all men. But it must be clearly understood that life in the open air is not "sanatorium treatment." It is too commonly one's lot to meet an unfortunate consumptive who has been told to get plenty of fresh air, and who in spite of hectic, dyspnoea and loss of flesh, struggles along road, meadow, or seashore, panting for the breath of life, which to him is but a will-o'-the-wisp luring soul from body, when it should be a gentle spirit permeating a peaceful mind and quiet body. The medical man who casually orders fresh air without thoroughly insisting on the need of rest to the feverish patient has much to answer for. Abundance of the purest air, good food, and a careful regulation of rest and exercise, are the three essentials of sanatorium treatment as advised by Brehmer exactly fifty years ago (1854), and fifty years' experience of this triple rule has convinced impartial judges all over the world that in this way, with time and patience, phthisis can be more often arrested than by any other known method, and that whatever further therapeutic agent may be hereafter adopted this mode of life will always be a basis.

That a doctor should take his own physis is rightly considered a proof of his belief in it, and nothing is more striking

* A paper read before the Midland Branch of the British Medical Association, June 9th, 1904.

than the readiness of medical men when attacked by phthisis to resort to a sanatorium. Quite a number of sanatoriums, both in this country and abroad, are now managed by doctors who themselves were once patients, and among them are some of the most remarkable cures on record.

The evidence of the worth of this method may be looked at from two points of view: (1) The statistical, (2) the impression produced by the study of individual cases. Each method has its faults and each its merits, but probably the conjunction of the two may help us towards the truth.

STATISTICS.

Among obvious fallacies of the statistical are the different meanings given by different writers to such terms as "early" and "advanced" phthisis, and "improvement," "arrest," and "cure." More especially is the term "economic cure" and "capacity for work" a snare.

All medical men know the foolhardy rashness with which the patched-up consumptive rushes into work, matrimony, or other hazardous occupation.

It may, however, be stated without fear of contradiction that the figures of private or pay sanatoriums, as well as those organized for the poor in Germany and Switzerland, show an average of about 70 per cent. of cases very greatly improved during their residence; and some of the directors of these institutions speak of this proportion of "economic cures." Thus the German Imperial Health Office, analysing 6,000 cases from industrial sanatoriums, gives the number discharged as capable of work in five successive years at from 68 per cent. to 77 per cent.¹

Private sanatoriums, attempting a more scientific analysis, speak of cures or apparent cures (in which presumably there are neither subjective nor objective signs of disease), and from a table given in Dr. Walther's valuable book on sanatoriums (p. 53) we find that but from 11 per cent. to 20 per cent. of cases can thus be reckoned, though the total number of "improvements" varies from 70 per cent. to 80 per cent. The following interesting table is given² by Dr. Burton Fanning as the result of the study of patients at Mundesley from June, 1899, to June, 1902—four years:

Arrest, and Fit for Work.	Arrest, but Unable to Work.	Improved.	Total Improvement.
32 per cent.	25 per cent.	26 per cent.	83 per cent.

Of the "arrested cases," 93 per cent. were living in August, 1903.

It would thus appear that sanatorium treatment in England in such capable hands as that of Dr. Burton Fanning is at least as effective as in Germany.

With regard to the permanence of the arrest or cure of the tuberculous disease, we find a marked difference between the well-to-do patients of private and the poor of industrial sanatoriums. Thus of 40 patients discharged as cured, or nearly cured, from Brehmer's Sanatorium in 1876, 25 were alive and well in 1890, and Dettweiler found that 72 out of 99 patients discharged from Falkenstein as "cured" were in good health from three to nine years afterwards. On the other hand, the above-mentioned German Government figures show that of the patients discharged as fit for work in 1897, only 27 per cent. were well and at work at the close of 1901, four years later, though it is also noted that some of those discharged as not improved were now found to be well.

Better results are reported from the Basel-Davos Sanatorium³ where 58 per cent. were at work at the close of the fourth year after discharge; but I think it may fairly be said, as the result of a large mass of Continental statistics, that only about 30 per cent. of patients discharged from sanatoriums for the poor maintain the capacity for work more than four years. The German Board of Health speaks of this as an economically satisfactory result, and is of opinion that the very large sums spent in that country in the erection and maintenance of sanatoriums for the working classes are justified by the prolongation of life in this number of patients. These figures include patients in all stages of disease, but if we classify them according to their stage we get the most decisive answer as to the possibility of doing good to early cases and the uselessness of treating those that are advanced. Thus, Rumpf of Friederichsheim out of 541 cases treated in 1900 found between two and three years later 75.6 per cent. of first-stage patients at work and 3.4 per cent. dead, while of third-stage cases 54.8 per cent. were dead and

25.4 per cent. at work. Still more striking are some figures given by Weicker, which state that out of 1,367 patients three years after treatment, 95 per cent. of those in the first stage were at work and 95 per cent. of those in the third stage were dead.

In the consideration of sanatoriums for the poor maintained by private charity and public funds, the facts are of the utmost importance. In England sanatoriums for the poor have existed too short a time to allow of statistics of much value being collected from them; but the open-air treatment has been carried on longer than most people think. Thus, it was in 1893 that Dr. Jane Walker, and in 1895 that Dr. Burton Fanning started this treatment in Norfolk, while Dr. Philip took his first patients into the Victoria Hospital near Edinburgh in 1894; so that these three observers at least have had about ten years' experience of the treatment in both rich and poor.

Dr. Jane Walker⁴ gives the following table of results of treatment of poor patients treated before January, 1902, and inquired about in January, 1903:

Number of Patients.	Well, and at Work.	Worse.	Died.	Lost Sight of.
95	26	9	23	34

Died in Sanatorium, 3.

Of Dr. Philip's results I have no information.

The Westmorland Sanatorium for the Poor has now been at work for four years, and in its report for 1904 sums up its results as follows:

Of 41 early cases, nearly all are now in robust health and earning a comfortable livelihood.

Of 54 "intermediate" cases, the majority are quite well; 7 have died.

Of 74 "advanced" cases, 32 have died, and the rest are invalids.

Thirty-nine cases were discharged from the sanatorium, after a short stay, as hopeless.

These figures point clearly to the uselessness of sending advanced cases to a sanatorium.

The average cost at the Westmorland Sanatorium was 36s. a week, or £93 10s. a year.

The Nottinghamshire Sanatorium in Sherwood Forest has been open since February, 1902, and in that year and 1903 received and discharged 110 patients, who have been classified as follows:

Table of 110 Patients Treated in the Nottinghamshire Sanatorium in 1902 and 1903.

Result.	Number of Cases.	Stage of Disease.	Percentage.
(a) Disease arrested ...	22	{ 17 in first stage 5 in second .. }	20 per cent.
(b) Much improved ...	31	{ 11 in first .. 18 in second .. 2 in third .. }	81.8 of total improved
(c) Improved ...	37	{ 16 in first .. 12 in second .. 9 in third .. }	
(d) Stationary ...	6	{ 1 in first .. 3 in second .. 2 in third .. }	18.2 per cent. total not improved
(e) Worse ...	14	{ 2 in first .. 9 in second .. 3 in third .. }	
(f) Died ...	0	—	—

The term "arrested" is used when there is no expectoration, no fever, and no sign of active disease in the chest. The cost of maintenance is about £75 a year per patient. Of 42 patients who left the sanatorium in 1902, the following information was obtained in reply to inquiries made in February, 1904:

Well and at work ...	...	16 = { 11 in 1st stage 5 in 2nd .. }
Fairly well, but not at work ...	...	5 = All in 2nd ..
Worse ...	...	5 = { 1 in 1st .. 4 in 2nd .. }
Dead ...	...	16 = { 1 in 1st .. 10 in 2nd .. 5 in 3rd .. }

Thus exactly half of the patients discharged have maintained improvement gained for over a year, while half have got worse or died. And I ought to add that one of the patients in whom the disease was described as "arrested" in 1902 has within the last few months had a relapse. On the other hand, some of the patients who were only described as

"improved" have since their discharge done remarkably well and been among our most satisfactory cases. Thus a man (L. A.), who was in the sanatorium from June to September with acute softening of one apex, and was bringing up crowds of tubercle bacilli, made great general improvement while in residence, but could not be spoken of as "arrested," as he still on discharge coughed a little phlegm with bacilli. He was able, however, to spend a few more months in the country and intelligently to continue the rule of life learned in the sanatorium, and when examined a year later no lesion whatever could be detected in his chest by myself and by two other medical men. He has since been regularly at work, can take twelve-mile walks without fatigue, and in a letter written this year says, "I never felt better in my life." He further adds, "Before I broke down my winter life was marked by a succession of severe colds. Since I began the treatment colds and influenza have been all around, but the plague has not come near me."

The narration of this case is perhaps prematurely leaving the statistical aspect for that of personal impression, but it will serve as a text to illustrate the fact that the personal equation plays a large part in the compilation of statistics. There is obviously room for difference of opinion as to whether a given case should be classed as "arrested" or only "much improved," and we have had serious debate as to whether one should be labelled "stationary" or "worse." The most truth-loving mind may be biased by the spirit of optimism or its reverse.

An interesting paper on the economic value of sanatorium treatment by Drs. Bardswell and Chapman was printed in abstract in the *BRITISH MEDICAL JOURNAL* of April 30th, 1904, but it dealt with patients treated on these lines, not in a country sanatorium, but in the Sheffield Royal Infirmary, and followed up their after-history for four years.

Of 29 cases admitted, 11 were from the first hopeless, while 16 seemed to have a chance of recovery. Of these 9 were discharged as fit for full work, 7 for light work. The period of treatment varied from six to over twelve months. Of the 9 apparently cured patients, 3 died within four years, 2 kept quite well till the fourth year and were then lost sight of, while 4 were positively known to be well and at full work up to the end of the fourth year. Of the 7 partially restored only 1 was alive at the end of four years, but 3 of them had done some work for three years.

Thus out of the 16 patients which were not quite hopeless from the first, it seems that in 6 only was a really satisfactory result obtained. It should, however, be remembered that most of these 16 were by no means slight cases, that their "open air" was that of smoky Sheffield, and that the conditions of life and work to which they returned were the reverse of the best.

IMPRESSION PRODUCED BY INDIVIDUAL CASES.

Leaving the statistical side of the question, I will pass on to the personal impression that the study of private, hospital, and sanatorium patients has made, and at once say that I entirely believe that the "open-air" or "sanatorium" treatment is the best we have, and should myself promptly resort to in the event of being attacked by tubercle. Yet at the same time I must confess that I think our anticipations as to its general applicability, as to the rapidity and permanence of its remedial action, have been somewhat too sanguine, and that a practical acquaintance with the difficulties attendant to its application to the working classes point to limitations to its sphere of action.

While I recall with pleasure several such cases as that above mentioned from our Nottinghamshire sanatorium, where intelligence on the part of the patient and financial assistance from friends has apparently led to a complete recovery, I cannot forget others where the want of one or both of these factors, or where, even with them, the natural lack of resistance of the body has caused the improvement to be but temporary, and yet others where, in spite of the disease being recognized early, and every possible therapeutic resource employed, the disease has progressed steadily to a fatal issue.

There is a proportion of acute cases, small it is true, occurring mostly in young people about 20, in whom no treatment, sanatorium or otherwise, has the slightest effect in mitigating the virulence of the disease. Such are obviously unsuitable for a sanatorium maintained by public subscription. Keeping them there is an unwarranted expense, and only tends to discredit the institution in the minds of outside medical men and the public. The more I see of phthisis the more do I agree with Walther as to the impossibility of making a prognosis without closely watching the patient for several weeks and observing the response to treatment.

To obtain the maximum benefit from a sanatorium for the poor it should be worked in connexion with an urban hospital, where the cases should be watched for a few weeks in the first instance and only those sent who exhibit some recuperative power. The medical examiner who is asked to certify at a single interview that a patient is suitable for a sanatorium may be able to, (nay, often must,) give a decided answer in the negative, but will certainly make many erroneous forecasts among those whom he passes as hopeful. And here I must be allowed to lament the little assistance given in this respect by the majority of general practitioners. By far the greater part of sanatorium candidates have been more or less under medical care for months; yet it is the rarest event to find any record of temperature, any instructions as to the need of rest and as to precautions against spread of infection. Unsuitable work is often allowed to be continued without its suicidal effect being made clear. I have known a Board School teacher, with copious phlegm and frequent slight hæmoptysis, permitted to continue at work, with occasional days off, for a space of two years, until, being quite cachectic, he thought he would try a sanatorium. Until medical men recognize and insist on the prompt treatment of phthisis in its earliest stage, sanatoriums can only be beneficially worked as adjuncts to hospitals.

So much for the patients before they enter a sanatorium. What about their after-care? With the present class of cases—a few early and the greater number serious phthisis—it is obviously impossible, in a few months' course, to do more than effect some improvement. Even if all were quite early cases, a complete recovery could not be effected in the three or four months which is all that most working people can afford for the sanatorium. The most that can be expected is an "arrest" of the disease.

(It is unfortunate that the word "cure" has come into such popular use, probably from the German word "kur," which would be better translated "treatment.")

Whether this arrest will be permanent no one can say when the patient leaves the sanatorium, though one can fairly confidentially predict that it will *not* if the patient returns to an unhealthy home or work. It is therefore highly desirable that organized efforts should be made for the "after-care" of convalescent sanatorium patients to enable them to live for a time under favourable hygienic conditions, and undertake only such light work as may suit them.

The Nottinghamshire Association for the Prevention of Consumption has from the first recognized this essential supplement to sanatorium treatment, and through its "After-care" Committee had hoped to establish a horticultural colony. Lack of funds has unfortunately prevented the development of this scheme, but something has been done in aid of individual patients. Time will not permit me to enter into further details of this aspect of my subject.

Have we now got the data for answering the question, Are sanatoriums for the poor worth the expense?

We have evidence to show that in sanatoriums, as now managed, from one-fourth to one-third of the patients regain their working capacity for at least four years, and I am strongly of opinion that those who survive that period will live longer. The chief weeding-out comes in the first two years after discharge. Moreover, it is certain that when patients are sent earlier in the disease a large number of recoveries will occur. Can home or hospital treatment give as good a result? The home or out-patient treatment of poor phthisical patients is, in my experience, almost invariably, sooner or later, a failure; but undoubtedly a sequence of treatment in hospital and a convalescent home often does great good.

I have not statistics to compare with those of sanatoriums, but will mention a few objections to the latter plan. In the first place, special chest hospitals are few outside London and our largest cities, and general hospitals object to having more than a small proportion of phthisical patients in their wards, and also to keeping patients for so long a time as three or four months. Secondly, all these hospitals, so far as they are able, now treat their consumptives on sanatorium lines, and thus incur an equal expense; and, thirdly, there is no doubt that they would meet with greater success if their patients breathed, not the smoky air of towns, but the pure atmosphere of the country, and if they had extensive grounds and shady walks where the graduated exercise that is so essential could be taken under medical supervision.

If we are to treat consumptives at all, they are best treated in a special hospital, and such a hospital is best placed on a dry, bracing spot, with plenty of pure

country air. Such a hospital is a sanatorium. That consumptives should not receive medical treatment, because so many relapse is a proposition so monstrous that few I hope will be found to utter it. It is an argument which will apply to many other diseases. What can be more sad than the experience of a children's hospital, where after every care has been lavished on the puny infants to bring about a restoration to health, the return to the squalid home and careless mother leads once more to marasmus and death? How many cases of heart disease do we laboriously patch up only to see fall back when the sufferer attempts again to earn his daily bread? Shall we condemn the care and skill of the surgeon who performs an elaborate operation to extirpate cancer, because in four-fifths of his cases the patient goes home to die a miserable death a year or two later? Humanity will not let us count the cost too closely in these. Neither shall it say to the consumptive—For you alone nothing can be done.

Let us try to prevent disease, and further all measures, public and private, which strike at the causes of consumption; but since it is still with us as our most fatal plague, let us also do what we can for those whom it has stricken.

POSTSCRIPT.

Time limitations did not allow reference in the above paper to various other aspects of the tuberculosis question, whose importance is nevertheless great. Thus, the economic loss to the community from the mortality and inability to work from tuberculosis is obviously an important consideration in discussing means of prevention and treatment of the disease. The matter is one for the economist equally with the physician, and cannot be treated in detail here. It may, however, be pointed out that 60,000 persons die in each year of this malady in England and Wales, and if, with Dr. Biggs of New York, we put a value of £300 upon each such life, we get a sum of £18,000,000 lost annually, without counting the loss incurred during their last year of life, in which they are mostly incapable of work and kept at the expense of the community.

Secondly, no reference was made to the need of homes or hospitals for the isolation of advanced cases, which are frequently a danger to others. There is no doubt that this is a real need, and, in my opinion, could best be met by the provision of special wards in union infirmaries. The stigma of pauperism should be removed from these infirmaries, and there should be no more disgrace in going there for a chronic or hopeless malady than to an ordinary hospital for an acute or curable disease.

Thirdly, the due provision of sanatoriums and hospitals for consumptives should not exclude the out-patient or "dispensary" treatment of a large number at their own homes, on the lines described by Calmette, of Lille, at the British Congress on Tuberculosis, in 1901, and quite recently by Dr. Philip, of Edinburgh.⁶

This plan, which appears to have been first elaborated by Philip in 1887, and has been independently evolved by Calmette in Lille and by others in France, might in my opinion easily be carried out in the out-patient department of general hospitals by co-operation with municipal "lady health visitors," health inspectors, and with district nurses.

It would be an advantage if each such hospital had one or more special "out-nurses" with special training in hygiene to visit patients at their own homes. But much good could be done by the notification of phthisical out-patients to the medical officer of health and obtaining the assistance of his lady health visitors to instruct and help the patients at their homes.

REFERENCES.

¹ *Tuberculosis*, June, 1903. Leipzig. ² *Lancet*, August, 1903. ³ Quoted by Dr. Theodore Williams, *Lancet*, June 30th, 1900. ⁴ *Hospital Saturday Fund Journal*, December 31st, 1903. ⁵ *BRITISH MEDICAL JOURNAL*, June 11th, 1904.

CONGRESS OF PSYCHOLOGY.—The fifth meeting of the Psychological Congress will be held in Rome from April 26th to 30th. The Organizing Committee consists of Professors Luciani, Tamburini, Sante de Sanctis, and Sergi, to any of whom communications relative to the Congress may be addressed.

MILK CHARITY IN PHILADELPHIA.—There has been established in Philadelphia a society having for its object the distribution of pasteurized milk to needy children throughout the city. It has nine supply stations. Half of the milk distributed by the society is given free to applicants who present a medical practitioner's certificate that the milk is needed and who are unable to pay for it. The other half is given at a nominal cost which puts it within the reach of all.

THE INFLUENCE OF RAINY WINDS, SOIL, POVERTY, AND GENERAL DEATH-RATE ON THE PHTHISIS DEATH-RATE IN EXETER, 1892 TO 1901.

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THE influence of rainy winds on phthisis is so pronounced, so important, and so little recognized,* that no excuse is needed for reverting to the subject. A valuable report† has recently been issued by the sanitary authority of Exeter, dealing with the distribution of phthisis death-rate in those streets of the city in which deaths from the disease have occurred during the decade 1892 to 1901. From the figures in this report I propose to show that in Exeter—

1. The streets whose roadways are swept by the prevalent rainy winds—S.W., W., N.W.—suffer more from phthisis than those whose roadways are sheltered.
2. The streets built on relatively impervious soil tend to suffer more than those on relatively pervious soil.
3. The streets inhabited by the poor suffer more than those lived in by the well-to-do.
4. General death-rate apart from poverty seems not to affect phthisis death-rate.
5. Exposure to rainy wind exerts a greater influence than soil or poverty.
6. The influence of rainy wind appears to be direct upon the people exposed to it, not, as some have suggested, indirect, either through closure of doors and windows or through wet driven into walls.

Preliminary Remarks.

In dealing with these points it is necessary to consider female deaths only, because the men are so much from home during the day, besides being far more liable than the women to occupational phthisis.

Unfortunately the female populations of the streets are not available, so that the female phthisis death-rates have to be expressed in terms of the total populations. The error thus introduced, however, will probably not be a large one when numbers of streets, containing a considerable aggregate population, are grouped together, and will not, probably, be held to invalidate the striking results brought forward. It will be remembered, of course, that the figures so obtained should be about half the ordinary female death-rates. Deaths registered under 5 years of age have been excluded. Only two such were found—one amongst the sheltered, the other amongst the exposed streets.

A few words are needed about "made soil." This obviously cannot be regarded as of uniform composition. In Exeter it is associated generally with a very high phthisis death-rate, but the death-rates upon it seem to follow none of the laws which appear to govern the death-rates on such soils as clay, sandstone, and gravel. Consequently its inclusion amongst other soils tends to obscure the results obtained on the other soils. This may fairly be ascribed to its inconstancy of composition; and it will probably be thought allowable, perhaps even obligatory, to exclude it from consideration in most of the tables which follow, provided that a note to that effect is added in each case. Table I furnishes figures for the recalculation of all tables, including made soil, if that is desired.

1. The Influence of Rainy Winds.

In Table I the streets are arranged in ascending order of female phthisis death-rates expressed in terms of their total populations. It can be seen at a glance that streets with sheltered roadways (marked S) are commonest near the beginning, and streets with exposed roadways (marked X) are commonest near the end of the table. The natural inference drawn from this table is confirmed by Table II; but, in order to make sure that the result is not a chance one, the difference between shelter and exposure has been investigated separately

* If any one doubts this, let him refer to the discussions on the subject in the *Transactions* of the British Congress on Tuberculosis of 1901.

† This report, which I believe to be unique in character, divides the streets into groups according to the rateable values of the houses, and gives for every street during the ten years 1892 to 1901 the number of inhabited houses, the population according to the census of 1901, the average height above sea level, the direction of the street, its soil, its death-rate per 1,000 from all causes for ten years, its death-rate per 1,000 from phthisis for ten years, the deaths each year from all causes and from phthisis, the total number of deaths in the ten years from all causes and from phthisis, with the sex, age, and occupation of every death from phthisis in every year.