POPULAR ENDEAVOUR AGAINST TUBERCULOSIS—ITS INSTRUMENTS, METHODS, AND RESULTS.

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[Read April 19th, 1907]

It was on the 24th March, 1882, that Koch brought forward his famous paper, in which he described his discovery of the Tubercle Bacillus, before the Berlin Physiological Society. Twenty-five years have since rolled by, and we may now be said to have arrived at the Silver Jubilee of the Bacillus. The present would, therefore, seem a very appropriate time to review the results of the impetus imparted by Koch's genius to the study of this most widespread and fatal of human diseases, and endeavour to precise the directions in which future exertion may be most fruitfully employed.

First of all, may I be permitted, as I am addressing an audience which is, for the most part, non-medical, to give an exact idea of Koch's discovery by quoting his own words? Here they are:

"The result of these investigations was, therefore, that in parts of the body that are the subject of Tuberculosis, there are present Bacilli, that these Bacilli can be removed from the body and grown in pure cultivation through as many generations as one pleases, and that animals infected in the most diverse ways with these Bacilli become tubercular. Hence we may conclude that the Tubercle Bacillus is the essential cause of Tuberculosis, and that this disease is, therefore, of parasitic nature."

By a Bacillus is meant a minute vegetable organism belonging to the Order Bacteria which comprises the lowest Fungi. The common Mushroom is one of the highest Fungi. Other well-known Fungi are the Moulds and Yeasts. Generally speaking, the rôle of Fungi in Nature is the splitting up of dead organised matter, and the setting free of its elements in simple forms capable of being again built up into the bodies of plants and then into those of animals.

This process of disintegration is accomplished in the case of dead vegetable matter by the higher Fungi, such as Toadstools, the Dry-rot Fungus and Moulds; in the case of certain organic compounds, such as sugars, by the Yeasts; and in the case of dead animal matter by the Bacteria. Some of these latter have acquired the habit of maintaining their existence in the bodies of *living animals*. In the act of so doing they alter the working of the system. This alteration is what we call "disease." The Bacteria that cause disease are of three sorts, round (*Cocci*), rod-shaped (*Bacilli*),

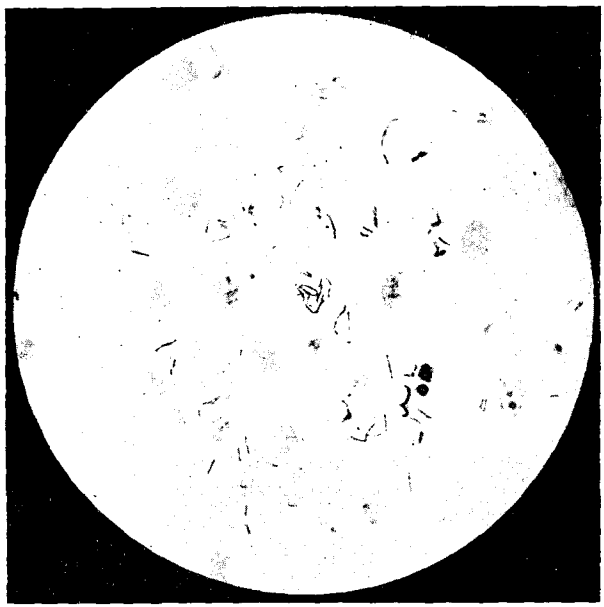

Fig. 1.—Stained preparation of the sputum of a Consumptive, showing many Tubercle Bacilli, lying singly and in groups. The thin thread-like objects are the Bacilli. [Microphotograph, taken under a magnifying power of about 750 diameters.]

and corkscrew (*Spirilla*). All are very small. It would take about 7,000 Tubercle Bacilli, placed end to end to make up one inch. (Fig. 1.)

The speaker (Koch) proceeded as follows:—

"As the Bacilli can only grow at a temperature between 30° and 40° C. (86° and 105.8 °F.), it is only within the body that they find the conditions necessary for their subsistence, and it is from it alone that they spring. They can be demonstrated in large numbers in the sputum of consumptives,

and, moreover, it can be shown that dried sputum containing the Bacilli can preserve its virulence for at least eight weeks. Hence it may be concluded that it is in phthisical sputum that the Bacilli get into the open air, are transported here and there, and are finally breathed in, attached to particles of dust. In favour of this view, moreover, is the fact that in man Tuberculosis almost always starts from the respiratory organs, and is often confined to them, either for a considerable time or altogether.

"Another probable source of infection exists in the exceedingly widespread Tuberculosis of domestic animals, more especially in the 'Perlsucht' (Grapes) of cattle.

"The cause of Tuberculosis once known, the methods by which it may be prevented at once follow. Above all, the sputum of consumptives must be rendered harmless, by disinfection, or in some other way."

The immediate effect of this momentous discovery—which be it said *en passant*. has never been shaken, but merely corroborated by all subsequent work—was to remove Tuberculosis from out of the domain of constitutional diseases caused by unfavourable economic conditions, in other words, as Koch himself phrased it, by social misery, and place it with the parasitic maladies, which are preventable by preventing the access of the disease-germ, no matter how bad the patient's life-conditions may be. The greater the poverty the harder the task. But the essence of the discovery was that it proved that it was not an economic revolution that was needed, but the destruction of the Bacillus. Improvement of social conditions was important in so far as it made it easier to keep the Bacillus in check, but it was not absolutely essential. By suitable precautions, nature could, to a large extent, be robbed of her deadliest weapon—the weapon with which, from time immemorial, she had been accustomed to punish mankind for the adoption of unnatural conditions of life.

Before passing to a consideration of the means that have been found most effective for the prevention of Tuberculosis, I think it right to dwell for a moment on the development of our knowledge that has taken place since Koch's discovery let loose a regular flood of discussion and investigation, and to point out the chief differences of opinion that have arisen during the past twenty-five years of unremitting labour in every civilised country—to such differences, at any rate, as seem to lead to diversity of practical action.

In the first place, the occasional failure of experiments made with the object of infecting animals with dried pulverised, bacillary sputum, led Flügge of Breslau, towards 1900, to inquire as to the existence of some other mode of infection. By a series of masterly experimental researches, Flügge and

his pupils succeeded in proving that the liquid *droplets* projected from the mouth in the acts of coughing, sneezing, nay, even of loud talking, might contain specimens of any germs present in the mouth or throat; and, in the case of Consumptives, that the Tubercle Bacillus was often contained in such *droplets* in a virulent condition. Moreover, the spray was so freely divided that the tiny particles could remain for many minutes suspended and capable of being carried long distances by currents of air. Flugge and his pupils are entitled to the credit of conclusively establishing the danger from this cause. The practical deduction from their labours would seem to be the necessity for causing consumptives to guard the mouth carefully with the pocket-handkerchief. To cause such persons to wear a thin veil or mask, or to surround their place in the workroom with movable partitions, are precautions which, though to some extent practised in Germany, will hardly recommend themselves in this country.

Koch's original opinion, as expressed in the passage which I quoted higher up, was that whereas the chief source of danger was dried bacillary sputum, a secondary source of danger lay in the Tuberculosis of cattle. The danger seemed to attach more especially to milk rather than to meat, and this for four reasons; firstly, because the sort of cattle that produce milk, viz., milch cows, are enormously more subject to Tuberculosis than beeves that are slaughtered for food; secondly, because the meat is comparatively seldom the seat of tuberculous disease, and then only in very advanced cases; thirdly, because meat is most often eaten cooked, whereas milk is frequently taken raw; and lastly, because meat is merely one component of the food of adults, who only become infected with difficulty, whereas milk is the staple food of children, who are easily infected. As a matter of fact, virulent Tubercle Bacilli have been often detected in market-milk and its products, butter and cheese. Roughly speaking, one may say that, as a rule, the larger the dairy-herd—apart from special precaution—the more frequently are Tubercle Bacilli found to be present in the milk.

The reality of the danger is further shown by the enormous prevalence of Tuberculosis amongst animals, such as calves and pigs, that are fed on the raw skim-milk or separator-refuse of large Dairies. These facts have led up to the recommendation that all the raw milk dealt with in such Dairies should be "pasteurised" or "scalded," *i.e.*, raised for at least a couple of minutes to the temperature of 185° —190° Fahrenheit.

In Ireland this precaution is required, and should be adopted by all "Creameries," and, where it is not done at the Dairy, by the individual householders, at any rate where there are young children. As the result of a careful investigation

which I carried out nearly ten years ago, in collaboration with Professor Thomas Carroll, Col. Steele, A.V.D., and Mr. A. Watson, V.S., I found that out of an excellent dairy-herd, every second cow was tuberculous, though not to a dangerous degree, as was shown by subsequent inoculation experiments which I made with the milk of several of these slightly affected animals. Experience has shown, however, that out of any hundred tuberculous dairy cows, one or two (some authorities say five) have the disease in the *udder*. Now the milk that comes from a tuberculous udder is laden with virulent bacilli and *intensely* infective. Therefore, out of every two hundred dairy cows in Ireland, one or two at least are yielding this dangerous milk. In the absence of any effective method for eliminating these, the only way consumers have of avoiding risk is to boil or scald their children's milk.

That Tuberculosis might be acquired through the milk of tubercular cows was Koch's original position. Another eminent worker in the same department, Von Behring, to whose genius and industry we are largely indebted for the discovery of the antitoxic treatment of diphtheria, now came forward with the view that this was *the most usual mode of infection*; that the history of most cases of pulmonary consumption was to be traced back to the taking in of the bacilli with milk during earliest infancy; that the bacilli remained in the system for years, not exactly dormant, but increasing very slowly in numbers, and, gradually settling on the lungs, gave rise to consumption in early adult life. This view was still further modified by Pasteur's pupil, Calmette (of Lille), who has published some highly important experimental work unsuitable for detailed exposition before this Society, and difficult to sum up without explanation. Suffice it to say that whilst Calmette agrees with Von Behring, that Tuberculosis is more often contracted by *swallowing* the virus than by *breathing* it in, he considers that the danger is not confined to early childhood, but extends over a much longer period, and that the swallowed bacilli are transported with very little delay to the lung, where they set up pulmonary consumption.

Meanwhile the tendency of Koch's own work was directly opposed to the results just mentioned. By experiments on cattle with the Bacilli of human Tuberculosis he convinced himself that these bacilli have but little virulence for cattle, and from this, taken together with certain minute differences between the bacilli obtained from the human source and those got from tubercular cattle, he drew the conclusion that the two sorts of Bacilli were of different species, and that bovine Bacilli were incapable of infecting the human subject. I was present when Koch made this memorable pronouncement in St. James's Hall, London, at the Great International

Tuberculosis Congress of 1901, and I well remember how vigorously his idea was repudiated by most of those in a position to speak authoritatively, such as Sir John Mac-Fadyen, of England, and the late lamented Professor Nocard from France. Whether right or wrong, Koch's pronouncement had at any rate as its immediate consequence one satisfactory result, viz., the appointment by nearly every civilised Government of a Commission of Bacteriologists to inquire into the question as to the identity of human and bovine Tuberculosis. Voluminous reports have since been issued by several of these Commissions, including that of our own Government. Briefly, the results of these laborious investigations appear to me capable of being summarised in the following propositions :—

1. It *is* possible to distinguish Tubercle Bacilli that have become acclimatised to the human organism from those that have become acclimatised to the organism of cattle ("bovine Bacilli.")
2. The vast majority of cases of pulmonary consumption amongst human beings are due to the first of these sorts (Bacilli of human origin).
3. Bacilli of bovine origin *are* capable of infecting the human subject, and occasionally produce a fatal generalised form of the disease, but usually they give rise to a localised chronic form, more especially in the lymphatic glands, bones, and joints.
4. Accordingly we must uphold the existing regulations for the prevention of danger from the ingestion of bovine Tubercle Bacilli.

Pari passu with the development of our knowledge as to the nature of the Tubercle-parasite and its mode of propagation, there has been going an equally interesting development of our knowledge as to how our being in possession of the disease-producing agent in a pure state may be utilised for the prevention and cure of the malady (vaccinal and anti-toxic treatment). But this is a subject which is not suitable for discussion before a non-medical Society, and, in any case, it would take me too far from my immediate purpose to-night, which is to show in what way and in how far the knowledge that we have gained can be turned to account by the people themselves, more especially by a people like ours, which is, as I have elsewhere said, "on the threshold of co-ordinated effort against Tuberculosis."

The magnitude of the problem has been so recently and so often publicly adverted to, that I may be excused from doing more than merely mentioning that in Ireland, during 1905, 11,882 deaths were registered from all forms of Tuberculosis, including 9,216 from the pulmonary form (phthisis). In the North Dublin Union Registration Area, during that year,

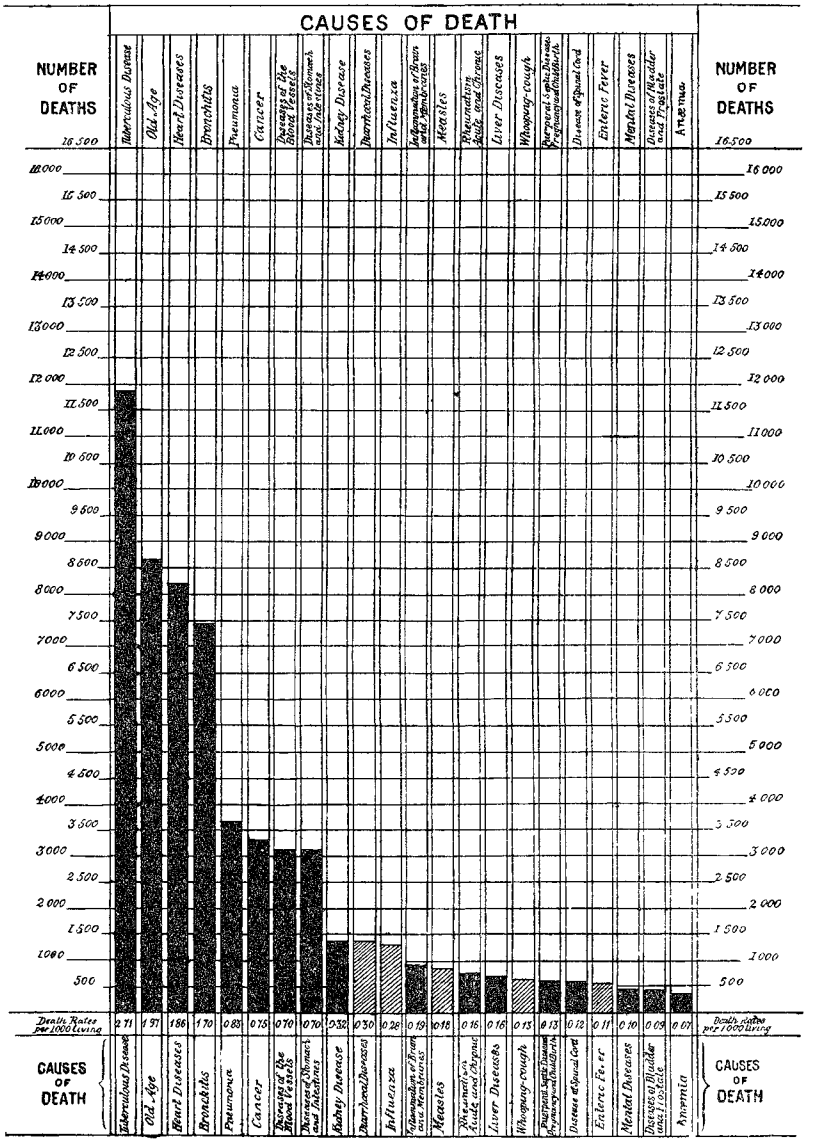

Fig. 2.—The Relative Importance of the twenty-two principal Diseases in Ireland during 1905, showing the number of Deaths caused by each.

[Copied, by permission, from the Registrar-General's Report for 1905].

715 deaths occurred from all forms of Tuberculosis, including 483 from consumption; whilst for the South Dublin Union the figures were: 1,030 from all forms, including 725 from pulmonary phthisis. Omitting the deaths of persons who came from outside the area covered by the two Dublin Poor Law Unions, the Registrar-General calculates that for every 100,000 persons living in that area there were 455 deaths from all forms of Tuberculosis during 1905. This is the worst in Ireland; but Cork "runs us tight," with 453, and Belfast comes next with 385.

A glance at Fig. 2 will serve to give an idea of the great mortality caused by Tuberculosis as compared with other diseases and especially with those of "Zymotic" or "Infective" nature. Amongst the latter, it will be observed that such dreaded maladies as Small-pox and Typhus do not appear at all. The other infective diseases that cause most deaths in Ireland are seen to be Infantile Diarrhœa, Influenza, Measles, Whooping-cough, and Enteric [Typhoid] Fever. Yet how small is their individual, nay, their collective contribution to the death-roll, as compared with that of Tuberculosis. Accurate information as to the extent to which the disease prevails in the several Poor-law Unions throughout Ireland may be gathered from a study of the map (Fig. 5).

For the year just expired, 1906, the figures for the whole of Ireland are not yet available; but, through the courtesy of the Registrar-General, I am able to say that the number of deaths ascribed to Tuberculosis in the area comprised in the two Dublin Unions, was 1,694, corresponding to a rate of 447 deaths per 100,000 living—just a shade better than in 1905.

When we remember that a reliable authority, Dr. Philip, of Edinburgh, calculates that for each death we may reckon at least twenty persons more or less seriously affected with the disease, the number (1,694) of deaths in the Dublin Registration district indicates that nearly 34,000 persons are more or less affected with the disease. In other words, the population of Dublin is literally decimated by this disease, and the other large towns are not much better off.

Should we prefer to take Dr. Philip's estimate as applying only to deaths from the pulmonary form, we obtain the following figures. Deaths from Phthisis in the Dublin Registration Area, during 1906, 1,152. This multiplied by 20, gives 23,040. In the whole of Ireland in the Census-year, 1901, there died of Phthisis 9,549 persons. Twenty times this is 190,980 cases of Tuberculosis, more or less severe. It is no wonder our Hospitals overflow with it. Now the actual number of persons returned as afflicted with Phthisis on Census-night was only 1,967. This shows to what an

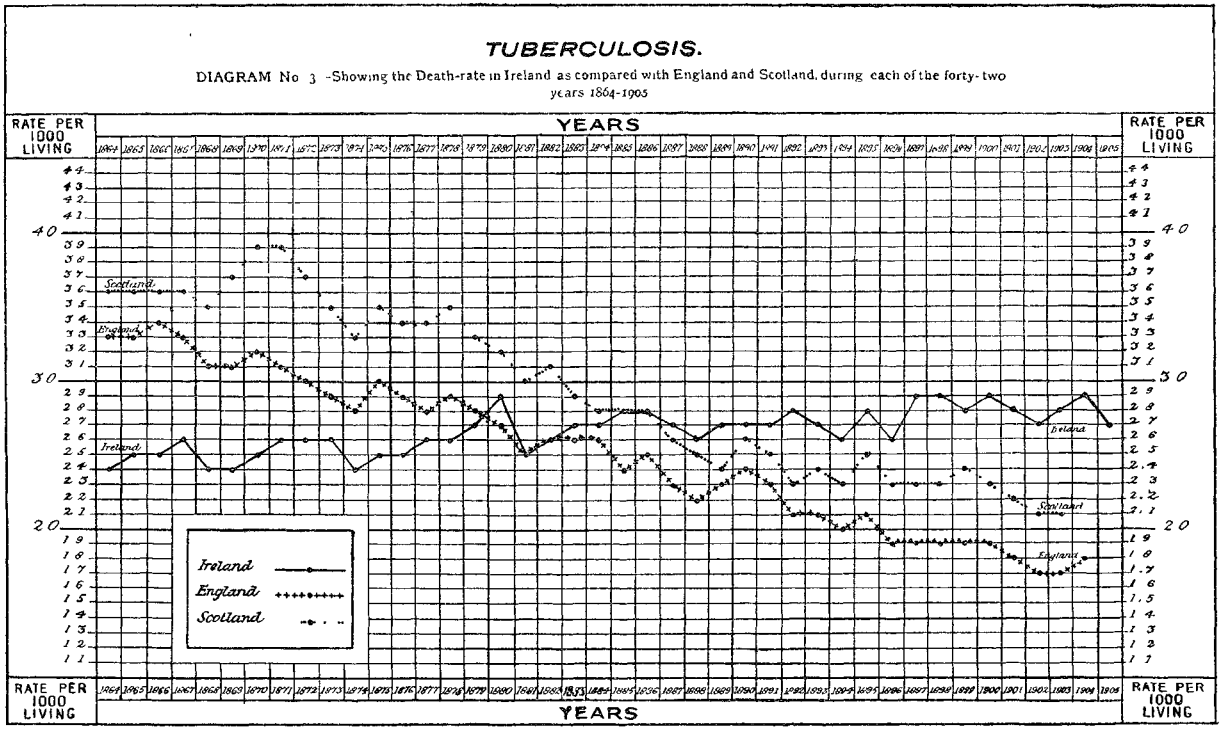

Fig. 3.—Showing how the Mortality from Tuberculosis has declined in England and Scotland during the past 40 years, whilst in Ireland it tends to increase

[Copied, by permission, from the Registrar-General's Report for 1905].

DIAGRAM No. 4.—Showing the Proportion of Deaths from Tuberculosis at each age period to the number per 1,000 living at those ages in Ireland, as compared with England and Wales and Scotland in the Year 1903.

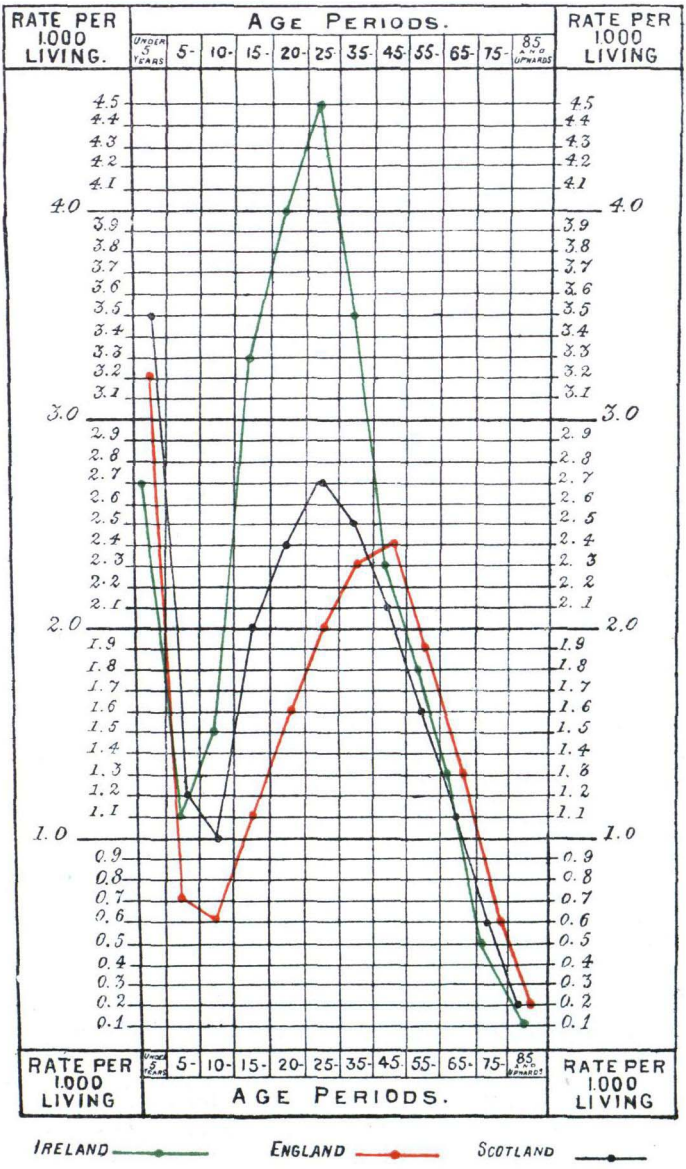

Fig. 4.—Showing that Ireland suffers most from Tuberculosis at the productive age period, 25 to 35, whilst such is not the case in England and Scotland.

[Copied, by permission, from the Registrar-General's Report for 1905].

enormous extent the public overlook the existence of the malady. It is evident, as the Registrar-General points out, that no cases were returned, except where the patients were confined to their rooms and incapacitated from attending to their ordinary avocations.

The economic loss must be something enormous. What it is in Ireland I have not been able as yet to calculate. Whatever it is, it falls upon poor Ireland with a severity unknown in the richer and more populous island—an interesting fact, discovered by the Registrar-General.

In the first place, the mortality from this cause has been steadily declining in both divisions of Great Britain. A moment's study of the Registrar-General's Diagram [Fig. 3] will show that whereas during the past forty-two years, the death-rate from Tuberculosis in Scotland has declined by over 41 per cent., and in England by over 45 per cent., in Ireland this disease, so far from decreasing, *is actually causing more deaths than it did forty years ago!* Moreover, in his Report for 1905, the Registrar-General points out that in Ireland the highest death-rate occurred amongst those living at the age period 25 to 35 years, namely 4.5 per thousand. In England the rate at this age-period was 2.0 per 1,000 and in Scotland, 2.7. Thus it is seen that in Ireland the scourge falls heaviest on citizens in the fulness of their economic activity, whilst in the Sister Isle, the highest death-rate (3.2 per thousand) occurs amongst infants under five who can hardly be said to have any economic existence at all (Fig. 4).

Dr. Nathan Raw, a well-known authority, has expressed the opinion that 40 per cent. of paupers dying from phthisis have been reduced to pauperism by their disease, independently of all other causes. The loss must be very great, for almost every person who dies of consumption is disabled for months, and sometimes for years, before death; and, according to Richat,* whilst the death-roll of all the wars of the nineteenth century may be estimated at 14,000,000, that of consumption, within the same period and countries, would reach 30,000,000.

When we ask ourselves why are not the measures that have been found effective in the control of the other "zymotic" diseases, applied to Tuberculosis, we are at once confronted with a great difficulty—the indefinite prolongation of the infective period, and the ability of the patient to exercise his functions as a citizen during the greater part of that period, which may extend to years. Moreover, the length of time that elapses between actual infection and the occurrence of symptoms is so great, that all connection between cases is lost, and the popular mind does not regard the malady

* Quoted by Sir Lauder Brunton in the *British Journal of Tuberculosis*, January, 1907.

as infectious, but as hereditary, constitutional, and inevitable.

A case of scarlatina or smallpox runs its course within a few weeks; one of typhoid may extend perhaps to a couple of months; but, at the end of that time, such diseases are done with definitively; and during that period the patient is so manifestly prostrate and so evidently infective that an isolation hospital is obviously the only place for him. In Tuberculosis, for the reasons I have stated, it is quite otherwise. The patient is able to earn his bread, his liberty cannot well be restricted, and his disease is concealed or spoken of by some euphemism, such as "a delicate chest," or the like.

What can we do as a people to grapple with this difficult problem? Without further preface I will give the answer that recommends itself to my mind. We can and ought to

1st; put ourselves in a position to deal with cases of the disease *effectively*, and

2nd; when we have done so, make it compulsorily notifiable to the Sanitary Authority.

Now, in order to put ourselves in a position to deal with notified cases, we need in each area of Sanitary administration at least three sorts of Institutions, viz.:—

(*a*) One or more institutions for the treatment of curable cases (Sanatoria);

(*b*) One or more Hospitals for the isolation of advanced and highly infective cases that are regarded as incurable (but which often prove susceptible of unexpected amelioration);

(*c*) One or more Dispensaries for the affording of information, for the organisation of domiciliary visits, and for the co-ordination of the struggle generally.

In agreement with Dr. Philip of Edinburgh, I regard the Consumption Dispensary as a most essential institution; but I place the Sanatorium in the foreground, because, under the existing law, it is the one institution for which funds may be at once provided, under section 155 of the Public Health Act, by means of local taxation.

I may say at once that I regard the results of sanatorium treatment as highly encouraging. Though I have never been personally concerned with the carrying-out of the treatment, the impression left upon me by a study of the question is that, if only suitable cases are admitted, the vast majority recover their working-power and keep it unimpaired for several years—in many cases permanently.

The standard object-lesson in this connection is the splendid work done by the sanatoria for sick workmen established and maintained in Germany under the Workmen's Insurance System that obtains in that country. In a recent report to the Local Government Board (Report on the International Congress on Tuberculosis held at Paris, in October, 1905) I adduced some of these figures, and I do not now

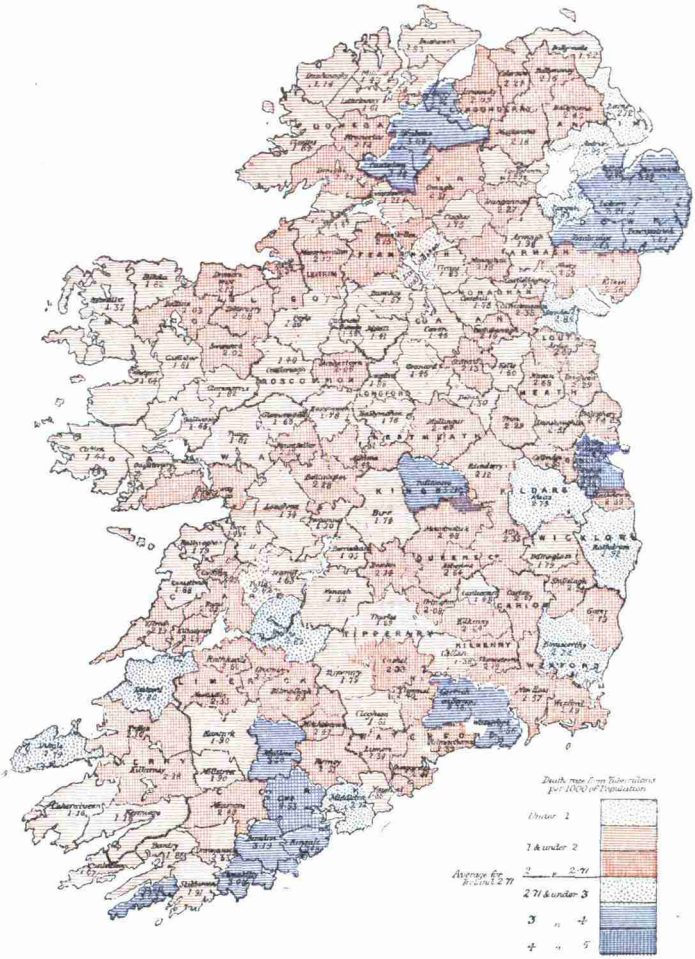

Fig. 5.—Map showing the distribution of Tuberculosis-mortality throughout Ireland in 1905. The areas are Poor Law Unions. The figures represent number of deaths per thousand of the population living.

[Copied, by permission, from the Registrar-General's Report for 1905].

propose to go over that ground again. I will content myself with quoting some statistics that give a general idea of the greatness of the work attempted and of the results achieved.*

TABLE I.—NUMBER OF CASES TREATED IN GERMAN SANATORIA FOR THE WORKING CLASS.

	1904	1903	1902	1901	1900	1899	1898	1897
Men	16,957	14,937	12,187	10,812	8,442	6,032	3,806	2,598
Women	6,520	5 211	4,302	3,844	2,652	1,666	1,104	736
Total	23,477	20,148	16,489	14,656	11,094	7,698	4,910	3,334

Amounting altogether to 101,816 for the 8 years to end of 1904.

TABLE II.—A.—RESULTS OF EACH 100 CASES TREATED IN THE SANATORIA.

Discharged fit to work in 1900	Remained capable of full work at end of				
	1900	1901	1902	1903	1904
Men, 72	66	48	40	35	30
Women, 72	67	52	46	40	35

TABLE II.—B.

Discharged fit to work in 1901	Remained capable of full work at end of			
	1901	1902	1903	1904
Men, 77	70	53	45	38
Women, 77	72	60	51	45

TABLE II.—C.

Discharged fit to work in 1902	Remained capable of full work at end of		
	1902	1903	1904
Men, 77 ..	72	57	48
Women 80 .	76	62	54

The average duration of stay in Sanatorium was 75 days. The average cost per patient was £17 to £18.

*Taken as quoted from Latham in Bardswell's book, Appendix III.

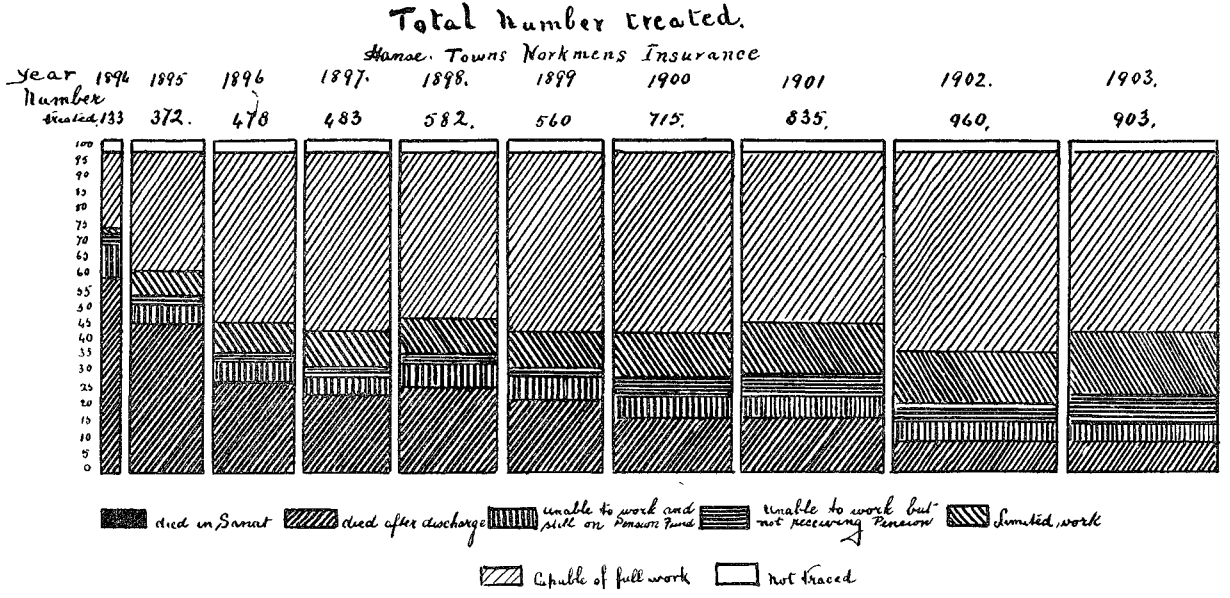

Fig 6 —Shows the results of Sanatorium Treatment at certain German Sanatoria [those maintained by the Workers' Insurance Society of the Hanseatic Towns] Note that the *Width* of each column corresponds to the total number treated that year, and that the details signified by the shading refer to the condition of the patients at the end of 1904.

TABLE III.—RESULTS OBTAINED IN THE CASE OF THE EMPLOYEES OF PRUSSIAN AND HESSIAN STATE RAILWAYS.

Year of treatment, ..	1898	1899	1900	1901
Number of cases treated.	217	354	429	532
Percentage of patients capable of full work in subsequent years	79% in 1899 63% in 1900 54% in 1901 45% in 1902 43% in 1903	83% in 1900 72% in 1901 61% in 1902 54% in 1903 49% in 1904	84% in 1901 72% in 1902 63% in 1903 57% in 1904 53% in 1905	84% in 1902 72% in 1903 63% in 1904 58% in 1905

The best object-lesson of all is, perhaps, afforded by the Diagrams, Figs. 6 and 7, which give a graphic representation of the results achieved by the Sanatoria of the Hanseatic Towns Workers' Insurance Society. These Diagrams are essentially the same as those exhibited at the Paris Congress of Tuberculosis in 1905, and are worthy of careful study, as showing the subsequent history of the patients.

But, it may be asked, why go to Germany for statistics? Have we no Sanatoria at home from which results might be quoted? There are several reasons why I have not attempted a systematic study of home statistics.

Firstly, the vast majority of British sanatoria are destined for the reception of patients belonging to the middle and upper class. They are mostly in private hands, and do not publish statistics, or, if they do, the figures are not compiled on a uniform system, so that the results are not comparable. They suffer, moreover, from two sources of fallacy, which are hard to eliminate. One is that many of the patients belong to a class so leisured and comfortable that they can afford to make their mode of home life partake, for an indefinite period, of the characters of sanatorial life, *e.g.*, mental and bodily repose, graduated exercise, and abundant, nourishing, easily-digested food. This tends to make the results appear too favourable. The other source of fallacy is the tendency to defer to the entreaties of friends, and admit to the sanatorium patients whose disease has passed beyond the curable stage. They are discharged after a time, only to make room for others equally unsuitable. The result is statistics that disappoint the Sanitarian and failures that disappoint the patients and prejudice their friends against the whole system. In Germany it is quite otherwise. Under the Workman's Insurance System prevailing in that country, the sanatoria are managed according to pre-determined uniform standards, according

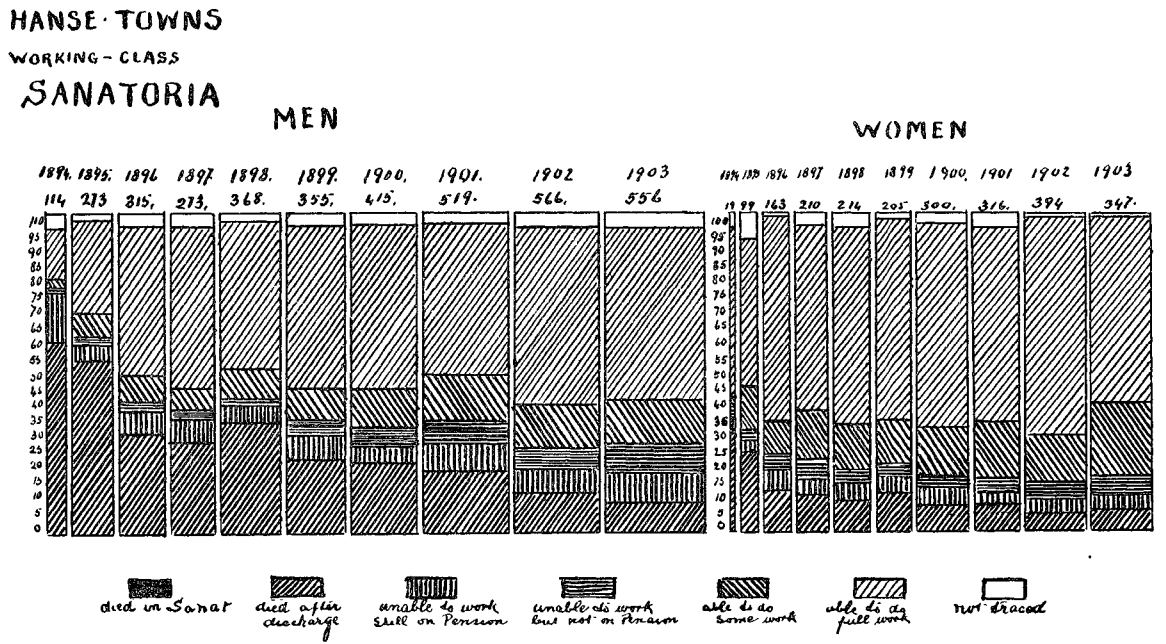

Fig. 7 —Same as Fig. 6, but showing the number treated and results obtained for the two sexes.

to which patients are admitted and discharged, and results are appraised. As one of the most important steps towards that co-ordination in which our struggle against Tuberculosis is so sadly lacking in this country, I would regard the agreement of those engaged in sanatorial work on a set of principles which would ensure uniformity of working and of recording results. But until this has been done, it is difficult to form an idea of the amount of success already achieved in this country.

The only statistics from British institutions of the type now under discussion which I have hitherto been able to find are those of the Durham, Westmoreland, Mundesley, and Sheffield sanatoria. I quote them from Dr. Bardswell's book, which will shortly be referred to :—

TABLE IV.—AFTER PERIODS VARYING FROM 1 TO 5½ YEARS AFTER DISCHARGE.

No of cases treated.	In Normal Health, and at full work	Little or no Work, and in Poor or only Fair Health.	Dead.
At Durham, 268	50%	19.62%	30.4%
At Westmoreland, 173	46.2%	22.5%	31.2%
At Mundesley and Sheffield, 24	41.7%	16.6%	41.7%
Total Number, 465	46%	19.6%	34.4%

Excluding the quite advanced and presumably hopeless cases, the patients who find admission to working-class sanatoria may be divided into three classes:

1. Those with slight localised disease—"early cases."
2. Those with more extensive disease, affecting a considerable amount of one or both lungs, but of recent origin.
3. Those with chronic disease of long standing and tending to progress slowly.

The result of the treatment is much more favourable in the first class than in either of the others, as is shown by the following Table :—

TABLE V.—RESULTS OF THE SANATORIUM TREATMENT FOR THE WORKING CLASSES AS SHOWN BY AFTER-HISTORIES.

[After 5 years Work at the Durham, Westmoreland, Sheffield and Mundesley Sanatoria.]

Type of case treated	Number treated	Condition from 1 to 4 years after Discharge		
		Normal health and full working Power	Fair or Poor Health, Little or no Power to work	Dead.
Early cases,	204	147 = 72%	32 = 15.7%	25 = 12.3%
Fairly recent and extensive Disease. / Chronic Progressive Disease of Considerable Duration.	261	77 = 29%	64 = 24.5	120 = 46.5%

In order to give an idea as to the extent to which each type of the disease is represented in the admissions to English working-class sanatoria, I quote* a statement to the effect that amongst 1,915 patients, the early cases were 32.5 per cent.; those with fairly recent but more extensive disease were 40 per cent.; and the remaining 18 per cent. were the subjects of chronic progressive disease of long standing. When we take up this work here, as I hope we very soon shall, it would be well to select the cases more carefully, and to secure for the early curable cases a larger representation among the admissions.

* *Bardswell*, p. 165.

By far the best observed group of cases from a British source is that recorded in a most valuable little book by Dr. N. D. Bardswell, now medical superintendent of the new King Edward VII. Sanatorium at Midhurst. Dr. Bardswell's book is entitled *The Consumptive Working-Man—What can Sanatoria do for him?** and it contains the life histories of twenty-five workingmen who have been under his care, some in the wards of the Sheffield Royal Infirmary, and most of the others at a cottage sanatorium at Mundesley. Be it understood that neither of these institutions was a sanatorium in the strict sense. The first is a general hospital, endeavouring to make special provision for consumptives in the way in which my friend, Dr. Dunne, has so ably struck out at the South Dublin Union. The so-called "cottage" sanatorium at Mundesley was merely an ordinary two-storied red brick house by the seaside, with a rental of £50 a year, and containing eight rooms reserved for the use of patients. It had not even a garden, nor was there any outside accommodation provided in the way of shelters, and there was no resident medical officer. The cottage was, however, situated within a mile of a regular sanatorium, where the patients had to report themselves at frequent intervals to the doctor in charge.

I must here explicitly point out that such primitive arrangements could not possibly be made to work, save for a very small number of patients, not exceeding six, who would have to be good specimens of their class and of a thoroughly reliable and tranquil disposition, cared for, as they were, only by a landlady and her staff of servants and without authoritative supervision. Yet the results achieved were highly satisfactory, as we shall see directly.

What strikes one about Dr. Bardswell's account of his experiences is the thoroughness with which the patients' life conditions are studied, both before and after the course of treatment. Moreover, these men seem typical of their class. Here are some of their occupations —Brewer's drayman (age 35), wood-sawyer (age 36), cook in a coffee-shop (age 28), coal-miner (age 22), coachman (age 32), cabinet-maker's apprentice (age 19), and so on. In a word, these are just the type of people we should have to deal with in a working-class sanatorium over here.

Dr. Bardswell divides his twenty-five cases into two classes, one of ten patients, whom he was able to study completely; the other of fifteen, with regard to whom his information is not so complete. In each case he gives full details, not only as to their disease, but also as to their mode of life, weekly earnings, number in family, usual diet, as well as other points, during the period before and after their sanatorial treatment.

* London: *Scientific Press*, 1906.

The wages of this group of patients varied from 32s. to 12s. 6d. a week. Some were treated so far back as 1899 and 1900; others during the winter of 1903; and the results are brought down to the end of 1905, and, in some cases, well into 1906. As regards the results, I reproduce Dr. Bardswell's conclusions in his own words, which have the ring of studious fairness:

"Taking these ten patients together, one may safely say that they were, clinically speaking, on admission, a distinctly favourable set of men. If the sanatorium treatment is indeed of any lasting value, it is from such a class of patient as this that a fair proportion of permanent successes may be looked for; *nor can the results in these cases be considered otherwise than satisfactory.* The conditions of these men when discharged were as follows —*No less than eight of them were restored to their normal working capacity and the remaining two sufficiently restored for work of a light character.*"

Coming now to the economic as distinguished from the medical results, the first point to be noted is the hopeless financial outlook for these patients when overtaken by illness. Not one had any money saved (one was in a club that secured him 10s. a week); but not one of these men could pay any fee for treatment or do anything to support those dependent on him during his stay of at least eight weeks at the sanatorium. As a matter of fact, the sanatorium fees (17s. a week) were paid by private or public charity (chiefly through the Charitable Organisation Society). If this had not been done, none of them could have afforded the treatment, each would have kept on working till the fell progress of the disease laid him low, a hopeless wreck, and then blank destitution and the workhouse would have been the only outlook for those dependent on him for their daily bread.

Omitting details, the economic result of sanatorium treatment in these ten cases is thus summed up by Dr. Bardswell —

"The figures show that the total cost of restoring the ten patients to health and to a working capacity, plus the cost of maintaining the wives and families of the married men, amounted to £259 19s. This sum was entirely subscribed by charity. In return for this outlay of £259 19s., the ten men are now bringing in an income of £11 17s. 2d. a week, equivalent to an annual sum of over £600 a year. . . . If this outlay had not been made, the annual income of these ten men would by now have fallen considerably, and several families would doubtless be dependent upon charity or the Poor Rate for their maintenance." Is it not a sad reflection, all the time we are losing, in vain discussion and futile differences of opinion, instead of manfully joining hands and

tackling the evil which is destroying so many of our Irish homes? I believe we have medical skill, enterprise, and money, too, enough and to spare for the accomplishment of the task.

Amongst the larger group which Dr. Bardswell considers less well observed, of fifteen cases, there is one of especial interest, as being one of extensive disease of both lungs, with formation of a cavity and severe attacks of blood-spitting. The man, a type-founder, aged twenty-seven, earning 33s. a week, was treated for twenty-one weeks in the Sheffield Infirmary in 1900. On his discharge he got a situation as commercial traveller in the drapery business, but he found carrying about the heavy sample-bags too much for him. He then became a tram-conductor, at 28s. a week, and so late as February, 1906, was still working and in very fair health. Although the great success of the treatment in his case is in part ascribable to his favourable social conditions, his history shows that even advanced cases may become economic recoveries, if they get a long course of treatment and are otherwise favourably circumstanced.

I come now to the cost of sanatorial treatment.

In my report to the Local Government Board, previously referred to, the average cost of erecting sanatoria on the level is given as £250 to £275 per bed, and from £325 to £350 in mountainous situations. These figures may, I fear, have exercised a deterrent effect on local bodies, and I now find that a much smaller outlay would suffice to provide accommodation for working-class consumptives, which, although not ideal, would suffice for immediate requirements.

For £2,300 a one-story building, to accommodate 100 patients, can, I am informed, and I have no reason to doubt the accuracy of the information, be erected of wood and iron by Spiers of Glasgow, specially designed for this particular purpose.* This pre-supposes that foundations are already provided by the local authority. For this purpose we have to add another £400. Suppose we add £1,000 for equipment, the expense then amounts to £3,700, or, providing for contingencies, £4,000.

The ideal situation would be on the sunny rising ground to the North of the city, near Glasnevin, or, better still, in the region of Dunsink. Amongst the foot-hills of the Dublin Mountains, such as Mountpelier, or on the slopes of Tallaght or Saggart Hills, or amongst the Pine Forests of Glendhu, which remind one of Switzerland, ideal sites could also be found. But the cost of transporting materials for building, and, once built, the cost of conveying patients and their

*It would have six wards and an adequate administrative block and be drained into existing drains. The cost would not include plumbing or heating. Spiers' address is Regent St., Glasgow. Other firms making a specialty of portable buildings, such as Humphreys, or T. & C. Martin of Dublin, would, no doubt, estimate as cheaply.

food, would make the undertaking unnecessarily, though not, as I think, prohibitively, expensive. The unnecessary expense could be avoided by erecting the building within or close to the city on ground already in the possession of the Corporation or of one of the suburban authorities. Unless I am mistaken, there is ample space in the extensive grounds of the South Dublin Union for the purpose. From what I can learn, a suitable group of buildings of light construction, yet sufficiently solid to gain the sanction of the Local Government Board, could be erected for from £40 to £100 per bed. To cover the initial expenses of construction, a loan could be obtained through the Board of Works at 3½ per cent., repayable in 20 years. Suppose accommodation were provided for 100 patients, at £75 per bed, this would cost £7,500. Interest and sinking fund would amount to £650 a year. Suppose each patient's maintenance cost ten shillings a week, and administration expenses, salaries, up-keep, and repairs cost five shillings per head per week, the annual cost for the 100 patients would be £3,900. Add interest and sinking fund and the amount becomes £4,550 a year. For the first year an additional £1,000 would have to be spent on furnishing and equipment. In return for this £4,550, 300 poor consumptives could be treated, and if suitably selected, a large proportion of them restored to economic efficiency. I am not reckoning anything for what non-pauper patients might be able to pay. I have no doubt that there would be many applicants who could afford to pay, at any rate, half the cost of their maintenance. A house for the Doctor would be an additional initial expense. A penny in the pound raised over the entire County of Dublin would yield £7,500 a year, which leaves an ample margin

A good system is that of one-storied pavilions, each accommodating about twenty patients. Each should consist of a central administrative block, containing the dining-rooms, etc., and of wings stretching laterally therefrom. Each wing would contain the patient's bed-rooms in the rear, and in front would consist of a long unbroken glazed corridor or open-air gallery, for promenading and reclining. But it would be more economical to have all the patients in the one building.

Would it not be practicable for each Rural District Council, acting in conjunction with its own portion of the city, and (in the case of the South Dublin Rural District Council) with the adjoining Urban Districts, to undertake this work of public utility? I can see no reason whatever why, within a short time, we should not have 100 poor curable consumptives under treatment. As, however, expenses are necessarily increased when establishments are duplicated or multiplied, it would be better if the entire set of local authorities comprised within the City and County were to unite

over this matter, sink their differences for the public good, and impose a general rate of 1d. in the £1 for the provision of one large sanatorium.

Supposing the economic results of the treatment were as good as those obtained by Drs. Bardswell and Chapman at the Mundesley Cottage Sanatorium, let us see if we can calculate the gain to our community. In return for an outlay of £250 (which includes the cost of maintaining the wives and families of the married men during their treatment), his ten patients were, several years afterwards, bringing in an annual sum of £600 a year, whereas without such expenditure many of them would undoubtedly have lost all or most of their earning power, and their families would have become dependent on the parish. Supposing that we can do the same in Dublin for 100 men each year, under the same conditions, the expense would be £2,500 and the earning powers preserved to their families and the community would be £6,000 a year. Add to this the saving of human misery, the educative influence which sanatorial life exercises upon those who have ever lived it, and which overflows from them to their families, and would tend to raise enormously the standard of life in the city. Surely there must be a big balance in favour of undertaking this good work.

Why has the question not been tackled ere now? We have had a long series of meetings; much individual time has been wasted; a Local Government Inquiry has been held, and yet we seem to make little or no progress. The reason is not far to seek. There is a lack of driving power—of that steady, purposeful persistence which can alone overcome the various local objections and compel union. Meetings are held, discussions take place, differences of opinion about detail are revealed, but there is no master-mind stored with facts and arguments, fired by enthusiasm, and capable of allaying suspicion, smoothing difficulties, and compelling agreement. And so the project languishes. Men get tired of barren talk, the subject grows stale, and drops. Meanwhile consumption strikes its victims with redoubled swiftness—breadwinners are hurried to the grave—wives and children to the workhouse, whilst our representatives do nothing effective.

Personally I am sufficiently optimistic to hope that all our local Dublin City and County local authorities could, if they were properly approached, be readily induced to co-operate for the establishment of one large, well equipped sanatorium, in an ideal situation, and on grounds large enough for almost indefinite expansion. Should, however, the forces that work for isolated and therefore expensive and ineffective action prove stronger than those tending to bind together

for the common good, then I would say, let the law be changed so that the County Council could become a Sanitary Authority for this purpose, and erect and maintain a sanatorium out of a County-at-large Rate. The County Councils throughout Ireland are relatively homogeneous bodies; and if they got the power from Parliament and used it, we could have a sanatorium for each county. If, at the same time, the recommendations of the recent Viceregal Poor Law Commission (which were recently discussed fully in another place*) were put in force, there would be, in each county, at least one disused workhouse available for conversion into a sanatorium. This would be an enormous step in advance. The Local Government Board, as the Central Body co-ordinating Public Health Administration, would, I have no doubt welcome a change in the law, which would so greatly facilitate the campaign against Tuberculosis.

I have dwelt thus at length on the sanatorium question because I regard it as the kernel of the whole matter. The sanatorium once established, the other institutions would come of themselves and group themselves round it. It would serve as a centre and a stimulus of popular voluntary effort. The following institutions would immediately follow it —

1. A Special Consumption Dispensary in each County Borough, and perhaps two in Dublin. For help in this important matter I would look to such voluntary bodies as the Women's National Health Association of Ireland quite recently founded, under the Presidency of Her Excellency the Countess of Aberdeen. I believe the money for the purchase of suitable premises on each side of the city could readily be obtained by subscription amongst the members. The rooms could be furnished and expert medical concurrence obtained on the lines sketched out in my Report to the Local Government Board. The idea is to obtain from large employers of labour, or otherwise, information as to cases of suspected "decline," visit them at their houses, advise them and their families how to avoid the danger; furnish them with the means of doing so, and put those already affected on the list for admission to the sanatorium, whilst the dangerous cases could be sent to the special hospital, of which more anon. No interference with the relation between patients and their medical advisers is contemplated, but those not already under medical treatment are induced to present themselves at the Dispensary for expert examination and skilled advice, all of which are, of course, gratuitous. In the Royal Victoria Dispensary, founded by Dr. Philip, in Edinburgh, and carried on by him for many years with striking

* At the Royal Academy of Medicine, February 8th, 1907 (*Medical Press*, March 30th, 1907).

success, we have the model to be followed. There is in this city of ours a regular wealth of voluntary charitable and philanthropic endeavour, in what may be termed (if I may be allowed to use the language of physics) a *potential* form, but capable at any moment of becoming *kinetic*, under the influence of opportunity. The foundation of a sanatorium out of public funds would provide the opportunity. The Women's National Health Association could then step in, and collect by voluntary subscription the funds necessary for the establishment and maintenance of two special Dispensaries, one on each side of the city. Here is an ideal outlet for that philanthropic energy with which our atmosphere is so heavily charged.

But this is not the only charitable function I can foresee for the women of Ireland, should the establishment of a sanatorium give them the opportunity of showing what they can do. They can see to it that the family is not broken up during the absence of the breadwinner at the sanatorium. I look upon the maintenance of the Home, with its privacy and sacredness, and that sense of responsibility and citizenship which the headship of it imposes, as all-important to the social organisation. I would discountenance the sanatorium, if entry to it involved the entry of dependents into the Workhouse. I see no objection to the entry of the poor workingman, who is not a pauper, into the sanatorium, in *formâ pauperis*, according to the method already practised, by entering his name on the Workhouse books, so as to remove from the Guardians the necessity of making him pay for the cost of his maintenance whilst under treatment. But his family must under no circumstances be brought "into the house." The home should be maintained intact, partly by means of judicious out-door relief from the rates, partly by voluntary charitable effort organised by the Women's National Health Association. An occasional day's work found for the mother would be of material assistance. Another channel for fruitful voluntary effort, the sluices of which would be opened by the establishment of sanatoria, would be the provision of suitable occupation for patients after leaving the sanatorium. This is a matter of vital importance. The duration of the "cure" largely depends on the patient's mode of after life. Put him back into foul air; make him work long hours on insufficient or unsuitable food, and his uphill course will soon be retraced; his cough will return; his new-found strength will again desert him; and he will find himself once more face to face with the grim spectre of Tuberculosis. The following employments are amongst those suitable for such cases :—

Light work about a farm or garden.
Driving (Motor or Tram).
Caretaking of unoccupied houses.
Insurance or other agency work.
Clerking in airy rooms.
Estate work.
Acting as hall porter or ticket collector ; and many others.

To get into touch with employers of such labour, and provide it for " cured " or " improved " consumptives would be, perhaps, a function of what might be called " The After-Care Committee " of the Women's Health Association or of a special Ratepayer's Committee in connection with the Dispensary. A farm colony might be established for the patients to work on. I cannot now go into this matter, but details of such an enterprise, undertaken at Hadleigh, in Essex, are to be found in Dr. Bardswell's book above referred to, and the matter has also been dealt with by Dr. Philip, of Edinburgh. I may say to employers that there is no danger whatever from the employment of ex-patients. The remark is evoked by the fact, that I have lately heard, on good authority, that a large firm in this city sends its employees who have had to undergo a course of sanatorium treatment, to the colonies rather than re-employ them.

I have left myself but little time in which to deal with the remaining institutions required by the campaign against Tuberculosis. Of these, the most important is the Consumption *Hospital*, by which is meant the Refuge, or Home, for advanced and infective cases. It is important that this institution should be, so far as possible, robbed of its *hopeless* character. Otherwise it will be shunned by those for whom it is intended. I would, therefore, suggest that it be called the Consumption *Hospital* as distinguished from the Sanatorium, which is for curable cases *only*. Bearing in mind the fact that it is quite possible by domiciliary visits, paid by the officers of the Sanitary Authority, under the Compulsory Notification System, or, without compulsory notification, by the visitors from the Tuberculosis Dispensary, to induce the majority of coughing consumptives and their families to take the needful precautions, I do not place the provision of such hospital in the foreground of my programme. My view is rather that cases urgently requiring removal would mostly be found amongst the " very poor " who dwell in one-room tenements, and that ample accommodation could be provided for them at the Unions. This is certainly the case at the South Dublin Union, where Dr. Dunne informs me that there are at present under his care 135 adults and 12 children in special isolated buildings. Of these, about one-third are still in the curable stage, and are progressing most favourably under the excellent

arrangements which he has been able to make. Owing to the congestion of the site at the North Dublin Union, it would seem undesirable (even if it were possible) to accumulate infective cases there. The Guardians will have to provide a Special Hospital elsewhere for their advanced cases, and the sooner they face this fact the better for the health of the city.

Before concluding this paper, there are just one or two final points upon which I should like to touch. One is what the French call *Préservation Scolaire*, the preservation of school-children from infection, or, if infected, their preservation from its consequence—the disease—by timely and appropriate action. This should be undertaken conjointly by the Board of National Education and partly by the Local Sanitary Authority. Amongst its Inspectors of Schools, would it not be well if the Education Board included one or two expert medical men, holding the Public Health Diploma, who would visit and report upon the suitability of the School Buildings, and collect statistics about the health of the children? Remembering that it is during infancy and childhood that the disease-germ is most often taken in, this would seem most essential.

In London there is, I understand, a Medical Adviser to the School Board.* Why not here? In each great town the children found to be sickly and tending to develop consumption, should be provided with an "open-air" school, on the lines I have already sketched out in my Report to the Local Government Board.† In France there are upwards of 6,000 beds available for the rational treatment of tuberculosis disease in children. Near Berlin there are two open-air schools, one of which was, during 1904, attended by 704, and the other by 595 delicate children, with marked improvement of their health as well as of their intellectual development.

The importance of the question in Dublin is at once seen when I mention the fact that during 1905, the average daily attendance of pupils at our City National Schools, was 24,181. How many of these children, coming from infected homes, are harbouring the seeds of the disease, at present latent, yet discoverable by skilled inspection and capable of being eradicated by suitable means? Dr. W. Robertson, Medical Officer of Leith, in a recent investigation of a school of 806 children found a number affected with definite pulmonary tuberculosis. Dr. Alfred Greenwood, M.O.H. for Blackburn, in an examination of 338 school-children of that town, reports

* Under the new English Education (Administrative Provisions) Act which has just been passed (August, 1907), School-children are to be subjected to medical inspection

† Details of portable School-pavilions suitable for this purpose can be had from Hasserodt & Co., 31 Queen Street, London, E.C.

that "fifty-four children were found to be affected by Tuberculosis in some form, and of this number, thirty-four had Tuberculosis of one or both lungs."*

How many of our Dublin National Schools are in a satisfactory condition? From the admirable Report of Dr. Edgar Flinn, Medical Inspector, Local Government Board, on the Sanitary Circumstances and Administration of the City of Dublin † (which will prove a real mine of wealth to all who seek for the causes of our hideous death-rate),‡ it may be gathered that the sanitary condition of many of these schools was unsatisfactory—buildings unsuitable, sanitary accommodation inadequate, ventilation defective. Out of the 167 schools, 21 have no playground, and 104 have no arrangements for ablutions.

The only other point to which I would draw attention is the question of *housing*. So long as a large proportion of our working classes live in one-room tenements, we cannot hope to do more than palliate the evil of Tuberculosis. This aspect of the question has recently come in for a great deal of attention in Paris, where Tuberculosis is even more prevalent than in Dublin. It was found that in each Arrondissement (Ward) the mortality from Tuberculosis was *in the inverse ratio of the number of windows per head.* Thus the 8th Arrondissement, with 4.2 windows per inhabitant, gave a consumption mortality of 1.3 per thousand, whereas the 12th, with 1.8 windows per inhabitant, gave a mortality of 8.2. Moreover, it was found that the mortality from this cause in the houses along a large, wide thoroughfare (the Boulevards St. Michel, Sebastopol, and Strasbourg) was 1.34, whereas in a closely adjoining, parallel, but narrow, street, it was 5.54. Inquiry further showed that certain houses were mainly responsible for the high consumption death-rate of Paris. In twelve years, there died of Tuberculosis in that city 101,496 persons, distributed over 39,447 houses. Of these houses, 820, containing 106,308 persons, yielded 11,500 deaths from this cause. The Tuberculosis mortality of the city in general being 4.95, that of the dwellers in these houses was just double, 9.8. Although these 820 houses represent only one-fiftieth of the total number of houses in Paris, the deaths in them represent one-tenth of the total mortality from Tuberculosis. The worst of these houses were found to belong to the class of lodging-houses called *hôtels garnis.* The Tuberculosis mortality amongst the inhabitants of these plague-houses was actually found to amount to 42 per thousand in certain wards of Paris. Amongst

* *British Journal of Tuberculosis*, No 2, p. 105

† Blue Book, Dublin, Thom, 1906

‡ Average for the 11 years, 1895-1905, inclusive, London, 17·5, Edinburgh, 16·7, *Dublin, 27 per thousand.*

the 820 houses above referred to, 195 were large tenement houses, with a population (during the period covered) of 13,130, amongst whom Tuberculosis claimed in 11 years 2,888 victims—the fifth of the population! These grim facts were ascertained by a special department of the public health office, called the *Casier Sanitaire*, employing ten inspectors, whose business it is to collect the figures of illness and death for each house, and see that the requirements of the sanitary authority are enforced. French sanitarians suggest that plates bearing a classification-number corresponding to the degree of healthiness, should be affixed to every house, or, at any rate, to every lodging house, so that would-be tenants could accurately appraise the risk they were running in taking up their abode there. A further suggestion of value would be that, in the compulsory demolition of house property by the Sanitary Authority in the act of clearing unhealthy areas, compensation should be regulated according to the death-rate of the individual houses—the higher the death-rate, the smaller the compensation. At present, owners of this class of house have no motive for keeping them in a healthy state. Would it be too much to expect of our Public Health Department to undertake such a systematic survey of our Dublin tenements and common lodging houses as that above indicated?

The Corporation and, I may add, the Suburban Sanitary Authorities, deserve the greatest credit for providing so many decent houses within recent years for the working class. But an immense amount of work still needs to be done, as anyone walking through the purlieus of our city can testify. The need for immediate action is urgent, for, the moment a sanatorium is established, the demand for salubrious dwellings by the working class will become more urgent than at any previous period of our history.

We may well despair of accomplishing anything, when we remember that the average labourer in Dublin *does not earn enough to maintain a family in a state of physical efficiency*. From data contained in Dr. Flinn's Report, I find that one shilling per head, per week, is all that is available for food in many of these "very poor" families. Dr. Bardswell calculates that an adult cannot save himself from relapsing into phthisis on a diet that costs less than five shillings a week, and even then special knowledge (which our working-classes certainly do not possess) is needed, in order to obtain the best nutritive value for the money expended. What is particularly noticeable is the enormous proportion which the rent of their miserable rooms bears to the total income of these unfortunate ones. "The owners of the poorest class of tenement house property do as little as they possibly can to keep their houses in proper repair and in a sanitary

condition," says Dr. Flinn. I would suggest that, if the Public Health Authorities cannot secure for the unskilled labouring class a living wage, they can, at any rate, secure them from extortion by providing them with decent dwellings, and ensuring, by means of proper supervision, that such dwelling be kept clean and wholesome. Much has been done, as the changed condition of Bride's Alley, Montgomery Street, and White's Lane testifies. The Artisans' Dwellings Company, the Association for the Housing of the Very Poor, and the Guinness Trust have also accomplished much. But much more remains to be done, and I do not think that any expenditure of public money could well be more remunerative (though not perhaps in the commercial sense) than that spent on improving the Housing of the Very Poor in Dublin.

I hope that these few suggestions, based on simple and easily followed statistics, may be of some little use in directing public attention to the necessity for active, well-considered, and well co-ordinated endeavour in the prevention and care of Tuberculosis. This has now become, perhaps, the most important branch of public health administration.

In conclusion, I desire to thank the Registrar-General, Dr. Matheson, for permission (granted with the sanction of H. M. Stationery Office), to make use of certain Diagrams contained in his Annual Report for 1905, as well as for his great and unvarying kindness in facilitating my inquiries. And I also feel deeply indebted to the Superintendent of Vital Statistics, Dr. Nimian Falkiner, for much valuable information, courteously afforded.