Malcolm Morris Memorial Lecture

ON

THE OUTLOOK ON TUBERCULOSIS:
CHANGING ORIENTATION

BY

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We are met to-day to commemorate the life and work of one who was "honoured in his generation—a leader of the people by his counsels, and by his knowledge of learning meet for the people, wise and eloquent in instruction."

The setting of this memorial gathering is remarkable—scenically appropriate. The Chadwick Trust—under whose auspices the meeting is convened—serves as a perennial monument to one whose inspiration "lay in the conception that the life of man is so entirely influenced and affected by its surroundings, that by a perfected sanitary code the death rates may be made, practically, whatever we like to make them, until we arrive at that natural duration of human existence which is bounded by anatomical or physiological law."

Edwin Chadwick stepped into the open as champion for man's heritage of health about the commencement of the Victorian era, at a time when Great Britain was apparently spending little more than £2,000 a year on everything that concerned public health. What a contrast to 1928, when the national expenditure for health measures exceeded £10,000,000, not including national health insurance and medical services to sick poor and school children!

Chadwick's contribution to the renaissance of thought and effort is incalculable. There is no need to dwell, in the presence of the Chadwick trustees, on his incomparable achievements. The chaplet of laurel with which towards the close of his life he was enwreathed by France bore the legend, "*Une des gloires de l'Angleterre.*"

It is likewise fitting—and no less gratifying to many of us—that this gathering in commemoration of one of Chadwick's ardent followers is presided over by the honoured Nestor of the trustees, whose long life of distinguished service has run parallel with the beneficent revolution in the domain of health inspired by the labours of Edwin Chadwick, and who himself has been a foremost exponent and no less striking illustration of the virtues of healthy living. There is fitness, too, let me add, in the fact that the invitations to the meeting have been issued by the daughter-in-law of another valiant warrior in the great campaign.

AN APOSTLE OF PREVENTIVE MEDICINE

Could the central figure in our recollections be with us this afternoon, I believe this *mise en scène* would not be displeasing to him. For Edwin Chadwick and Malcolm Morris were cast in a like mould. They had much in common. They scanned the causes of health and disease with the scrutiny of the statesman. They were not content with the expediencies of the politician. Both observed, pondered, drew their conclusions, and acted firmly and fearlessly.

The town of Goole, where Malcolm Morris practised medicine for nine years, lacked horizon for his vision and scope for his superabounding energy. He needed for his workshop the world of his fellows. There was a supreme purpose in what he said and did. So he came to London, where "nature willed him to wear himself and never rest" until the end.

For our present purpose his life presents two main aspects. In the first place, he made himself master in the department of medicine which he especially professed. He did much to raise dermatology to the position it now occupies in the realm of scientific medicine. His name holds an honoured place in the records of the subject as a learned exponent and trusted physician whose happiness lay in taking infinite pains.

Beyond this, however, he delved deeply among the twisted roots of communal disease. The health of the nation became for him the burden of thought and song. A citizen of the world, he accepted collective responsibility, and showed a keen flair for the abolition of disease by the removal of preventable causes.

It is not my province to dwell on the narrower side of his professional life. His powerful impress, and the impulse he imparted to the study of the skin in health and disease, are reflected on other occasions. We are concerned to-day with his larger objective. Here, his personality had ample scope. He was pre-eminently an apostle of preventive medicine.

MORRIS'S INTEREST IN TUBERCULOSIS

In particular, it is fitting to recall his great interest in the problems of tuberculosis and the effective part he played in attempting their solution.

My first lengthy conversation with him—so far as I can recollect—was in 1897 or 1898. He had heard something of the work at Edinburgh and was attracted by the application of the concerted scheme, which by that date had assumed definite shape. Thus began a friendship which it was my happiness to enjoy until it passed into affectionate regard for his memory. When there came the chance of a long talk with Malcolm Morris there was naturally little reference to dermatology. Whether in Harley Street or at the Reform Club, it was the larger issue. He always had time for that. I recall a delightful meeting with him in Paris in 1905 during the session of the International Congress on Tuberculosis. As we paced its squares and gardens, if his sensitive, well-trained eye was not engaged with some architectural feature on which he dwelt with informed affection, he talked with emphasis and discrimination on what had been achieved, or might yet be achieved, in the campaign against tuberculosis.

In 1898, as editor of the *Practitioner*, he wrote:

"No pestilence which visits mankind makes anything like the havoc that is wrought by tuberculosis; typhoid fever, diphtheria, scarlet fever, measles, small-pox, cholera, and all other infectious diseases together do not claim half so many victims as are killed by tuberculosis. And when, in addition to this enormous destruction of life, there is taken into account the amount of suffering which it causes to the patient, and the expense, trouble, and danger which it entails on those about him, it will be recognized that tuberculosis is one of the worst scourges which afflict the human race. . . . The question is not one of merely philanthropic interest; it is of national importance, as it closely concerns the maintenance of the vigour of the race. On this ground the co-operation of the State might well be asked. In this country it is notoriously difficult to get even enlightened statesmen to attend to anything out of which party capital cannot be made. But even here the day is surely, if somewhat slowly, coming when ordinary legislators will be brought to recognize that the public health is the first and greatest of political questions. Let us, in short, have a national crusade against a national disease."

FOUNDATION OF NATIONAL ASSOCIATION

That same year he was a member of the group which, under the presidency of Sir William Broadbent, focused opinion and effort by the establishment of the National Association for the Prevention of Consumption (afterwards termed tuberculosis). It will be recalled that the

movement gained the sympathy of King Edward VII, then Prince of Wales, who convened a meeting at Marlborough House on December 20th, 1898.

In speaking of the purpose of the association, Sir William Broadbent, as chairman of the organizing committee, said:

"The mission of the association is to carry into every dwelling in the land an elementary knowledge of the mode in which consumption is propagated, and of the means by which its spread may be prevented, and thus to strengthen the hands of medical men throughout the country who are dealing with individual cases of this disease. To this end the public attention must be captured, the public imagination must be impressed, the defensive instincts of the general public must be aroused, and we do not hesitate to express our belief that your Royal Highness will, by the single gracious act of calling together and presiding over this meeting, save thousands of lives."

The resolution put to the meeting by His Royal Highness was as follows:

"This meeting desires to express its approval of the effort which is being made by the National Association for the Prevention of Consumption and other forms of Tuberculosis to check the spread of the disease due to tubercle, and to promote the recovery of those suffering from consumption and tuberculous disease generally. It also commends the method adopted by the association, of instructing public opinion and stimulating public interest, rather than the advocacy of measures of compulsion."

The council of the National Association was then formed, with Sir William Broadbent as chairman and Sir Malcolm Morris as treasurer. Speaking as one of the early members of that council, I desire to testify to the immense impetus given to the association by Sir Malcolm's clear vision and indefatigable energy. It was chiefly owing to him that the great British Congress on Tuberculosis was held in London in July, 1901—a congress attended by medical men from all parts of the world. The discussions covered a very wide field. One of the memorable events was the general address by Professor Koch, in which he made light of the intercommunicability of human and bovine tuberculosis. The criticism which followed at the close of the address led to the institution of the Royal Commission, whose conclusions showed that Koch's view was not justified by the facts.

In the annual report of the National Association (March, 1903) special emphasis was laid upon the splendid services rendered by the honorary treasurer, Mr. Morris.

"He had acted as honorary treasurer-general to the International Congress and had borne the brunt of the great labour entailed. The success of the Congress and the admirable character of all the arrangements connected with it, afford an abiding testimony to his ability, energy, and public spirit."

VALUE OF CONCERTED EFFORT

I have vivid recollections of his timely and gallant aid when he spoke in Edinburgh in 1904 as medical president of the Fourth International Home Relief Conference. It was a time when there was still a good deal of cold-shouldering, a time of cross purposes and cross currents, when proposals were followed only by counter proposals. The opportunity was afforded by the international conference of restating the purposes and methods of the co-ordinated scheme against tuberculosis which, begun in 1887, was gradually becoming known as the Edinburgh scheme. As president, he formally seconded the following motion, which had been submitted by me to the congress:

"That, in the opinion of this Section, organized effort against tuberculosis is required. The Section believes that this would be effected by the establishment of properly equipped dispensaries under the direction of the municipalities or local authorities."

He added that, in his opinion, tuberculosis stood absolutely by itself; it was one of the diseases of which they knew the cause, and it ran a peculiar course.

"They desired to carry out an organized scheme against it and wanted the officials of the country to assist them. By passing this resolution the Section would strengthen the hands of the authorities. No Act of Parliament would ever come into force unless the authorities felt that public opinion demanded it. No President of a Board would initiate anything unless it should come from the public themselves. He put the resolution before them in order that, by passing it, they might strengthen the municipal authorities, not oppose them, in order that they might in this way express to the authorities their opinion that the time was ripe for action. He did not believe it would have been right to pass such a resolution five or six years ago; it was only the result of the experience of the work . . . that had advanced the movement in spite of checks."

His very practical appreciation of the possibilities of the concerted tuberculosis scheme was conspicuously illustrated by remarks which he made on the occasion of the semi-jubilee of the tuberculosis dispensary at Edinburgh in 1912. In conversation he led me to understand that, behind the scenes, he had pulled all his weight for the appointment of the Departmental Committee on Tuberculosis which, it will be remembered, led finally to the adoption of the national pattern of co-ordinated tuberculosis schemes.

NATIONAL TUBERCULOSIS SCHEME

It is not my purpose to dwell on the developments which have followed since the adoption of a uniform tuberculosis scheme for this country. It is sufficient to recall that, while thirty years ago there were not more than two or three sanatoriums in Great Britain, and only one tuberculosis dispensary, there now exist in England and Scotland, approved by the central health authorities, more than three hundred sanatoriums and hospitals, and some five hundred tuberculosis dispensaries. This means that, under the direction of every local authority in the kingdom, machinery is in operation for the detection of tuberculosis at an early date, for the improvement of environmental conditions in the widest sense, for the treatment of the various forms of tuberculosis with a view to cure, and for the segregation and hospital care of more advanced cases.

This very remarkable fact illustrates the extraordinary change of outlook which has occurred with regard to the whole subject. It is the more remarkable when we consider that the formal recognition of the nation's responsibility was achieved only eighteen years ago, and that initial efforts to erect appropriate machinery all over the country were abruptly interrupted by the outbreak of the war, the immediate and later effects of which have proved disastrous in this as in other fields. Accordingly, as was inevitable, the machinery is not all it might be in various ways, and its quality is far from being uniform throughout the kingdom. Both the machinery and the personnel in charge stand to be improved. None the less, we have already attained, as in no other country in the world, a uniform, concerted scheme, functioning more or less adequately in every part of the land. The fact registers effectively the amazing alteration of national outlook.

RETROSPECT

What need of further illustration of the change in thought and action? And yet—because the immensity of the change in methods and results is still hardly realized—I am tempted to cite a witness whose testimony regarding the outlook in the past is no less true than picturesque. Sir Clifford Allbutt, whose birth coincided with Chadwick's

emergence into public life, when giving in 1907 a retrospect of his experience regarding tuberculosis, wrote:

"My retrospect begins in a shaded parlour at Ventnor, a room in which we were taught the art of embalming the air by stuffing cotton about the doors and pasting paper about the window frames. There I had been sent as a little boy for whom it would be very nice to have such a change from the sterner and gloomier climate of a fifteenth century house in the North. . . . So for a time I was to be the child companion of my father's cousin—a pretty lady, sweet and fragile, who had gone to Ventnor for a consumption. . . . Even still I seem to hear the hack-hack of her hollow cough—too hard and hollow to come from that slender body; and again, the quick, stealthy coming and going of the physician; and the mysterious hours in the bedroom—once very long—when I heard whispers of a blood-spitting. Then, when the sun shone—it was winter, and the sun no constant visitor—my delicate lady ventured to pace—how slowly she paced!—up and down the south of the terrace. Such a poor short walk it seemed, after so much waiting and preparation, so much cloaking and muffling, and the eclipse of the hot cheek under the close black respirator, over which the fine Highland woollen veiling was folded again and again. . . .

"At length I went home again, and gladly. The experience was indeed new, and the lady sweet; but it was all weird, still and stuffy, and rather sinister. Happily, I was none the worse; of her or of the respirator I did not even get a scrofula. I was told afterwards that she went with her husband very far away—to Madeira—which I supposed, for her good, to be even stiller and stuffier. But she had died, they said, and we wore black clothes for a few weeks. . . .

"Thus was my little life spared to pry into the affairs of the medical uncles, where I saw more and more of these hothouse plants like my cousin, and wondered whether the gardeners were stupid, or the houses not hot enough—for all of them died! Indeed, no one ever seemed to suppose they would get well! . . .

"Then as a student I began to prowl in the hospitals, where I saw these consumptives in flocks. 'Only phthisis!' was the monotonous diagnosis. They used to sit on a side-bench along with infantile palsies and the rest, not as infectors, but as incurables. Meanwhile they were comforted with large beer-bottlefuls of balsams and liniments—a sort of liturgy, as it seemed to us; for every week one or two came no more, and others took their places."

GENERAL APATHY

Yet another witness may be cited as to the limitation of medical thought in relation to tuberculosis fifty years ago. I remember well the disappointment felt by me, on returning to Edinburgh after laboratory work elsewhere on the lines of Koch, by the remark of Sir Thomas Grainger Stewart, one of the kindest of my former teachers. When, in reply to a question regarding future work, I told him I proposed devoting much of my time to the subject of tuberculosis, his remark was: "Don't think of such a thing. Phthisis is worn to a very thin thread. The subject is exhausted." The reply reflected the medical apathy which then prevailed. How curiously in contrast seem the interminable piles of literature devoted to the subject in more recent times!

Again, in 1887, when convinced by laboratory and clinical work that in concerted activity on the part of communities lay the road towards successful handling of the problem, I proposed to civic and medical authorities in Edinburgh that Queen Victoria's jubilee might be fitly commemorated by the inauguration of a movement towards that end, a wet blanket was thrown on the project by the adoption of a city scheme for sending consumptive patients to cottages in the country. It was the apathy of the city fathers and their advisers which led to the establishment of the first tuberculosis dispensary and the development of the Edinburgh scheme on a voluntary basis.

A few years later, when pleading for the establishment of the first sanatorium in Scotland, I was pulled up in

fatherly fashion by the learned Principal of the University of Edinburgh for the folly of proposing to treat pulmonary tuberculosis in such a climate.

"When you tell me you have discovered how to get rid of the east wind and Scottish haar, I shall believe you may be trusted to do something to remove consumption, which is the special curse of our climate."

INDICATIONS OF CHANGING OUTLOOK

Not many years later one was able to write (1898), as the result of extended observations in the said sanatorium, which—peace to the Principal's ashes!—came into being notwithstanding his good-natured opposition:

"The one essential factor in treatment is the free exposure of the patient to open air. He must be bathed in fresh air day and night, and this irrespective of whether the weather be good or bad, as popularly understood. The more sunshine, or at least bright sunlight, he can have, the better for the patient. . . . Every aspect of climate having been considered, I have been led to the conclusion, which I have now for long taught to the members of my chest clinic, that the best climate for the treatment of pulmonary tuberculosis is that which woos the patient most into the open air. . . . The experience of the past dozen years has convinced me that if the patient can only be persuaded to be out of doors, lying, sitting, or walking, as the case may be, a large part of each day, and, when indoors, to allow the freest access of fresh air day and night, results may be obtained in almost any district which will compare satisfactorily with those obtainable at most favoured resorts."

About the same time, Sir William Broadbent, having visited the sanatorium, in citing the views just expressed, was impelled to write:

"This is not a mere pious aspiration, but a verified experience. [Results] at Edinburgh, on the Norfolk coast, in Ireland, and elsewhere have shown that consumption can be treated successfully in practically all parts of our islands. This has revolutionized our ideas and it has created new duties."

In the same year Sir Samuel Wilks, president of the Royal College of Physicians, wrote from his own experience as follows:

"The remedy for consumption, therefore, is not medicine but fresh air. In various parts of the globe this may be obtained. Seeing that all the places best fitted for consumptives are blessed with sunshine, it is quite possible that the latter may be one of the conditions favouring recovery. . . . Air and sunshine are the needs of the consumptive; without them no other remedies will succeed. When reading at school of Diogenes in his tub, and the visit of Alexander the Great to him, I thought he was a man of very bad manners in telling the monarch to get out of his sunshine, and it was not until late years that I took a different estimate of the philosopher."

NOTIFICATION

One other illustration. A day or two after venturing at a public meeting (1890) to urge the desirability of the notification of tuberculosis, I was stopped in the street and reproved by that veteran exponent of notification, Sir Henry Littlejohn, for the foolish notion that a principle applicable to acute infections should be extended to so chronic a condition as consumption. He advised me not to run my head against a stone wall. Yet notification of tuberculosis in all its forms has for some eighteen years been the law of the land. In the year 1929 the cases of tuberculosis notified in England and Wales and in Scotland numbered 86,296. Alongside of notification there has developed throughout the country a uniform system of centres for diagnosis and residential institutions for all the varying manifestations of tuberculous disease. By the adoption of this uniform tuberculosis scheme throughout the kingdom an immense

amount has been effected, notwithstanding the inseparable disadvantages of the years we have lived through since 1914. In spite of imperfections of machinery and inequality of personnel, most convincing results have followed the incessant efforts of understanding officers attached to the tuberculosis service in the country.

MORTALITY FROM TUBERCULOSIS

What are the facts regarding the mortality of tuberculosis at the present time, compared with those past years which we have been considering? They are significant, and deserve to be broadcast repeatedly in view of the ill-informed and foolish statements one hears on many sides. Let me cite a few. If the figures relate to Scotland for the most part, the fact must not be attributed to perfervid patriotism, but rather to the great convenience I have experienced in tapping, on the spot, the resources of the Registrar-General for Scotland, to whom my thanks are gratefully accorded. The returns from England and Scotland are remarkably parallel.

Decline in Mortality

1. During the past fifty years the decline in mortality from tuberculosis has been very remarkable. In Scotland the death rate from all forms of tuberculosis has fallen from 336 per 100,000 in 1879 to 97 in 1928, and the death rate from pulmonary tuberculosis has fallen from 231 per 100,000 to 68. The continuity of the drop is noteworthy.

FIG. 1.—Graph showing age death rates for tuberculosis in Scotland.

The graph is of special interest, contrasting as it does the age death rates of 1871 and 1921 (last census). While the general form of the curves is similar, the following points are noteworthy: (a) the general difference of levels; (b) the striking difference at the early age periods; and (c) the gradual levelling of the peak in early adult life.

2. The decline in mortality from tuberculosis has been much more rapid than the decline in mortality from all causes. Stated broadly, while the mortality from all causes has decreased by approximately one-half, the mortality from tuberculosis and from pulmonary tuberculosis has declined by more than two-thirds. Stated otherwise, while in 1871 the deaths from tuberculosis formed 16.8 per cent. of deaths from all causes, in 1921 they formed only 9 per cent.

Accelerating Decline

3. The rate of decline in mortality from tuberculosis has accelerated within recent years. While the percentage decline of rate of mortality from tuberculosis during the decade 1901-11 was 21, the percentage decrease during the decade 1911-21 was 31. This remarkable acceleration

of rate is indicated in Table I, where, taking a series of 5-year periods, the mean death rate of each 5-year period is compared with that of the previous 5-year period. The percentage decrease in each instance is shown in the last column of the table.

TABLE I.—Death rate per 100,000 from tuberculosis (all forms) in Scotland, illustrating accelerating fall within recent years; as prepared by the Registrar-General for Scotland.

Year	Death Rate	Mean Death Rate (5-yearly)	Percentage Decrease since previous 5 year Period
1893	240	239	15.55
1894	235		
1895	256		
1896	229		
1897	237		
1903	216	217	9.21
1904	224		
1905	211		
1906	218		
1907	218		
1913	170	163	24.88
1914	162		
1915	164		
1916	160		
1917	159		
1923	118	109	33.13
1924	116		
1925	110		
1926	99		
1927	100		

The point is illustrated likewise in respect of individual cities—for example, Birmingham, during a period of forty years, 1883-1922. The percentage decrease as between five years (1883-87) and five years (1898-1902) was 4.15, while the percentage decrease as between five years (1903-7) and five years (1918-22) was 24.24.

Unequal Decline in Different Countries

4. The decline in mortality from tuberculosis has been unequal in different countries and different cities, as Tables II and III reveal.

TABLE II.—Death rate per 100,000 population from tuberculosis: larger cities of Great Britain and Ireland in 1925.

	Estimated Population	Death Rate per 100,000 from			
		All Tuberculosis	Pulmonary Tuberculosis	Tuberculous Meningitis	Abdominal and other Tuberculosis
London ...	4,612,000	112	95	8	10
Glasgow ...	1,033,999	137	97	14	25
Birmingham .	945,900	114	95	8	11
Liverpool ...	856,000	151	121	11	19
Manchester ...	755,800	158	133	9	16
Sheffield ...	527,100	99	79	9	11
Leeds ...	472,900	129	107	9	14
Edinburgh ...	421,968	134	95	14	26
Bristol ...	386,000	120	95	9	16
Bradford ...	290,200	101	81	8	12
Newcastle-on-Tyne	287,100	156	121	16	19
Dundee ...	169,361	122	87	11	24
Aberdeen ...	157,192	124	97	11	16
Belfast County Borough	413,000	187	138	20	29
Dublin Area...	438,000	186	144	42	

TABLE III.—*Death rate per 100,000 population from tuberculosis in America and European cities (outside Great Britain) during 1920.*

American Cities	Estimated Population	All Tuberculosis	European Cities	Estimated Population	All Tuberculosis
Philadelphia...	1,837,924	137	Vienna ...	1,842,005	405
Indianapolis...	314,194	132	Budapest ...	—	376
Newark ..	414,216	130	Warsaw ...	—	338
San Francisco	520,546	128	Prague ...	487,000	324
Boston ...	751,251	127	Florence ...	248,587	298
New York ...	5,663,980	126	Paris... ..	2,905,248	279
Pittsburgh ..	591,033	119	Köln ...	656,617	189
Cleveland ..	808,258	108	Leipzig ...	621,351	179
Buffalo... ..	519,608	102	Berlin ...	1,931,330	177
Chicago ...	2,728,022	97	Düsseldorf...	414,900	172
St. Paul ...	290,000	89	Amsterdam	650,758	156
Washington ...	437,571	85	Hamburg ...	1,011,000	152

The discrepancies between cities in Great Britain and Ireland are most noteworthy. Similar discrepancies are found in the towns of the United States, and become still more arresting when we review cities in other European countries. Note the inequality among cities in our own country. For example, in 1925, the death rate from tuberculosis per 100,000 of the population was in Sheffield 99, London 112, Manchester 158, Belfast 187. In cities outside Great Britain the inequality was even more striking. Comparable statistics for the year 1920 indicated that the death rate from tuberculosis per 100,000 of the population was in Washington, D.C., 85, Chicago 97, New York 126, Philadelphia 137, Berlin 177, Paris 279, Warsaw 338, Vienna 405. The comparison throws doubt on the explanation frequently cited on the authority of Metchnikoff that diminution in mortality from tuberculosis is the expression of an advancing immunization of civilized populations against the disease.

While the significance of progressive immunization in certain directions is admitted, the examples just cited indicate that tuberculosis continues to be unequally distributed throughout the civilized world, and that the distribution does not appear to bear close relationship to the influence of immunization. Were progressive immunization the chief factor, we might rightly expect to find evidence of the influence conspicuous among the populations of the older civilizations. The figures in the above tables cannot be said to bear that out.

FIG. 2.—Diagram showing expected and actual deaths in Scotland in 1925.

(Note.—All numbers are based on five-yearly returns.)

Without attempting to analyse all the factors, we may conclude generally that in some countries and some cities causes making for tuberculous disease remain prevalent, and that influences making for diminution have, for one reason or another, had less effective play.

Returning to the facts of our own country, the main propositions regarding the decline and acceleration of the

decline are strikingly illustrated in the accompanying diagram (Fig. 2).

The columns indicate that the number of deaths that might have been expected in Scotland in the year 1925, (A) if the death rate had remained the same as in 1875; (B) if the death rate of 1900 had continued; (C) if the tuberculosis death rate had declined during the whole period in the same ratio as the death rate from all causes; and (D) if the death rate during the second half of the period had declined in the same ratio as during the first half of the period—that is to say, if there had been no acceleration of decline. The last column (E) shows the actual number of deaths.

Results Follow Intelligent Action

Such facts are inspiring. From whatever angle the evidence is considered, it seems fair to conclude that the decline in mortality has been hastened by the fuller understanding of the natural history of tuberculosis, which has been rendered possible by the discovery of the tubercle bacillus and by the more correct outlook on the field and the better adaptation of measures of attack and defence.

A comparison of the epidemiological records of different countries points to the conclusion that by the adoption of a certain procedure it is possible to influence the morbidity of, and the mortality from, tuberculosis. In other words, the tuberculosis index of a given area is dependent on, and governable by, the degree of intelligent action on the part of health authorities and of co-operation on the part of the inhabitants. The scoffer who tells us that the decline in mortality so evident in Great Britain to-day is referable to causes acting uniformly throughout the world does not know, or is unwilling to face, the facts.

In view of the evidence, it is clearly up to every progressive community to understand the *why* and the *how* of each factor in the tuberculosis scheme of the country, and to insist on its adequate application.

Have we Reached Finality?

If we assume that this is realized, the question arises: Have we then reached finality? May we rest content with the results attained and the accelerating rate of decline in tuberculosis mortality presently apparent, in the belief that we are within sight of the date when the descending curve of mortality will reach the vanishing point? Shall we be content to wait and see?

To such a question the answer can be only an emphatic negative. With the constantly increasing knowledge of the natural history of the disease there is a recurrent call for fresh orientation. Action under the tuberculosis scheme is not stereotyped, but can be adjusted to meet the indications afforded by every new fact and fresh conception based thereon. Unfortunately the influence of habit and tradition tends still to dominate the situation. Even now the bearing of some well-ascertained facts remains inadequately realized in the preventive programme.

The chief weakness of the present-day attitude is the disproportionate concentration of attention on pronounced lesions, more especially pulmonary tuberculosis. This is a natural result of the earlier outlook and of the gravity of the condition itself. Fifty years ago little attention was paid to anything save advanced disease of the lung. And it is most fitting, from the individual and communal point of view, that tuberculosis of the lung should have special consideration. The advance made during the past forty years in connexion with the diagnosis and treatment of pulmonary tuberculosis ranks as one of the most encouraging facts in the history of practical medicine. On the other hand, it should be kept well in mind that, for the most part, pulmonary tuberculosis—"phthisis" as, unfortunately, it is still sometimes termed—is in reality

a late visceral manifestation of an infection contracted much earlier.

From the larger preventive point of view it is necessary to probe more deeply. Attention must be shifted more and more towards the earliest *indications of tuberculous infection*—not to the neglect of late manifestations, but to their better interpretation and progressive elimination.

CHANGING ORIENTATION

Continued observation of the natural history of the infection, the lessons of experiment, and the facts of comparative pathology—for example, tuberculosis as it occurs in cattle—together with the introduction of tuberculin tests, have made possible a truer perspective.

The gradual dissemination of tuberculous infection and the resultant disturbance have been followed from the point of infection through the lymphatic system to involvement of the various viscera. The march of events may be readily studied in animals, when inoculated either naturally or artificially. In the human subject, it is one of the privileges of age to have had the opportunity time after time of watching the procession of events in the same individual *from the date of initial infection and trifling manifestations, through the varying phases of the infected individual's life*. It has been possible for me in numerous instances to trace the development of tuberculosis in the same subject in ever-changing form, from the seed stage up to full fruition, in some instances for thirty years and more.

BIOLOGICAL METHOD

How slight and apparently simple the first indications may be! How gradually those may become pronounced and fixed—it may be in glands—receding here and advancing there! And the same ebb and flow may be observed in visceral involvements—periods of activity alternating with quiescence. The latency may be so complete as to simulate arrest. Yet this in turn may be followed by a fresh outburst.

The march of events throughout the long or short life of the infected individual, passing panorama-wise before the observer, is a fascinating study. That ebb and flow—that arrest and advance, occurring irregularly throughout many years—are but the expression of the continuing contest between the invading organism and the resistance of the tissues of its host.

The variety of expression is infinite. While the invading organism is presumably little changed, save in respect of numbers, the resistance offered varies endlessly in different individuals and in the same individual at different times. This results from many causes—intercurrent illness, accident, strain (at different stages of life), and a host of environmental influences.

The tuberculosis scheme, as usually developed, tends to be lopsided, heavily weighted in respect of pronounced lesions and but little occupied with the possibilities and consequences of early infection. In the absence of so-called clinical disease, too little attention is paid to the fact that tuberculous infection has been established. And yet this is the crossing of the frontier—the beginning of what is often a lifelong contest.

CARDINAL FACTS

In its everyday operations the tuberculosis scheme frequently lacks grip on certain facts of primary importance.

1. That infection is widespread, indeed more or less universal, throughout a community.
2. That infection is contracted for the most part in childhood.
3. That tuberculous infection, once established, continues to exert its influence throughout the life of the individual, either

by securing protection—immunity—from the consequences of further exposure, as happily occurs in the majority of individuals, or by producing recurrent disturbances which are precipitated by many different causes—personal and environmental—and which vary endlessly in kind and in degree.

4. That in proportion as the resistance of the infected individual is kept high, these disturbances are likely to be few and relatively slight. In proportion as the resistance is lowered by any cause, the infection is apt to spread, and existing lesions tend to be activated and extended.

To no other disease is the classical maxim so applicable: *Venienti occurrere morbo*. Anticipation, that is, prevention, of the endless possibilities of subsequent mischief following infection was the *motif* behind my insistence on the systematic examination of contacts as an essential function of the tuberculosis dispensary. If our efforts towards the eradication of tuberculosis from a community are to be effective, it is necessary that we should hunt for the earliest traces of tuberculous infection. The advanced case of disease is but the late efflorescence of the full-grown weed, which might have been scotched at the seedling stage. To neglect the methods of early detection with a view to arrest is medically and economically unsound.

FUNDAMENTAL VALUE OF TUBERCULIN

Having regard to the likelihood of infection in the course of childhood, and the difficulty of assessing the ultimate consequences of such infection, I am firmly convinced that the general use of tuberculin as a diagnostic agent in childhood is most desirable. Because of the likelihood of infection, the tuberculin test should become routine practice at stated intervals from early infancy onwards. The procedure is painless and harmless; yet the knowledge obtained by it is priceless.

So long as the reaction remains negative, nothing further is necessary. Whenever a positive reaction is obtained for the first time, the fact and the date should be recorded. The fact of tuberculinization, and the date of its first detection, are of immense significance in the life-history of the child, having regard to the possible implications.

If, after positive determination, the health of the child continues thoroughly good, we have the knowledge that the child's resistance is sufficient, and there is no call for treatment. On the other hand, the positive determination may illuminate many after-events. Vague conditions of "delicacy" in the child may find their explanation—for example, malnutrition, obscure feverish attacks, ill-defined lack of energy, so-called "disturbed action of the heart," which may interfere with the claims of education and sport. Such conditions, I am satisfied, are very frequently the expression of tuberculous infection. Further, the occurrence of incidental illnesses, such as measles and whooping-cough, will call for watchfulness, and care will be taken to secure complete convalescence after such attacks. The doctor will insist on the maintenance of a high level of resistance, more particularly in relation to school life, the period of adolescence, and the time of entrance into more responsible life.

Preventive medicine may wisely take a lesson from the sphere of agriculture. The practical farmer who seeks to raise a tubercle-free herd has learned the value of the tuberculin test. A method for the early detection of tubercle which is worth the farmer's while on economic grounds has still greater significance and wider efficacy—both medically and economically—in dealing with the human race.

Through the knowledge gained by the tuberculin test, the intelligent farmer is able to direct separate attention

to two groups in his herd: (a) to those animals which react to tuberculin, and (b) to those which do not react. If his purpose is solely to secure and maintain a tubercle-free herd, naturally he removes the reactors entirely. On the other hand, he may prefer to retain the reactors, as a group by themselves, in which case he will take special precautions for their individual care and their communal relationships.

These things are a parable. In view of the frequency of infection in the human family, I am satisfied that, while insisting on the undesirability of any formal distinction between reactors and non-reactors, it would constitute an advance of first importance could it be made routine practice to determine the *fact* and *date* of the initial infection (tuberculinization) in every child. This important subject has been elaborated by me elsewhere.

Such determination is the first essential step towards effective detuberculinization of the individual and, ultimately, of the community. The procedure is harmless and costs little. Yet its general adoption would result in the anticipation and limitation of countless consequences in the shape of invalidism and crippling. It is the lack of such scientific anticipation which has created, and meantime maintains, the need for sanatoriums and hospitals all over the country. As I put it in 1912: "It is to the nursery and schoolroom that observation and effort should be directed if measures for the eradication of tuberculosis are to be fundamentally sound and practically effective."

ADMINISTRATIVE DEFECTS

It is one of the disadvantages of our public health system that divisions made for administrative convenience do not always coincide with the grouping of individuals from the standpoint of the physician. The departmental system which has developed in relation to the public health service leads sometimes to embarrassment and incomplete results.

Especially is this true of the line of separation between the department of maternity and child welfare and that of tuberculosis. In actual practice that artificial barrier should cease to exist. The liaison between these two departments ought to be of the closest kind. Falling administratively within the province of the maternity department is to be found the tuberculous mother—expectant, or after the event—with the variety of difficult problems which her presence brings. Then there is the problem of the newborn child and of other infants from tuberculous mothers. There is also the question: How are infants generally to be safeguarded from the ubiquitous infection?

The department of child welfare, as such, is of limited value unless the likelihood of tuberculinization during the early years of life is kept steadily in mind and the advent of *infection*—as opposed to the appearance of definite *disease*—watched for with scrupulous attention. It should be regarded as a responsible duty of the department—as it should be of the family doctor—to instruct the ordinary mother regarding the likelihood of the occurrence, the ready means for determining this, and the simple measures to be taken to avoid serious consequences.

ANTICIPATORY MEASURES: VACCINES

With the knowledge we now have of the genesis and distribution of tuberculous disease, it is high time that the medical adviser of the household, whether the family doctor or the health officer (to whichever department he is attached), should see that the parent or responsible guardian understands the available methods for excluding the risks of tuberculous disease. The meaning and value of anticipatory (preventive) procedure should be incul-

cated on parents from the birth of the child onwards, and procedure on the lines indicated should be commenced at an early date. I have the conviction that extended knowledge of the facts, and the application of anticipatory measures which will be consequently demanded, will lead to better results than attempts along the line of enforced vaccination.

Attempts at vaccination have been numerous. It is foreign to the purpose of this address to refer to those in detail. One after another they have been proposed on scientific grounds. In some cases they have been boomed less desirably. They have been tested and, so far, all have been found wanting. The latest proposal is at present valiantly championed. The vaccine B.C.G. awaits the final verdict, but I think it only right to say that in my opinion there remain loopholes in the evidence which call for further examination before it would be proper to sanction the adoption of the B.C.G. method generally. Owing to the continuing lack of certainty on several issues, and the difficulty of determining the limits, on the one hand, of the risk, and on the other hand, of the protection following B.C.G. vaccination, it has seemed to me remarkable that what may be described as an experiment on the human subject should have been permitted on so large a scale.

Looking to all sides of the question in the light of present knowledge, I am convinced that the proper line meantime is to concentrate attention on the detection at the first possible moment of the occurrence of tuberculous infection (tuberculinization) in the child. This event, which can be determined exactly by means of the tuberculin test, gives the key to much that may be otherwise obscure in the life-history of the individual, and opens the way to the rational and timely employment of preventive and curative measures. Were this line of approach adopted universally, I am satisfied that the after-consequences of the infection would be correspondingly reduced and that not only would the decline of mortality from tuberculosis be further accelerated but that—assuming thoroughness of procedure—we might expect to reduce the mortality from tuberculosis to a negligible amount within a generation or so.

Neither child nor calf is born tuberculous—even if born of a tuberculous mother. Exception to the rule is a very rare occurrence. Tuberculosis was unknown to the wild man of the prairie, the forest, and the hills. Like cattle, living and breeding in the open, he was exempt. The blight of tuberculosis has followed incessantly the aggregation of men in groups—one of the vicious by-products of incomplete and ill-informed civilization. Begotten among these conditions, and fostered by ignorance and dread, it has shadowed man from the cradle to the grave. Tradition and fear have engendered hopelessness and helplessness. Mankind, stricken and crippled—mankind in all its ranks, for tuberculosis knows no class distinction—was in a sorry way. Medicine, blindfold, stumbled in the dark.

The past half-century has changed all this. There is light at every point on a sure road. What we require now is wide extension of the lighting system. Better training of our doctors will bring precision of effort towards the prevention or limitation of tuberculosis. Popular education regarding the causation and natural history of tuberculosis will arouse the health conscience of the community to demand that nothing be left undone to ensure that this "great disease of life" shall cease.

It has been given to few to realize so clearly as did Sir Malcolm Morris how true it is that the final conquest of tuberculosis depends on the provision of better lenses for the doctor and more active insistence on the part of the people. He looked confidently for the dawn of "that great to-morrow when mankind shall mend."