PRESENT-DAY OUTLOOK ON TUBERCULOSIS.

BEING THE INAUGURAL ADDRESS DELIVERED ON THE INSTITUTION OF THE CHAIR OF TUBERCULOSIS IN THE UNIVERSITY OF EDINBURGH, 16TH APRIL 1918.

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The inauguration of a Department in the University affords fitting occasion for a statement of the circumstances which led to its inception and for a sketch of the outlook and purposes of the chair. A formal apologia is unnecessary, but certain facts and considerations may be put on record.

The Chair of Tuberculosis is the gift of the Royal Victoria Hospital Tuberculosis Trust. It is the latest expression of a policy which has gradually developed in the minds of the Committee of Management since 1887. The Committee were concerned with tuberculosis as a social malady of vast dimensions, responsible directly for at least one-seventh of the deaths of the civilised world, and indirectly for an incalculable amount of physical weakness and economic waste.

The policy had for a cardinal fact and starting-point the discovery—the recent discovery then—of the tubercle bacillus as the essential cause of tuberculosis in all its forms. Resting on that foundation, an endeavour was made to adapt to tuberculosis the great principles of prevention and treatment that were proving serviceable in the case of other infective diseases.

The year, 1882, is an important date in the history of tuberculosis, not merely because of the announcement of the bacillus, but as the dawn of a great renaissance in the study of the disease. The flutter caused by the announcement in histological and pathological laboratories is one of the romantic memories of medicine. In the laboratory where I happened to be working, the learned director literally danced with excitement, and routine work gave place to endeavour to determine or refute the claim.

FORMER HOPELESSNESS.

In the light of to-day, it is difficult to convey an adequate conception of the sombre outlook on tuberculosis in the seventies and more or less right back to the time of Hippocrates. Then it was the finished picture—the dying patient, or the mortality table—that commanded attention. The name, Phthisis, itself
suggests downward progress along a weary road towards an inevitable end. The master-draughtsmen and colourists of clinical medicine throughout the ages have painted an unmistakable portrait—the fragile frame, dropping flesh, pale skin, hectic flush, short breath, quick pulse, tiring cough, wearing fever, drenching sweats, and fading strength.

But these traits so graphically drawn are the traits of hastening death. The legend over the picture told of defeat, almost without contest: *Mussabat tacito Medicina timore* (Medicine, dumb with fear, scarce dared a word). Only the fateful, *Prognosis infaustissima*. And then, with an easy air of omniscience, the physician set about instituting conditions of environment which removed the last hope of natural resistance. The patient, whose illness was traced to exposure and “cold,” was shielded in every possible way—literally wrapped in cotton wadding and placed in an incubator. And all this with a certainty of statement and procedure beyond question.

The mental attitude of the profession before the discovery of the bacillus was excellently reflected in the remark made to me by a distinguished member of the faculty when, on returning to work in Edinburgh in 1883, in reply to his question as to future line of work, I suggested tuberculosis. “Don’t think of such a thing,” he said. “Phthisis is worn to a very thin thread. The subject is exhausted.”

**Scientific Era.**

By the recognition of the *causa causans*, we were switched, as it were, from the harvest field of disease to the sowing time—from consideration of the final manifestations of the life-history of the bacillus in the favouring medium of the patient’s tissues to observation of the pathogenic organism under the more exact conditions which experiment makes possible. By the recognition of the bacillus, old popular premonitions as to the infective character of the disease—notably on the part of the Latin races—were seen to have a basis of fact. Scientific observations prior to 1882 as to the infective character of tuberculosis—such as those of Klencke, Villemin, Cohnheim, and Klebs—received conclusive endorsement.

The acceptance of the bacillus as the infecting agent was followed by countless investigations regarding its biology. Its characters were studied in discharges, in tissues, and in culture, and likewise its effects on tissues and media. With improvement
in histological methods investigation made rapid advances. The manifestations of tuberculous invasion wherever met with—whether in lungs, intestines, liver, kidney, peritoneum, glands, bones, joints or other tissues—were shown to be essentially the same. The unity of tuberculosis in its infinitely various manifestations, urged by Laennec in the beginning of last century on anatomical grounds, was now formally established.

Truer conceptions of pathology emerged. The toxic effects of the bacillus on tissues and functions were determined. Invasion of the bacillus meant intoxication of the system. Symptoms hitherto ascribed to progressive weakness were traced to the elaboration and circulation of poisonous products.

A number of diseases not previously regarded as tuberculous have been shown to be due to the bacillus, and additions are still being made to the list.

**Universality of Tuberculosis.**

Alongside the misconceptions produced by study of the late results of infection must be placed the misleading testimony of mortality tables.

A certain number of deaths in this country—say one-seventh of the total—was attributed to "phthisis." From the frequency of such deaths at certain ages, the disease was regarded as one especially of adolescence and early adult life. Curious theories were woven in explanation. What are the actual facts? Overwhelming evidence has accumulated showing that tuberculosis is practically universal.

The classic observations of Nägeli (Zürich) in 1900 are too well known to call for more than citation. He reported that definite signs of tuberculosis were found in 97 per cent. of bodies examined consecutively by him, that is, of persons dying in a general hospital from all sorts of diseases and accidents. Similar observations have been recorded by subsequent workers. The most recent—published in October 1917—are those of Reinhart (Berne), who, following the plan of consecutive post-mortem examinations, found that 96 per cent. yielded evidence of tuberculosis.

These citations might be multiplied. They all go to show that sooner or later most persons become tuberculised in some degree.
More important than the proof of the universality of the disease is the conclusion supported by convincing evidence that for the most part tuberculosis is acquired in childhood. Clinical, pathological, and experimental facts all indicate that tuberculosis is vastly common in childhood. While infants seem seldom born tuberculous, most children develop it in one form or another. The child's mucous membranes are specially receptive, and inoculation occurs readily at any point. The frequency of infection increases in each successive age group up to puberty.

These are but illustrations rapidly culled from an immense field. They are impressive and illuminating. If the natural history of tuberculosis is to be rightly comprehended and interpreted, we must brush aside the fallacies based on a time-honoured but mistaken pathology, and on mortality statistics which are misleading. We require observers with exact methods, possessed of scientific imagination and patience sufficient to overcome the difficulties inherent to the study of an infection so long drawn out—an infection which, while universal in distribution, is incomparably varied in expression.

A large part of laboratory observation suffers from the fault that the procedure is crude, hasty, and intensive. To get satisfactory results we must follow Nature's method of inoculation, which for the most part is unobtrusive, gradual, and repeated.

**Declining Death-Rate.**

Tuberculosis is a live, many-sided subject. Look at present-day facts. The ravages of tuberculosis are still appalling, but they have been greatly reduced. They are being met. In place of waiting till the bacillus has drained the life-blood from its victim, medicine is on the outlook for the first signs of attack. Effective forces have been mobilised. The invader is well in hand.

Take the Registrar-General's figures for England and Scotland in 1915. In England, 54,295 persons died of tuberculosis, representing a death-rate from all forms of 151 per 100,000 of the population. In Scotland, 7819 persons died of tuberculosis, representing a death-rate of 163 per 100,000. Restricting our view to pulmonary tuberculosis alone:—In England there died 41,676 persons, representing a death-rate of 116 per 100,000, and
in Scotland 5291 persons, representing a death-rate of 111 per 100,000.

If we go back twenty-five years and look into the mortality from pulmonary tuberculosis, the comparable figures are as follows:—In 1890 for England a death-rate of 168 per 100,000 as against 116 in 1915, i.e. a drop of 30·9 per cent., and for Scotland a death-rate of 193 per 100,000 as against 111 in 1915, i.e. a drop of 42·4 per cent.

The comparison shows that by some means or another a successful resistance is now being offered to tuberculous invasion which was not offered before.

That the remarkable fall is not due to natural causes which influence all civilised countries in more or less similar fashion is seen by comparing the 1915 figures for England and Scotland with the 1915 figures for Ireland, France, and Germany. The figures per 100,000 of the population run as follows:—Scotland, 111; England, 116; Germany, 142; Ireland, 172; France, 179. And the figures for Austria and Russia—less certainly obtained for the moment—are still higher.

Such facts afford striking commentary on the view maintained by Metchnikoff and others that a process of gradual immunisation is in progress in thickly populated countries through natural vaccination.

With the figures before us, we are faced with the question—If some countries are thus reaping the benefit of prolonged natural vaccination, why are there such striking differences in the various groups forming the older civilisations? If natural immunisation be the reason, why the difference in favour of Scotland over Ireland and France? If natural immunisation be the reason, why should Scotland and England show the strikingly low mortality (111 and 116 respectively) as compared with France (179)? The fascinating theory of communal immunisation on natural lines fails badly when tested by hard facts.

**Fallacies in Returns.**

Before leaving this part of the subject it is necessary to recall that mortality statistics as published by the Registrar-General include only deaths certified by the patients' doctors as having occurred from tuberculosis. It is common knowledge that many deaths occur from tuberculosis which are not thus certified, either because the disease has not been recognised, or because it has been described euphemistically. What the patient died of and what
he is said to have died of are not always one and the same thing. Many deaths are labelled as from pneumonia, bronchitis, measles, whooping-cough, or influenza, which are really referable to tuberculosis.

Take any one of our general hospitals, say the Royal Infirmary, or the Royal Hospital for Sick Children; go round the wards and follow a really exhaustive clinical examination of the cases. The amount of tuberculosis thus revealed will astonish you. The more refined the methods the greater will be your astonishment. Were it possible, in relation to the Sick Children's Hospital, to wipe out all the cases of tuberculosis applying for treatment, you would probably wipe out 50 per cent. of the whole.

Falling back on Reinhart's observations that 96 per cent. of all bodies examined by him presented tuberculous lesions, a further point of much interest emerges. Reinhart has made careful analysis of the cases, dividing them into two groups according as they showed an active or a healed lesion. He found that of the bodies presenting tuberculous lesions, 32 per cent. showed tuberculosis in presently aggressive form. In other words, about one-third of the hospital population, that is, of those who terminated their days within the hospital, presented post-mortem evidence of tuberculous disease in progress. In the remaining 64 per cent., while tuberculous lesions were present, these were, to all intents and purposes, healed.

Those details are remarkable and afford matter for reflection as we walk the hospitals or go about seeing sick people. It is in many instances to the co-existence of tuberculous disease that the mortality of other diseases is due.

When H.M.S. Caledonia, an old wooden hulk which had withstood many a storm, lay in the Forth as a training-ship for boys, we had one year from her at the Royal Infirmary many cases of pneumonia of vicious type, a large number of which were fatal. At successive post-mortem examinations the interesting observation emerged that in each case tuberculosis was present in the lungs. This is especially significant, because, as a rule, the outlook on pneumonia as occurring in a healthy young boy is good. Yet these boys died. Pneumonia was grafted on pre-existent tuberculosis. Tuberculosis was the factor that weighted the scales adversely.

This is similarly true of much which passes as bronchitis in old age. If we could remove the substratum of tuberculosis we would reduce enormously the morbidity of such affections.
In whatever way you view it, then, tuberculosis is to-day a live problem teeming with issues which call for observation and investigation.

Look for a moment at its kaleidoscopic features. While the essential cause (the tubercle bacillus) and the primary lesion (the tubercle) are common to them all, how different are their expression in different cases!

The individual may be inoculated with tuberculosis at any point. The site of inoculation may be visible, external, cutaneous. More often it is concealed, internal, mucous. Where it occurs makes little difference. At the site of inoculation, the first line of defence, an obvious lesion (wart, chancre) may develop, or nothing may be traceable as commonly in the case of mucous surfaces.

When the first line of defence has been passed, infection is carried by way of the lymphatic system to the lymphatic glands. Lymphatic glands nearest to the site of inoculation first show change. The change may be limited to one area. The infiltration and swelling which occur are obvious expressions of invasion in progress and of resistance offered by the glands which form the second line of defence.

The infective process may be arrested at this stage. This is a serious testing-point of the patient's resistance. Individual glands react variously. They may enlarge gradually and uniformly, or the reaction may be excessive and acute. They may suppurate. They may become calcareous. The process may apparently exhaust itself—that is, be adequately resisted—in the lymphatic system. It is this fact, doubtless, that has given rise to the notion that immunity may be effected when the disease affects the glands specially. The true interpretation would seem to be that spread is arrested because the glands exercise a sifting and perhaps antagonistic action in respect of the invading organism. The seeming immunity is really nothing more than effective resistance of the glands which hold up the invader.

If, on the other hand, the barrier of the lymphatic glands fail, a more general invasion follows. There is now infinite possibility of disease. Bacilli may pass to any of the organs, or there may be a widespread involvement of the system through the bloodstream.

The clinical features of tuberculosis are similarly varied. Any
part of the body may present evidence of disease. In the case of the lungs, the course is never quite the same in any two instances. Some cases run an acute course and death follows in a few weeks; others may last twenty, thirty years, or more. Between these limits there are endless possibilities.

In addition to the local changes, the more progressive case always presents systemic disturbance. The effects of such intoxication show themselves widely throughout the body. More especially they prejudice the circulation and lead to wasting of muscles, both skeletal and visceral.

The expression, "kaleidoscopic," just used is not exaggerated. The variations, clinical and pathological—the combinations and permutations—are unlimited. The place occupied by tuberculosis in medicine is a large one. It has extensive relationships with pathology, clinical medicine and surgery, diseases of children, diseases of the eye, ear, throat, and skin. The man who devotes himself to tuberculosis need never become a specialist in the narrow sense of the term.

A Return prepared for me by the Registrar of the Royal Infirmary shows that during the year ending 31st January 1918 some 650 cases were treated for tuberculosis within the wards. The Return includes tuberculosis of practically every organ and structure in the body. The list refers to indoor treatment alone, and is exclusive of a vast number of cases of tuberculosis coming as out-patients to all the departments. The numbers are the more remarkable, inasmuch as the Royal Infirmary is a general hospital which, on principle, excludes infective conditions.

**Diagnosis and Prognosis.**

The diagnosis and prognosis of tuberculosis involve a minute and exhaustive estimate of the degree of local disturbance caused in the various parts of the body and a delicate appraisement of the amount of systemic intoxication. This implies the application of physiological and pathological methods at every turn.

It is not—as seems sometimes to be imagined—a matter of sending a sample of expectoration or other discharge to someone behind the scenes, who has never seen the patient, and of resting content with a positive or negative result of such examination. The bacteriological proof, because of its finality, is serviceable as affording a convenient delimiting line in connection with admission into the Public Services and the like. For the larger purposes of treatment and prevention it does not carry us far. It is open
to the fundamental and paralysing objection that the appearance of the tubercle bacillus in the discharge is a comparatively late event.

For the purposes of effective diagnosis much more is needed than this. We must sift the evidence afforded by the various organs and the system as a whole. The rough and ready way in which patients are commonly classified as having reached the first or second or third stage of tuberculosis will not do. The hasty fashion in which a man with pronounced physical signs of pulmonary tuberculosis used to be—and often still is—accorded his congé from earthly worries within a given term has done much to discredit medical practice. Many authoritative works on clinical medicine require thoughtful re-editing of this chapter.

The humour of the situation appeals grimly to the subject of the premature death sentence. An old hand once remarked to me with unconcealed gusto, "Don't be rash in your prognosis regarding consumption. When I was a youngster I was condemned by my family doctor and several of the leading consultants of the day as a bad life. No insurance company would look at me. Well, I have had the melancholy satisfaction of following to the grave all these doctors and some Insurance Managers."

It is a frequent experience to come across persons often in seemingly good health who were patients for extensive tuberculous disease twenty and even thirty years ago. Within the past day or so three patients have come to see me with the arresting introduction: "You remember, I'm a case of fifteen, eighteen, or twenty-five years' standing." In the fighting line at the various fronts to-day may be found many a man whose life once trembled in the balance from tuberculous disease.

**TREATMENT.**

Turning to treatment, the prospect is full of hope. The fact is realised that no disease is more tractable than tuberculosis, if its character be recognised sufficiently early.

**AEROTHERAPY.**

Nature herself cures tuberculous every day. Half of us assembled in this hall are cases of arrested tubercle. The return of medicine to Nature's methods of cure is a story of deep human interest.

If the disease be taken in hand early, tuberculosis is readily managed. The principles of treatment are well defined. Their
successful application requires not only knowledge and skill, but complete reliance on the methods and infinite patience—patience on the doctor's part, patience on the sick man's part, and patience on the part of the patient's friend, the inevitable friend who always knows one better than both.

By the recognition of the eternal principle of aerotherapy and by fulfilment of physiological demands for rest, movement, and feeding, the treatment of tuberculosis has been revolutionised. The parasitic invader has been countered by Nature's own methods. Disease has been scared from a soil rendered unsuitable.

For many years some of us have pled for the more general realisation of aerotherapy in the treatment not only of tuberculosis, but of disease generally. There is still a pathetic, tragic failure to appreciate the value in household and in hospital of this great cleansing, antidotal, and vitalising principle.

Thanks to the devoted labours for many a year of Dispensary Officers and Tuberculosis Nurses in the city, Edinburgh—particularly the poorer parts—has justly acquired the reputation of being one of the most open-windowed cities. Yet paradoxes meet us at every turn. One of the most striking is the relative infrequency of the open window in larger houses and in halls of learning and other places where men and women congregate and—in institutions for the treatment of disease. My conviction is complete as to the view expressed by me many years ago that in the adaptation of aerotherapy to the prevention and treatment of disease, there exists the potential of successes comparable with those obtaining in surgery through the practice of aseptic methods. The principle of aerotherapy is the foundation of child welfare.

One of the difficulties we were up against in the early days was the mistaken view that consumption, as it was then called, was a disease of climate. Our forebears looked on consumption largely as one of the scourges of our climate. With little inquiry as to its frequency elsewhere, it was assumed to be dependent on the uncongenial elements, the grey sky, the east wind, and the haar from the Forth. The opinion was voiced by the man in the street, by our writers, and by our poets. It was expressed with painful bluntness by a distinguished citizen of Edinburgh, to whom I went in the hope of enlisting his powerful backing at the commencement of the committee's work. "I'll gladly," he said, "contribute all I can to send every poor consumptive soul away from Edinburgh, but you'll never convince me you can do any good to them here."
We are happily removed from those days in thought and practice. There is now general recognition of the fact that, as tuberculosis occurs everywhere, in like manner it may be cured anywhere.

**Vaccine-Therapy.**

Assuming that the larger physiological requirements have been met, can we direct treatment more intimately? Can we attack the tubercle bacillus within the system more directly? Is there a specific treatment?

This brings us to the possibilities of vaccine therapy and chemotherapy.

Vaccine therapy is represented by the numerous attempts to meet the disease by the use of products of the life-history of the bacillus as a means of cure. Many such products have been elaborated. Entire tubercle bacilli variously treated have been used, or the bacilli finely ground and emulsified. Extracts have been made from bacilli themselves and from the culture media in which bacilli have been grown. Such preparations constitute the considerable group of tuberculins available for treatment.

What as to the purpose and value of tuberculin therapy? Its aim is to stimulate the natural protective mechanism in the hope of attaining some degree of immunity. It seeks to activate the phagocyte and the parasitotropic elements of the blood. In this way local and systemic effects are induced, which are severally contributory to the therapeutic result.

So far it has been found impossible certainly to immunise an animal against tuberculosis, and no less difficult to secure permanent arrest of disease in a tuberculised animal. None the less there is evidence, both from the experimental and from the clinical side, that tuberculin therapy is efficacious. I am satisfied, as the result of continued observation since it was introduced, that tuberculin is of specific value. Some points relating to its use still require to be made clear. But the amount of evidence accumulated during these years leaves me in no doubt as to the favourable verdict.

**Chemotherapy.**

The remarkable success attained in the treatment of infections by means of organic arsenic compounds makes one hopefully anticipate similar developments from chemotherapy in the treatment of tuberculosis.
The aim of chemotherapy is the discovery of chemical substances possessed of parasitotropic properties, that is, capable of disturbing or destroying the invading parasite. The difficulty in the past has been that, for the most part, parasitotropic substances are also organotropic, that is, inimical to the living cells of the invaded body. The method of chemotherapy is illustrated by the use of arsenic in various diseases due to parasitic invasion, such as syphilis, trypanosomiasis, relapsing fever, and malaria.

There is no doubt that even in simple form arsenic is a drug of value in the treatment of the earliest manifestations of tuberculosis. When treatment by arsenic—whether orally or subcutaneously—is undertaken at the stage of multiple infiltration of lymphatic glands and maintained continuously for a prolonged period, remarkable results are sometimes obtained.

There is ground for believing that from the further development of chemotherapeutic experiment we are likely to obtain results in the treatment of tuberculosis comparable with our success in syphilis. There are many common features in the history of the two diseases from the point of inoculation through the lymphatic stage to the final visceral stage. It cannot be too much emphasised, however, that if tuberculosis is to be cured, treatment must be undertaken at the earliest possible moment. Following the analogy of syphilitic infection, it is relatively easy to effect a cure, provided treatment on proper lines be adopted at the stage of primary lesion or early secondary manifestations. It is another matter when gross organic disturbance has ensued, or extensive histological changes have been produced.

**Prevention.**

The cure of tuberculosis is closely linked with its prevention. This means the anticipative application throughout the community of the physiological principles and methods which make for the recovery of the individual.

Before the discovery of the bacillus, much had been done—more or less unconsciously—towards prevention. Legislative measures during half a century with regard to housing, factories, workshops, and other Public Health enactments all tended in the right direction. Along with, and constituting an important element in, the fall of the general death-rate, the death-rates from tuberculous disease showed a gradual and persistent drop.
But the discovery of the tubercle bacillus put us in possession of the key to the enigma. Henceforth, prevention rested on the sure premises that in tuberculosis we have to do with an infecting agent whose activity is governed by definite principles, and that it is possible to get rid both of the infecting agent and of the favouring conditions. It became clear that the principles which had proved efficacious in relation to other infective processes are applicable to tuberculosis. It was equally evident that by reason of the extraordinarily varying characters of tuberculosis, the application of these principles must be adapted and enlarged.

It was such considerations that led to the evolution of what is generally known as the Edinburgh Scheme. The first step was the recognition that there was a problem which had to be tackled and solved. Existing methods of handling tuberculosis, whether in private, or in hospital, or at out-patient departments, had largely to be scrapped, and a new order of things instituted. We had to get at facts. The infection had to be tracked in the household and in the community.

Notification was required. But valuable as notification might prove, it was clear that it would serve little effective purpose without the provision of facilities for the discovery, collection, and handling of patients on large scientific lines. Thus was realised the need for the creation of a well-equipped centre towards which persons possibly suffering from tuberculosis might be directed, and to which all inquiries regarding tuberculosis might be referred, a centre that would afford guidance to all sorts and conditions, giving immediate treatment in some cases, either on the spot or at the patient's home, and arranging for the transference of the varying types of patients to appropriate institutions and securing continuous supervision of the patient until the manifold risks of the long-drawn process had been sufficiently met. In this way was established (1887) the Tuberculosis Dispensary as the centre of antituberculosis operations for the community.

To be really effective, the Tuberculosis Dispensary had to be in close relationship with a variety of institutions, adapted to meet the needs of varying types of disease—the Sanatorium for early cases, the Farm Colony for more prolonged care and training, the Open-Air School, the Hospital for Advanced Cases, the After-Care Committee, and so on. These have successively developed.

The purpose of the Tuberculosis Dispensary was still larger.
In place of merely waiting to receive patients and directing their treatment, its officers went outside and sought to raid the haunts of the bacillus. In this way infected homes and households became the subject of exact examination and sympathetic consideration. The existence of tuberculous nests was determined, and infection spreading through households was detected at the earliest possible stage. Faulty environment in every aspect was investigated.

These and other procedures came as a natural evolution along with the widening of the rich and fascinating field of inquiry. The housing question assumed larger proportions. The site and structure of the house came under review, accommodation in relation to the number of inmates, amount of air and sunlight, sufficiency and suitability of food supplies and, generally, the degree of understanding in household management. In these and other ways much has been done towards a hygienic re-creation of the home.

The researches of numerous workers have accentuated the part played by milk in the production of tuberculosis and the urgent need there is for the adoption of uniform measures throughout the country to ensure a pure supply.

**Relation to the War.**

There is not time to dwell on the general adoption of co-ordinated antituberculosis measures. So far as the United Kingdom is concerned, the methods became stereotyped in the Report of the Departmental Committee on Tuberculosis. That Committee recommended the creation of a network of such antituberculosis schemes throughout the country.

The programme was beginning to be carried out. The several elements in the scheme were being forged according to the varying needs of different parts of the country. A special tuberculosis staff was in course of selection. Everything pointed to the establishment of uniform antituberculosis activity—when the war intervened.

Since July 1914 the movement has been largely held up. Schemes which were getting under way throughout the country have been crippled or stopped. Men chosen for the tuberculosis service have been hurried away to war service. Sanatoriums and hospitals erected for tuberculosis have been given up to wounded and sick soldiers. Buildings of all kinds in course of erection have been held up or diverted to other purposes.
The stern events of the war have, however, only thrown into sharper relief the urgent need for a wisely directed, comprehensive campaign against tuberculosis. With the continuance of the war there has been traceable in some parts of the country an increase in the death-rate from tuberculosis. Without discussing particular causes, the fact is significant. We are still up against an aggressive infection with immense ramifications, whose ravages can only be checked and overcome by unremitting effort along assured lines.

One encouraging fact has emerged during the war, namely, that the British Forces have suffered less than those of other Continental Powers. Dr. Hermann Biggs of New York, whose authority is acknowledged, has stated emphatically that France has suffered from the war in this respect infinitely more than Britain. He associates the result with the fact that in Britain the tuberculosis problem had been efficiently met before the war, while in France, on the other hand, practically nothing had been done.

The view is reassuring. But let us not plume ourselves overmuch. We must try to estimate the bearings of tuberculosis as occurring in the British war services. Officers and men discharged because of tuberculosis return to civil life and the State assures certain responsibilities towards them. With this in mind fullest use should be made of expert guidance available within the Services and outside, in respect of the examination of men before admission to the Services and in respect of the discharge of tuberculous men and their subsequent treatment and care. Men have been admitted to the Services who should not have been passed. Probably some have been excluded unduly. Men have not been discharged who had better have been and some discharged men might have been retained. After discharge the subjects of tuberculosis have too often drifted for lack of direction. This might in large part be obviated and the disturbing influence of the war be correspondingly limited.

**Training in Tuberculosis.**

A few words from the educational point of view. One of the outcomes of antituberculosis effort on the part of the State has been the establishment throughout the country of a tuberculosis service. Within the service are included tuberculosis officers of various grades, a large number of general practitioners, and also tuberculosis nurses and health visitors. It is manifestly
important that all persons engaged in the work, more particularly practitioners and medical students, should be afforded opportunities for training.

The need for it is prettily illustrated in the remark of a London tuberculosis expert, with whom I recently happened to raise the point. To my question as to how much he had learned of tuberculosis during his medical curriculum at one of the English universities he replied, “Of tuberculosis, just as much as I did of shipbuilding.”

One of the findings of the Departmental Committee was “that additional facilities should be afforded to medical students and practitioners to acquire familiarity with the methods of diagnosis of tuberculosis, more especially in its earlier manifestations, and with the methods of treatment.”

It was one of the original aims of the Royal Victoria Hospital “to promote the advancement of medical and surgical science with reference to consumption and allied diseases.” Classes on tuberculosis have been conducted by members of its Staff for many years. When the Tuberculosis Trust came into being, the purpose was maintained. There was included among the objects of the Trust “the promotion of the scientific study of tuberculosis and allied diseases by founding and equipping or assisting to found and equip a Chair or Lectureship or Chairs or Lectureships in one or more of the Universities of Scotland, or by otherwise providing facilities for the study of these subjects.”

In offering to the University of Edinburgh some £18,000 for the establishment of a Chair of Tuberculosis, the Committee of the Trust were, therefore, carrying out one of the purposes for which they existed. By the institution of the Chair they were ensuring, as far as they could, that the medical care and treatment of persons suffering from tuberculosis would be undertaken by men and women who had enjoyed special opportunities of becoming familiar with its protean features, its causes, treatment and prevention—men and women quick to recognise its earliest manifestations and keen to track the disease to its source.

By the Agreement concluded between the Hospital Committee and the Corporation of Edinburgh at the time of the amalgamation of the various institutions engaged in the prevention and treatment of tuberculosis in the city, a special clause was introduced providing that the Corporation should, in the event of the University of Edinburgh establishing a Chair in relation to tuberculosis, give all reasonable facilities for the purpose of the teaching of such chair in
connection with the tuberculosis work carried on in the Hospital, Dispensary, and Farm Colony, and for the purposes of research. This action on the part of the Town Council adds another to the numerous links which happily unite the Municipality and the University. It should prove of value to the community no less than to the University.

On many grounds it is desirable that the Chair should be in closest touch with the practical activities undertaken in relation to the care and eradication of tuberculosis. This is in line with the hope expressed by you, Mr. Principal, in your first Address to the graduates within this hall when, speaking more generally, you looked in the future work of the University for more direct relation to industrial requirements and economic problems. Our expectation is keen that, by intensive study and investigation in one department of medicine, greater results than anything accomplished in the past may follow in the common interest.

That outlook of the Chair was also in the mind of the late Principal. It is a vivid recollection of the year before the war how, on visiting the recently opened Tuberculosis Dispensary, Sir William Turner asked the question, “And what is to be the relationship of these various institutions with your Alma Mater?” The answer to the question lies in the foundation of the Chair, the proposal for which he warmly encouraged.

If the cynic raise the query, Why establish a chair for the study of a disease which it is proposed to exterminate, the members of the Trust, forestalling such realisation, have arranged that the scope of the chair should be defined in the Provisional Order sanctioning their procedure, so as to make it possible, when desirable, to include allied or other diseases within the activities of the department.

Research.

Before that time comes, however, there is a good long way to go. The natural history of tuberculosis calls for elucidation in many directions. With our hands on the key to the riddle of the ages, we are but feeling our way to its use.

We have discovered that the tubercle bacillus itself is not a fixed quantity. It varies under different conditions. It varies as it occurs in mammals, birds, and fishes. In mammals, in turn, it varies as it occurs in man and in cattle. We have got into the easy habit of speaking of a human and a bovine type. Yet an increasing body of evidence goes to show that the so-called bovine
type occurs frequently in man. The descriptive names are thus not quite apposite.

More than that. Numerous observations point to the variability of character in the human subject. Intermediate forms have been described with increasing frequency. What is the relation of those to the so-called types?

Biological variation is linked with varying degrees of virulence. The variations of tuberculosis expressed in terms of virulence afford a large field for research. Why the galloping pace in one subject? Why the snail-like creep in another? If tuberculosis is seldom transmitted directly from parent to child, what part does inheritance play in lessening or increasing resistance to infection? Is the tuberculosis of the adult the continuance or re-awakening of tuberculous infection acquired in childhood. Do re-infections occur? Granted that tuberculosis is almost universal and for the most part acquired in childhood, how comes it that the so-called bovine type of bacillus, frequently seen in children, is so seldom found in adults?

These are samples of numerous problems which await solution. Thorough investigation of the complex issues will need time and patience. There is much to occupy the attention of workers in the department for many a year.

AN OBJECT-LESSON IN MEDICINE.

Meanwhile the study of tuberculosis is well calculated to make a man think regarding the meaning and course of all disease. In the variability of its expression, in the methods of diagnosis and prognosis, and in the far-reaching questions of prevention and treatment, tuberculosis affords a fine object-lesson in medicine. Its teaching is not limited to tuberculosis. It is luminous with principles which give just proportion to the facts of disease and inspire fresh effort towards the realisation of the ideals of health.