alarming stimulus during a period of one to two days it usually flares up in a particularly severe form upon discontinuation of the stress—e.g., cold, muscular exercise. Indeed, sometimes the arthritis developed after a latency period even if the stress was continued. Such observations raise the question whether it will be possible to combat clinical "diseases of adaptation" indefinitely by continued A.C.T.H. or cortisone therapy.

Summary and Conclusions

A technique has been developed which permits the production of an acute arthritis and periarthritis by the local injection of formaldehyde into the vicinity of joints. If large doses of formaldehyde are administered the acute stage is followed by a very prolonged chronic arthritis and periarthritis, characterized by moderate oedema and very pronounced connective-tissue proliferation, with stiffening of the joint and hyperaemia of the surrounding skin. The resulting chronic granuloma is self-maintaining, as it continues to proliferate for weeks after the administration of the local irritant.

This "formalin-arthritis" is slightly aggravated by pretreatment with desoxycortone or crude anterior-pituitary preparations; on the other hand it can be almost completely inhibited by cortisone or A.C.T.H. Thus there seems to exist an antagonistic relationship between D.C.A. or crude anterior-pituitary preparations on the one hand and cortisone or purified A.C.T.H. on the other.

The possible role of such an antagonism is discussed in connexion with the concept of "crossed resistance" and of the "diseases of adaptation."

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TUBERCULOSIS IN EUROPE DURING AND AFTER THE SECOND WORLD WAR

BY

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THE TUBERCULOSIS SERVICES*

Before describing the reorganization of the tuberculosis services in the different European countries it may be helpful to say something of the conditions Unrra found in some of these countries at the end of the war. A preliminary stage of the Unrra programme was to study these conditions at close quarters, assess the damage, and make proposals for a programme of relief and rehabilitation on the basis of this assessment. Travelling throughout the countries as we did, discussing problems with people of all kinds, we were in a position often to get an exceptional overall view of the situation, and were in fact able to report back to the central authorities much that was unknown to them. It is only by remembering what these conditions were that we can appreciate what has been achieved since then.

It is difficult in this country to realize the extent of the disruption and destruction in some of the countries. Of those we saw, none had suffered more than Poland. The occupation had been brutal against a continuous opposition—the avowed German policy had been one of systematic reduction of the Poles to the status of a slave people, and a part of this policy had been the killing of professional and skilled workers. Some six million people of the total population of 33 millions had been killed in concentration camps, at their work, in their homes, or elsewhere. All higher education was stopped. The city of Warsaw was systematically destroyed till less than 10% of buildings were left standing, and other cities were similarly destroyed. The tragic war years were reflected in all we saw: when we went in we found towns that had throughout their area the look of some patches we know around St. Paul's or in the East End. Vast areas of farmland had been laid waste. People were living in cellars, dug-outs, in shells of buildings—one, two, or three families together in a room. Nearly all had lost relations in concentration camps or had spent years in camps themselves; there were half a million orphans; thousands of people were migrating from one area to another; thousands were returning from other countries. In the midst of all this the Polish people were attempting to rebuild—to provide homes, food, and services.

Dr. Gould, who visited Yugoslavia for Unrra, tells a similar story. In his words: "All the factors which tend to increase the incidence and mortality of tuberculosis became particularly acute during the war years. Entire villages had been burned after being plundered of food, clothing, livestock, and valuables. Men and women had been deported as slave labourers. With the combination of enemy action and civil strife the public health service was completely disorganized. Trained tuberculosis doctors and nurses were dispersed and lost."

Dr. McDougall reported from Greece: "In spring, 1945, when Unrra was invited to make a survey of tuberculosis requirements in Greece, after four years of German, Italian, and Bulgarian occupation and a month or more of civil

*The second Milroy Lecture (abridged) delivered at the Royal College of Physicians on February 17. The first lecture appeared last week.

war, it was clear that public health organization was completely out of hand. . . . During the occupation malnutrition had assumed epidemic proportions; anaemia and emaciation were the common lot of the majority of the population." But later he observes that after the war the great problem was not shortage of food but its cost, resulting from the lack of control of prices, black-marketeering, and the sale of imported food supplies by the Government at exorbitant rates.

It is against this background of countries physically and sometimes morally maimed that one must consider the tuberculosis services in the post-war period. The increase in mortality and the high incidence revealed by *x*-ray surveys set the first priority—the finding of hospital beds for the tuberculous sick.

Hospitals and Sanatoria

In Poland during the war all sanatoria had been occupied by the Germans. When they left they took instruments and equipment; buildings were left in a sorry condition. Even before the war there were only 8,300 beds for the tuberculous, representing about one bed per six deaths from tuberculosis. At the end of the war only 800 beds were available; but by May, 1946, there were already some 5,000 beds occupied. Buildings had been restored and supplied with Unrra beds, bedding, and equipment: this represented not only the large contributions by Unrra, but an effective and honest distribution by the Poles themselves, despite the occasional chaos in administration because experienced people were so few. By the end of 1947 there were over 11,500 beds for tuberculosis in sanatoria and hospitals; now they have 17,000—i.e., twice as many as before the war, and for a smaller population.

A major problem was the financing of hospital and sanatorium treatment. Before the war it was paid for by the Social Insurance Organization, the Red Cross, the local authorities, or the individual patient. Those dependent on their local authorities were the least likely to get treatment for an adequate time, if at all. Some of the best sanatoria were owned, directed, and staffed by the Social Insurance Organization. After the war this situation was unchanged, and there was in fact little co-ordination between insurance, private, and public sanatoria. The money provided from public funds was so meagre that, though there were too few beds for the tuberculous, some were empty because there were no funds to pay for patients in them. However, the State contributions to sanatorium treatment have increased considerably each year, and that problem has been resolved. Moreover, since the beginning of this year the split in the services between the Social Insurance Organization and the Ministry of Health no longer exists; the hospitals are now directed by the Ministry of Health, while the Social Insurance Organization has the function of financing the treatment of insured persons.

The conflict between social insurance organizations and the central health services was one we saw reproduced, with much more startling anomalies, in other countries, particularly in Italy. There before the war the National Insurance Organization (I.N.P.S.) had built what were the finest sanatoria in the country. There were few reputable sanatoria belonging to any other organization. Few of the sanatoria were damaged during the war, and in fact in 1945 the situation was very much as before, though some hundreds of beds were still controlled by the military authorities. Insured patients could be admitted to sanatoria of the I.N.P.S. as soon as diagnosed, regardless of their condition, whereas for the very large numbers of non-insured patients (some 60% of the population) there was in many areas little hope of getting hospital treatment at all. Beds in I.N.P.S. sanatoria could be rented by the local authorities, but only when these could pay. In one typical poor district visited no taxes were being paid, and for lack of funds the local authorities with a waiting-list of 240 patients had not been able to send a single patient to hospital for four months, while the Insurance Sanatorium, on the outskirts of the town, had 70 empty beds.

Another outstanding problem in countries where there was a shortage of hospitals was the type of accommodation required for the tuberculous. One striking feature of the sanatoria in Italy apart from their excellent equipment was their size. The Forlanini Institute had 2,000 beds. Another sanatorium, completed in 1939 at Sondalo, in the Italian Alps, was designed to accommodate 3,000 patients. Described as a sanatorium village, it consisted of nine large buildings grouped closely together on the side of a steep mountain. Though the medical treatment in some of the large sanatoria was of a high quality, the dangers inherent in their size were not averted; the lack of a personal element in supervising the welfare of patients was obvious.

In most other countries it has been interesting to observe a definite swing away from the conception of sanatoria as large luxurious establishments up in the mountains. In Holland, where three sanatoria were destroyed in the course of the fighting, it was decided to erect wooden hutment buildings in connexion with existing institutions. It was planned to do this on an extensive scale, and, though the scheme was held up by shortage of material and fittings, several temporary sanatoria were set up, yielding a total of over 1,100 new beds for the tuberculous. In Hungary before the war there were some 6,500 tuberculosis beds; in the spring of 1945 only about 500 beds were available. By 1948 many of the hospitals had been restored, and over 5,000 beds were in use for tuberculous patients. But at least another 8,000 are required, and the present plans are to set up hutment buildings of the Swedish type around existing hospitals, providing treatment, nursing, and food from the central building. Later on the huts not needed might serve for recreation and workshops. In Poland the Swedish Red Cross set up not far from Warsaw a whole children's sanatorium made of excellent hutment wards, with well-equipped and cheerful interiors. In Greece, where there was a dire overall shortage of accommodation, Dr. McDougall elaborated a programme for the supply of prefabricated buildings which would accommodate an additional 5,000 beds and 30 polyclinics; the scheme received enthusiastic support from the Ministry of Health under one Government, but there were many interests involved, and under another Government the scheme was dropped.

In several countries, in addition to erection of these pavilions, other buildings were being taken over, such as country villas, hotels, castles, and spa buildings, and were being converted for use as small tuberculosis hospitals. It is mainly by such means that in Yugoslavia, for instance, the number of tuberculosis beds has been increased from the pre-war figure of 3,250 to 10,300 in 1949. Some countries have decided that 5–10% of the beds in general hospitals in the towns must be assigned, at least provisionally, to the care of tuberculous patients; given adequate precautions against contagion, this is a measure which might well be given serious consideration in our own country (Boland, 1948).

Related to standards in England, the level of hospital care in some of these countries, and particularly in some areas, was low. Special post-war conditions aggravated the situation. It was not rare to find hospitals where

patients had to bring their own linen if they were to have any, and no drugs were provided; frantic relatives would spend much time trying to buy such drugs as calcium gluconate on the black market, to say nothing of penicillin and, later, streptomycin. To speak of these conditions is not to imply that our own services are faultless. Though the general standard of institutional care for the tuberculous here is high, even we are not without so-called sanatoria which have no diagnostic equipment, no facilities for active treatment, and no staff qualified to apply it if they had it, and whose patients are sent many miles away on the rare occasions when an *x*-ray film is thought necessary.

With the realization of the problems there was a growing feeling in several countries that the available beds were not being properly utilized, and a part of the plans for the future was to have centres to which patients would be admitted for primary observation and decision regarding the hospital to which they should go. Even more was it being realized that most of the local authorities who before the war had complete responsibility for providing tuberculosis services were far too small to perform such a function. We have seen this in England, and the regionalization of the hospital services is the natural outcome. This is happening in many countries. In Italy the provinces have been grouped into larger regions. In Czechoslovakia and Yugoslavia, too, there has been a regrouping in large regions to ensure a more equitable distribution of beds. In France also, where new legislation has brought radical changes in the tuberculosis services, these are now established on a regional basis, each region including several *départements*. The aim, as in England, is that each region shall provide a complete hospital service. The new Act stipulates that the hospital in the principal town of each *département* shall include a tuberculosis centre, with beds; where the town has a medical school the hospital unit becomes the regional tuberculosis centre.

The assumption by the State of much greater financial responsibility in provision of treatment for the tuberculous is an outstanding feature in the post-war services. The wartime increase in tuberculosis, in the absence of undue increase in other diseases except venereal disease, gave rise to the conception of this public health problem as a national emergency. The financing of sanatoria received radical reform. Before the war one of the causes of delay in sanatorium admission in France was the multiplicity of organizations, which made quite involved the problem of finding out before a patient went into sanatorium who would pay for him. Now if a bed is available the patient is admitted immediately; the payment of sanatorium expenses is incumbent on the *département* where the patient lives, unless eventually defrayed by a public or private body. All tuberculosis institutions qualify for a State subsidy, amounting to as much as 75% for building and equipment expenses. In many other European countries, including our own, the cost of institutional treatment is now entirely borne by the State.

Similarly, financial assistance to the tuberculous and their families, as a national scheme, was introduced in England in the middle of the war. As a basic principle it was recognized that the tuberculous patient must be relieved of economic anxiety, so that he might accept treatment for as long as is necessary, and so that his family might be protected. The measures introduced brought partial alleviation; but the scales were at a minimum subsistence level, and only certain patients qualified. Now since July 5, 1948, financial aid to tuberculous patients is covered by the National Assistance Board. In France since the liberation there has been increasingly generous social legislation, and part of it is directed to the new tuberculosis service. Previously patients received social insurance benefits for six months only. The new legislation grants the benefits of "prolonged illness" to insured tuberculous patients and to members of their families should they become tuberculous; during three years the patient gets all treatment expenses and half his salary. In Poland, Bulgaria, and Czechoslovakia similar new schemes of financial aid to the tuberculous have been introduced.

One concept, that of the so-called preventorium, which is practically unknown here, is prevalent in many European countries; the preventoria constitute sometimes more than 25% of the institutional tuberculosis accommodation. To these places are sent small children from tuberculous families, particularly when there is at home an infective patient who cannot or will not go to a sanatorium; for one or more years the children are kept away from the source of contagion, and then return at the end of their stay in the preventorium. Some were well organized; others we saw were barracks with children looking less healthy than those seen on the city streets. The problem is a thorny one. Certainly accommodation should be available for isolating children from households with an infective patient who cannot go away. However, one would like to be certain that every effort has been made to remove the infective case, since the preventorium is a second-best solution, returning the child to the infective household sooner or later, and leaving exposed the even more susceptible adolescents.

Dispensaries

The dispensary service is the basic diagnostic unit in European countries as it is here. But whereas here dispensaries have functioned for many years under the local authority, there they were directed before the war by a number of different organizations. In France, for instance, the 920 dispensaries had been created in the past 20 years mostly by local initiative, many by private organizations and Red Cross committees; there was no connexion with official centres; there was overlap in some areas, no service in others; financial arrangements and follow-up were extremely involved. The 1945 legislation makes the organization similar to what we have here; in each *département* now a list of dispensaries has been drawn up, and to each is ascribed a definite sector so that the districts concerned cover the whole *département*. A tuberculosis specialist is appointed to supervise all tuberculosis work in the *département*, and with him a specialized social worker. Each region has now a tuberculosis consultant with high qualifications. Another new feature is that many sanatorium medical officers attend at local dispensaries.

In Greece, too, the multiplicity of voluntary organizations was responsible for many gaps in the service. In whole large areas such as Epirus, with a population of over 300,000, there was not a single dispensary or institution for the diagnosis or treatment of tuberculosis. In Poland there was a basic organization, centred on the regions with their populations of about 1½ millions each, and numerous dispensaries in the districts, to a total of over 500 before the war. But here again, in the cities at least, there was a division between the local authority dispensaries and those belonging to the Social Insurance Organization, with little co-ordination between the two. The recent transfer of responsibility to the Ministry of Health is resolving a part of the problem, but the development of dispensary services is proceeding relatively slowly. The quality of the work in the hundreds of small country dispensaries varies

greatly; most of them are staffed by local practitioners who give one or two sessions a week and have no particular experience of tuberculosis. In Yugoslavia before the war there were some 50 dispensaries only, most of them poorly equipped; now there are 136, each of them with an *x*-ray unit and staffed by doctors who, while they have many other duties, have had at least three months of special training in tuberculosis work.

In Sweden the dispensaries were previously organized and financed by the National League Against Tuberculosis; now the expenses are chiefly defrayed by the State. In Belgium some dispensaries belong to the Œuvre Nationale Belge, some to other organizations; the Ministry of Health now covers 80% of dispensary expenses, compared with 50% pre-war. Denmark has a highly co-ordinated service with 85 dispensaries, of which 81 belong to the State. Every county, with about 150,000 population, has its own independent service, with tuberculosis hospital and dispensary working closely together; the specialist in charge of the hospital also serves the dispensaries in the neighbourhood. Great importance is attached to bacteriological examination, and in fact it is highly centralized, all cultures being done at the State Serum Institution in Copenhagen.

Staff

To the many problems of the tuberculosis services is added that of a lack of qualified personnel. Italy is the only country in which it is claimed that there is an excessive number of doctors, though even there adequate medical services are not readily available to large sections of the population. On the other hand, in Poland, where already before the war there were only 13,000 doctors for a population of 32 millions, the problem has become acute. In 1945 there were under 7,000, and in January this year 8,400—for a population of 24 millions. Moreover, they are concentrated in the towns, and there are rural areas with only one doctor serving 10,000 to 15,000 people. University medical courses were stopped throughout the war, and so, although the medical schools are now more than full and there are two new schools, there is little hope of the need being met before 1954 or 1955. There is a particular dearth of doctors with tuberculosis experience. Two-month postgraduate courses in tuberculosis are being held in all medical schools, but it is not easy to get doctors to attend these, as all are so busy. In Yugoslavia, also, the lack of doctors was a main obstacle to the programme; in 1945 there were only 25 tuberculosis specialists left of a pre-war total of 77. There, too, intensive three-month courses are being held for general practitioners, and three-year courses for the training of specialists. In France under the recent laws there is now provision for selection, by competitive examination, of physicians joining the dispensary service. Many more than before the war are engaged full-time. Physicians appointed to sanatorium posts are also now required to hold certain higher professional qualifications.

A nursing shortage is obvious in many countries, but nowhere has it had so severe an impact on the services as in this country. In Mediterranean countries nursing as we understand it does not exist in many places, and the work is done by nursing aids with little training. In many other countries there is a severe dearth of trained nurses, which was obvious before the war and has been made worse by the loss of so many during the occupation. Though many new training schools are being set up, the needs will not be met for many a year. However, it has been instructive to see how in some countries good nursing care is given in certain hospitals with a very small number of trained nurses and a sufficiently large number of domestic aids to carry out all duties except those requiring nursing skill. In our own country the number of nurses available would not rank elsewhere as a shortage, but thousands of beds are empty for "lack of staff," and the common waiting period for admission to sanatorium is six to nine months. This problem is so grave as to constitute by far the greatest obstacle to progress in our tuberculosis services to-day. In the present acute situation, at least a partial solution might be found in a revision of traditional ideas concerning division of labour between nursing and domestic staff (the revision could include a "job-analysis" on tuberculosis wards), followed by an imaginative effort to secure staff for hospital duties which do not require skilled training in nursing.

Rehabilitation

Rehabilitation services in Europe are for the most part rudimentary or non-existent. Countries are taking a great interest in rehabilitation projects, but economic circumstances are such that these schemes must take second place. One scheme is particularly worthy of mention, and deserves to be reproduced here—that of the tuberculosis service for students in France. It is a complete diagnostic, treatment, and rehabilitation service. The focus of the service is the Sanatorium des Etudiants in the French Alps above Grenoble. University students, young graduates, and doctors are accepted as patients; many of them have been diagnosed on routine examination at university. The State pays part or the whole of the cost of treatment, according to the patient's ability to pay. A basic aim is to maintain morale and so hasten recovery. The sanatorium employs a director of studies, who takes details of the level of studies of each patient who arrives, and together with the medical adviser decides how much and what type of work the student can do each day. According to the stage of illness, a student may be encouraged to do individual reading in bed, or take part in study circles, or attend lectures given in the sanatorium by visiting professors, or finally attend lectures on one to three days a week at the University of Grenoble. Lectures are relayed to the bedside for those who cannot get up. Each patient, in fact, gets individual attention as a student who happens to be ill: that is the constant approach. There is none of the mental paralysis one finds often elsewhere: the social and intellectual life of the sanatorium is remarkably lively—there are concerts, plays, and discussion circles, and the students even produce four times a year a good literary journal called *Existences*. The sanatorium is now only one of several institutions: one in Paris takes in students waiting for a bed, and other post-treatment hostels in Grenoble and Paris serve the needs of students between their leaving the sanatorium and their full recovery. In Paris there is in addition a "medico-social" restaurant, where special meals are served for students who have a medical recommendation from the dispensary set up by a Relief Committee. Belgium, Switzerland, Holland, and Poland also each have a special sanatorium for university students.

Routine Examinations

In several countries schemes for regular medical examination of university students have been introduced or extended since the end of the war, and we are falling far behind in this respect. In France yearly medical examinations of university students was introduced by a decree in April, 1946. *X*-ray examination has also been made compulsory for all teaching staffs—a measure entirely justified by the reports of minor tuberculosis epidemics discovered in school classes.

The examination of students is only a part of the work aiming at early diagnosis by routine examination which has been considerably extended since the advent of mass miniature radiography. This method has proved its value in the detection of undiagnosed lesions in large population groups, and there is no doubt now that it has an important place in tuberculosis eradication. Reports from services where annual examinations have been made have shown a falling incidence at successive annual re-examinations of a community, the fall being almost certainly due to the discovery of the early lesion with good prognosis, and the reduction of the infector pool. In England it has been developed as a national scheme, operated by as yet a limited number of local authorities; teams are trained centrally, and the technical level of work is relatively high. On the Continent it has been taken up by different organizations, and on an extensive scale in all countries I think except France; in fact, it has been adopted with almost embarrassing enthusiasm as in the first line of tuberculosis control. In countries which still have a very high prevalence of tuberculosis, and whose material resources are limited, mass radiography can for the time have only a small part in tuberculosis control; its role there can be to make spot surveys and so determine which population groups require prior attention in the tuberculosis programme. There is a danger at the moment in some countries that its excessive use in areas without adequate services may mean that other more fundamental work in tuberculosis control is being neglected.

B.C.G.

Another method of control that has been used widely since the end of the war is that of immunization against tuberculosis by B.C.G. vaccine. It was already being extensively used in Scandinavian countries. At the end of the war teams of the Danish Red Cross undertook B.C.G. vaccination in Poland, Hungary, and Germany. In 1947 it was decided by the newly formed Unicef (United Nations International Children's Emergency Fund) that, in addition to programmes of feeding and re-establishment of children's institutions and services, Unicef should continue and extend to several other countries the work started by the Danish Red Cross. This scheme is now in operation. Unicef furnishes supplies and equipment; Scandinavian teams do the initial field work; the Ministry of Health in each country furnishes local teams which will eventually take over the work; the World Health Organization assists with its advisory staff and will carry out a statistical analysis of the results. Finland, Poland, Czechoslovakia, Yugoslavia, Hungary, and Greece are taking part. By June 1, 1949, about six million tuberculin-negative children had been vaccinated. B.C.G. vaccination is being adopted with enthusiasm in these countries. One must hope that the development of basic measures of tuberculosis control will not be thereby neglected, for, even if the vaccine is as effective as its most ardent supporters claim, the basic tuberculosis services will still be required for many years to come.

International Services

The services described above have been those concerned specifically with tuberculosis. No doubt the measures taken to re-establish or improve the services are contributing to the post-war decline in tuberculosis mortality. But much of the decline, which in some countries started before the end of the war, and in nearly all countries has occurred since the war, may be attributed to the national and international services designed on a generous scale to protect the health of the peoples. In this respect it can be said that the work of Unrra in relief and rehabilitation and in the restoration of normal living was an important contribution to reduction of the tuberculosis rate.

Looking back on the work of Unrra in that post-war period, there is no doubt that it was a major achievement in international work. With all its faults, the organization carried out the task given to it by the United Nations—the task of relieving the most distressed areas in the war-ravaged countries, and of providing supplies to assist those countries to return to at least their pre-war standard of living. Because of it the dangers of famine and epidemics in the chaotic post-war period were averted, and with them the danger of another grave increase of tuberculosis.

Unrra, having provided immediate relief and the material for future reconstruction, was followed by other organizations operating under the United Nations; one of these is the World Health Organization. Established officially in 1948, WHO confirmed the decision of the Interim Committee, which had preceded it, regarding the priorities to be given to different diseases in the work of the organization. It was agreed without question that malaria, tuberculosis, and venereal diseases were the three main scourges demanding prior and special attention. An Expert Commitee on Tuberculosis was formed, and held its first meeting in July, 1947. Among its recommendations to WHO were the following:

1. That travelling fellowships be awarded to countries most in need.

2. That the Tuberculosis Section prepare from time to time material on recent developments of special importance for the use of physicians in different countries who may request such information. Dr. McDougall, who heads the section, reports that there has been a great demand for data on tuberculosis mortality and morbidity rates, mass radiography, and B.C.G. (Many of the rates given in this paper are taken from the WHO *Epidemiological and Vital Statistics Reports* (1948).)

3. That demonstration teams shall be available, at the request of governments, for countries where new tuberculosis schemes are about to be introduced. In this connexion work has been done in China, Greece, Poland, and India.

4. That WHO should develop and recommend uniform procedures on such matters as the classification of tuberculosis, *x*-ray interpretation and mass radiography, bacteriological diagnosis, and evaluation of new chemotherapeutic agents such as streptomycin.

It is fully acknowledged by those working for WHO in this field that they have a relatively limited part to play in the overall campaign for reduction of tuberculosis prevalence; in their words: "Without progressive improvements in the purely public health field, and above all in the economic status of countries, the best efforts of tuberculosis workers can be of only limited significance" (McDougall, 1948).

Conclusion

Sir Wilson Jameson, in his Harveian Oration to this College in 1942, traced the phases of advance in social medicine, and showed how many of them resulted from the medical necessities of war. Similar great advances were already being made then, but he forecast also a different attitude from that following the first world war, in that there was even then in 1942 "everywhere a conviction that great changes lie ahead of us and a desire so to plan the measures designed to meet the national emergency that some permanent good may be derived from them when the world is once again at peace."

It is true that out of this last war, with all its catastrophes and refined barbarities, people have emerged with a deepened sense of national and international responsibilities: of national responsibilities because we learned in

time of stress to co-ordinate action in defence of the community, and methods dependent on bounty and charity have been replaced in many countries by the conception of the community's duty to protect itself as a whole and each individual who may suffer misfortune. Hence the general measures we have seen of co-ordination of the tuberculosis services, their financing by the State, free treatment, and financial allowances to the sick and their families. The war awakened also a sense of international duty. It had brought together peoples who had lived in ignorance of each other, and, having assumed duties towards them in wartime, the projection into peacetime was natural, so that well before the war ended there were being laid the plans of international relief and co-operation which finally materialized in Unrra and then in the World Health Organization.

The wartime rise and the post-war fall in tuberculosis provide evidence that constitutes an indictment of existing social services when one relates them to what they should be. That tuberculosis is related to social conditions was already known, but the wartime evidence showing precise points of rise and fall is outstanding. With such evidence as this, and with the knowledge of rates obtained in countries such as Denmark, no country with a tuberculosis rate anywhere above the lowest rate yet recorded can afford not to make a continuous attack upon the disease and upon the conditions that favour its development. It has been said that "public health is purchasable, and that within natural limitations any community can determine its own death rate" (Biggs, 1911). Certainly of tuberculosis it is true. The more sore the economic plight of a country, the less it can afford to tolerate a preventable disease which affects the most active members of the community, and it is particularly in such countries that the tuberculosis programme should have a high budget priority.

We have the good fortune to be living through an age of extraordinary achievement. In the 80 years since the discovery of the bacterial sources of disease the advancement of knowledge in medicine alone has raced far ahead of our application of it to human welfare. Wars have arrested and then spurred on our progress. The means for attack on tuberculosis can be clearly seen; if the necessary measures are taken, and given a long enough respite from mutual massacre, there is no reason why this disease which has plagued the continent of Europe for many hundreds of years should not be almost eradicated before this century is out.

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VARIATIONS IN BACTERIOLOGY OF THROAT AND RECTUM OF INFANTS IN TWO MATERNITY UNITS

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This investigation was prompted by the suggestion that gastro-enteritis in infants might be due to bacteria usually regarded as normal inhabitants of the throat or intestine (Cruickshank, 1946). Particular strains or types of these organisms might be concerned; for instance, a serological type of coliform bacillus such as has been isolated from infants with diarrhoea (Bray, 1945; Giles and Sangster, 1948), and strains of *Streptococcus faecalis* which are active producers of tyrosine decarboxylase (Gale, 1944). It was also suggested (G. S. Wilson, 1947; personal communication) that *Staphylococcus pyogenes* might be the cause of some outbreaks of neonatal diarrhoea. The laboratory studies necessary to establish the serological type of coliform bacilli, the tyrosine decarboxylase activity of streptococci, and the phage type of staphylococci require considerable time and experience. In field investigations of an outbreak of neonatal diarrhoea it would be helpful if simple bacteriological methods could be used to give a rapid indication that coliform bacilli, faecal streptococci, or aureus staphylococci were present in cases with greater frequency than in healthy infants. Some observations suggested that this might be the case.

It had been noted in some outbreaks that coliform bacilli were often isolated from throat swabs (J. Taylor, 1947; personal communication) and in others that streptococci

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