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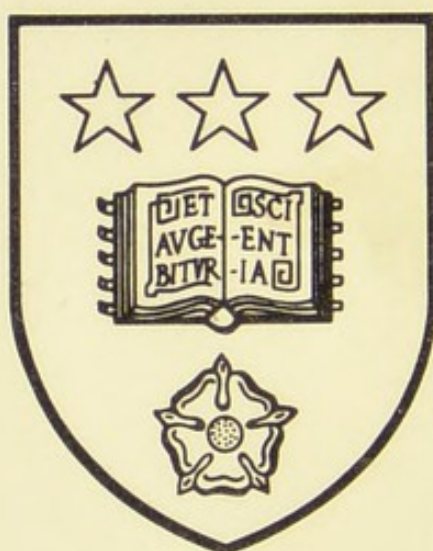
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# MODERN METHODS OF TREATMENT





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MODERN METHODS  
OF TREATMENT

THE  
OPEN-AIR TREATMENT  
OF  
PULMONARY TUBERCULOSIS



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THE

OPEN-AIR TREATMENT  
OF  
PULMONARY  
TUBERCULOSIS

BY

F. W. BURTON-FANNING

M.D. CANTAB.

Physician to the Norfolk and Norwich Hospital  
Honorary Visiting Physician to the  
Kelling Open-Air Sanatorium

"Some think there were few consumptives in the old world, when men lived much upon milk; and that the ancient inhabitants of this island were less troubled with coughs when they went naked and slept in caves and woods, than men now in chambers and feather-beds."—SIR THOMAS BROWNE, "Letter to a Friend."

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## PREFACE.

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THIS manual is intended to serve as a practical guide to the modern method of managing pulmonary tuberculosis. I aim particularly at representing the treatment in its very simplest form. The conditions which are absolutely necessary for the satisfactory adoption of the open-air system are to be found almost everywhere outside our cities, and the treatment need not by any means be confined to special institutions. Only a certain proportion of the victims of pulmonary tuberculosis are able to gain admission to a sanatorium, and even these require the subsequent supervision of their medical man. This book will have served its purpose if the practitioner finds within its pages information as to the carrying out of the treatment wherever it may be expedient. Arguments are adduced in support of the contention that not only are elaborate buildings unnecessary, but that they provide less efficient treatment than more primitive forms of accommodation. I am convinced that the results are more satisfactory when the consumptive patient is placed in a simple shelter than when he is housed within massive walls.

If, as I shall hope to show, fresh air is our most effective remedial agent against consumption, it follows that money should not be expended in providing unnecessary protection for the patient from his very means of restoration. As we proceed, it will be pointed out that expenditure may be directed with greater advantage to helping the consumptive working man after his discharge from the sanatorium than to building elaborate edifices for his treatment. A point that



has been too much lost sight of in the past is particularly emphasised here, that the majority of the inmates of a sanatorium require lifelong care and assistance if their recoveries are to be maintained. Even in the best circumstances a large number of our patients on the completion of their course of treatment are unfitted to resume their places in the struggle for existence. The time and money which have been spent in their restoration may be thrown away unless help is forthcoming to establish them in suitable modes of living.

This account of the treatment of pulmonary tuberculosis is based upon experience gained in my close connection with the Kelling Sanatorium, and in my former connection with the Mundesley Sanatorium. I have also had the opportunity of conducting the treatment during the last ten years in the private houses of many patients, and in more than one general hospital.

I must express my special obligation to Mr. W. J. Fanning and Mr. L. D'Oyly Carte, of the Kelling Sanatorium, for their assistance. The former is responsible for most of the drawings and charts which are used, and both of them have given me help in the form of stimulating suggestions which are at the same time most valuable and least easy to acknowledge.

F. W. B.-F.



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# OPEN-AIR TREATMENT.

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## CHAPTER I.

### INTRODUCTORY.

**Origins of the Treatment.**—The present method of treating pulmonary tuberculosis has now been in general use by the profession of this country for about ten years. From the first it has received nothing but endorsement, and at the present time the principles of the open-air treatment are universally followed in the management of the disease. It is true that in 1840 Dr. G. Bodington, of Sutton Coldfield, in Warwickshire, published his views as to the correct treatment of consumption, and that his system closely foreshadowed that now in vogue. He sought to convince his medical brethren that a life spent in the open air, with a liberal supply of substantial nourishment and the avoidance of excitement, acted beneficially in consumption. He received patients into his house and demonstrated upon them the success of his method. Dr. Bodington's teaching, however, was diametrically opposed to the ruling practices, and he was not even given a hearing. Later, Dr. Henry MacCormac and others protested against the error of confining the consumptive patient in hot and close rooms and of depriving him of fresh air, while his resisting powers were still further lowered by depleting medicines and a low diet. In 1859 Brehmer established the sanatorium at Görbersdorf, and



elaborated his system for the treatment of pulmonary tuberculosis, which has gradually come to be recognised as the rational method of opposing the malady. Brehmer soon had followers in his own country, and in 1884 Dr. E. L. Trudeau instituted his system in the Adirondacks. It was not seriously tried in England till 1895, though for years previously the English profession had been urged—notably by Sir Hermann Weber—to avail themselves of the salutary influence of fresh air in their treatment of consumption.

**Obstacles to its Adoption.**—The obstacle to the earlier adoption of the open-air treatment in this country was the misconception that occupied our minds as to the influence of climate on consumption. Because it was a disorder of the lungs and characterised by cough it was assumed that cold acted injuriously on the subjects of pulmonary tuberculosis, and transportation to a warm climate was ordered as a matter of course. The results obtained by treatment in warm climates were notoriously bad, but so deeply rooted is the notion that consumption is in some way connected with catching cold, that it still obstructs to some extent advance in more promising directions. Subsequently the mountain resorts of Switzerland and elsewhere gradually came into vogue, and their undeniable success in the climatic treatment of consumption disposed altogether of the idea that cold acted deleteriously on sufferers from this complaint.

While the most diverse climates were being used for the treatment of consumption—patients being sent by one adviser to a warm, low-lying locality; by another to the rigorous cold of the Alps—it became manifest that no one climatic condition underlay the undoubted benefit that many patients derived from a sojourn in these various places.

**The Treatment at Foreign Health Resorts.**

—Fortunately for the patients committed to their charge, the practitioners in many of these foreign health-resorts



were early to recognise the merits of the open-air treatment. It became more and more apparent that the recoveries of health wrought in these spots depended less upon any particular attribute of the climate than upon the fact that the patients' daily lives were strictly regulated in accordance with the principles of the sanatorium system. At many places frequented by English consumptives—and notably at Davos—sanatorium doctrines were readily embraced. It was at Davos that I received my own first instruction in the principles of the system, at the hands of Dr. W. Huggard.

The climates of these favoured spots lend themselves of course to the adoption of the open-air life ; but, speaking generally, it is doubtful if they possess any other unqualified advantage over healthy places in England for the consumptive's residence.

The outdoor life is pursued with greater comfort and enjoyment in many places than it is in England during the winter months. There may be felt a greater exhilaration, with increase of appetite and strength, on reaching a mountain station ; but we know now that England possesses all that is essential for the arrest of pulmonary tuberculosis. It is agreed that the best climate for the disease is one whose air is pure and invigorating, and which tempts the patient out of doors.

So long as we laboured under the delusion that change of climate constituted the only effective measure for combating consumption, we made no determined effort on behalf of the poorer sufferers. The poor patient was fortunate if he gained admission to a hospital, where, under the influence of good food and rest, his general health was perhaps improved, and the progress of the disease temporarily checked. We were, however, so little in earnest over our treatment of the poorer consumptive that he was never allowed to remain in the hospital long enough to secure even the maximum amount of benefit offered by good nursing and feeding. Shutting our eyes to the



incompleteness of the arrest of his disease, the patient was soon discharged to make room for another applicant. Without being made to understand his true position and the only conditions under which his partial improvement could be maintained, the discharged patient probably returned to his former mode of life, with the almost inevitable result that the patching up he had received in the hospital gave way, and he soon found himself losing ground as quickly as ever. With his disease advanced beyond a certain stage, he became ineligible for further hospital treatment, and then began his hopeless, drawn-out struggle against the illness and the straitened circumstances it entailed, to say nothing of the attendant risks his family ran of also becoming infected.

It was formerly said, "There are two kinds of consumption—that of the rich and that of the poor. The former is sometimes cured, the latter never." It is not surprising, therefore, that the introduction into this country of a practicable treatment, which had been long recognised on the Continent as a successful method for arresting this dire disease, was hailed with an unusual amount of enthusiasm.

**The Sanatorium Treatment at Home.**—In 1898 it was shown that the sanatorium system of treatment for pulmonary tuberculosis was perfectly practicable in this country, and results were brought forward which certainly compared very favourably with the effects of any other known method of treatment.

The unanimity with which this new departure was accepted was phenomenal. For the next few years the open-air treatment of consumption was continually before the profession, a large amount of space in periodical literature and many important gatherings of medical men being devoted to its consideration.

In the same year the National Association for the Prevention of Consumption began its crusade, and succeeded in arousing a widespread interest in the prevention



and treatment of this national scourge. The founders of this Association are certainly to be credited with the activity soon shown in the promotion of sanatoria throughout the country.

The first establishment in England for the open-air treatment of consumption was founded in January, 1899, and according to the National Association's list, there are now some seventy sanatoria in the United Kingdom with accommodation for 2,760 patients. Though no radical change has been made in the rules laid down by Brehmer for the treatment of pulmonary tuberculosis, English workers have succeeded in settling some points that were in dispute, and have simplified the system by establishing the relative value of the different factors.

The open-air treatment simply makes use of all the various agents which are proved to exert a beneficial influence on patients affected with pulmonary tuberculosis. It is not implied that any single remedy has been discovered for the disease, but the sanatorium system avails itself of all the factors which, according to experience, conduce towards the patient's recovery.

**Terminology.**—It is to be hoped that before long the terms "sanatorium treatment," "open-air treatment," and so forth, will be dropped. While the measures advocated constituted somewhat of a new departure in the treatment of consumption, it was convenient to refer to the new system by a special name. Now, however, that the component factors of the system are recognised as *the* agents on which we must all rely in our management of the disease, the necessity for applying any particular name to our treatment has disappeared. Like the asylum for the treatment of insanity, the sanatorium represents an institution which possesses every facility for applying the proper treatment for consumption. But we do not infer that the same measures may not be carried out with equal success elsewhere.



## CHAPTER II.

### THE ETIOLOGY OF PULMONARY TUBERCULOSIS.

SOME account of the recognised causes of the disease must find a place in any description of the treatment of consumption. Factors which conduce to the occurrence of the malady in the first instance are also powerful to hinder recovery, or when this has been achieved, to militate against the maintenance of such recovery. When we come to enumerate the various circumstances which are known to favour an attack of consumption, we shall have before us a number of factors that must be carefully guarded against in the management of the patient, both during the more acute phases of his illness and during his after-life.

The occurrence of two events is necessary for the causation of pulmonary tuberculosis :—

1. The invasion of the patient by the tubercle bacillus.
2. The patient's failure to counteract the virus.

**The Tubercle Bacillus.**—The one essential cause of the malady is the tubercle bacillus, and so far as our present knowledge goes, consumption only arises through the agency of this microbe. The only known sources of the tubercle bacillus are man and animals affected with the disease. Its perpetuation depends upon its transference from one host to another. Looked at broadly, therefore, consumption is an infectious disease communicated from man to man, and it is generally supposed from animals to man. From the point of view, however, of the practical physician it is not certain whether we



should regard the accidental infection of the patient with the tubercle bacillus as the determining cause of his attack, or whether the character of the soil which allowed the bacillus to grow is not the more important consideration.

Dr. Kingston Fowler says \*: "In considering the etiology of tuberculosis, infection must therefore be regarded as the *causa sine quâ non*, but it is not necessarily of most importance from a practical point of view. If of a large number of persons exposed to infection only a few acquire a disease, the susceptibility of the individual becomes a factor in causation of greater moment than exposure to infection."

On all hands it is allowed, however, that infection with the bacillus must precede the manifestation of tuberculosis ; so let us first of all briefly discuss the possible modes of entrance of the tubercle bacillus into the human organism.

**Transmission of the Tubercle Bacillus from the Mother to the fœtus** *in utero* has been stated by most writers to occur so exceptionally that it may be ignored as an etiological factor. Recently, however, the more minute examination of the offspring of tuberculous women and cows has been stated by some writers to demonstrate the tubercle bacillus in the fœtus in a larger proportion of cases. The subject of congenital tuberculosis is still under discussion.

**Inhalation of the Tubercle Bacillus** into the respiratory tract is generally considered to be the most important channel of infection in man. This mode of conveyance of the disease depends upon the bacilli finding their way from the expelled discharge of an affected person into the lungs of another. Innumerable experimenters have shown that animals may be rendered tuberculous by causing them to inhale powdered phlegm from a consumptive patient. Not only this, but animals have been rendered tuberculous by causing them to be coughed at

\* "The Diseases of the Lungs." Fowler and Godlee.



by consumptive patients. If the phlegm containing the bacilli is deposited where fresh air and sunlight are not allowed access, the organisms may retain their vitality and virulence for from 130 to 184 days, according to the observations of Ransome and Fischer respectively. It may be remarked on the other hand, that the tubercle bacillus perishes at once if freely exposed to currents of fresh air and sunlight. Further experiments have been made with the object of showing that after the sputum has become dried these virulent bacilli can easily rise and float in the air with the assistance of particles of dust. Carpets, boards, and pieces of linen on which tubercular sputum has been allowed to dry were rubbed or agitated inside a glass case which also contained cups of bouillon. It was ascertained that the bouillon become inoculated with the tubercle bacillus, and in the case of textile fabrics the dust-borne bacilli remained suspended in the air for an hour after the rubbing had ceased. These investigations and others are fully described by Dr. A. Hillier, who has set forth clearly all the evidence bearing on this subject in "The Prevention of Consumption."

**House Infection** explains some well-authenticated instances of successive occupants of a dwelling falling victims to consumption. In a few cases tubercle bacilli have been demonstrated in the scrapings from the walls, or in the dust of a room tenanted by a consumptive patient. It is thought by Flügge and his school that the dangerous diffusion of the tubercle bacillus depends less on its being wafted into the air from dried masses of sputum than on its being contained in the **minute droplets of moisture** that are expelled from the consumptive's mouth in the acts of coughing, sneezing, or even talking. Tubercle bacilli were found in the spray that was ejected when a patient coughed, and, moreover, for half an hour such bacilli were capable of remaining suspended in the air.

It has been conclusively shown, then, that the bacillus of tuberculosis which is expelled in enormous numbers by



the consumptive patient in coughing is capable of finding its way into the air we ordinarily breathe, and that, moreover, under certain conditions, its vitality may be retained for many months after its ejection by the patient. This last fact declares, of course, that though a patient was infected by the discharges of a previous sufferer, it is not essential that there should have been any close communication between the two persons.

Next let us examine very shortly other evidence which points to inhalation being the common mode of entrance of the bacillus into the human organism. The greatest amount of controversy has been raised by the discussion as to whether the respiratory tract or the digestive tract most commonly shows the traces of the first invasion by the tubercle bacillus. Unfortunately, it is still impossible to give a decisive answer to the question, and in a work of this scope it would be impossible to present fully both sides of the case. But I think the consensus of opinion is strongly in favour of the view that the revelations of morbid anatomy point to the respiratory tract as the common seat of earliest tubercular lesions.

Koch has particularly devoted himself to the elucidation of this point, and his conclusions must carry enormous weight. He states that primary tuberculosis of the intestinal tract is rarely found, and speaking from an experience of many thousands of autopsies conducted by himself or others with this point in view, Koch concludes that in the vast majority of bodies affected with tuberculosis the primary lesion is found in the lungs or bronchial glands.

Most English writers are in agreement that *tabes mesenterica* is less common than statistics appear to show, it being fairly certain that the name is used loosely in certificates, and often covers rickety or other abdominal affections of childhood. As far as our present knowledge goes it may be said that the tubercle bacillus appears generally to gain admission through the respiratory tract,



and that the lungs or bronchial glands are the common sites of its first settlement.

There remains for a little further consideration the **entrance of the bacillus by ingestion.** Suspicion, of course, falls heavily on milk and butter, as two articles of food in daily use, and of samples from different dairies examined for the presence of tubercle bacilli, some observers have found more than half contaminated with the tubercular virus. It is held that about 30 per cent. of the cows in this kingdom are tuberculous, and that about 3 per cent. of them have disease of the udder, which represents the most dangerous condition for the infection of the milk. Those who support the view that alimentary infection is the common source of human tuberculosis deny Koch's assertion that primary intestinal tuberculosis is rare, and point to the Registrar-General's figures, which show that while pulmonary tuberculosis steadily diminishes year by year, *tabes mesenterica* shows but little diminution. As already stated, these returns are discredited by others, who say that many of these deaths are not due to tuberculosis at all, or, if so, are not instances of a primary intestinal tuberculosis.

**Transmissibility of Bovine Tuberculosis to Man.**—While the relative frequency of the invasion of man by the tubercle bacillus through the respiratory route from the air, and through the alimentary tract from food, was still a subject of warm dispute, Koch astounded the scientific world by his announcement that bovine tuberculosis was not transmissible to man. This conclusion was based on the asserted infrequency of primary intestinal tuberculosis in man, and on the fact that milk and butter containing tubercle bacilli were often consumed with impunity. Instances were also related of inoculation of man with bovine tubercle which had not led to the development of tuberculosis in the persons inoculated. In this connection it may be argued that neither does inoculation of man with human tuberculosis commonly give rise to more



than a local lesion at the site of inoculation. Koch's contention rested chiefly on the results of experiments with cattle and pigs, some of which were injected or fed with bacilli from human tuberculosis, others with bacilli from bovine tuberculosis. Stated broadly, it was found that the animals infected with bacilli from bovine tuberculosis all speedily developed intestinal tuberculosis, while those infected with bacilli from human tuberculosis remained free from tuberculosis. If human tuberculosis is not transmissible to cattle, Koch argues that bovine tuberculosis is not transmissible to man.

This statement met with considerable opposition at the time, and has recently been controverted by Professor von Behring, who brings forward experimental evidence that points in an entirely new direction.\* Behring finds that in new-born guinea-pigs the **epithelial lining of the intestines is imperfect**, and allows of the passage through it unharmed of the tubercle bacillus. The tubercle bacillus introduced into the alimentary tract of very young animals can pass into the general circulation and be recovered from the blood, owing to the permeability of the intestinal wall. Behring states that this permeability is normally peculiar to very young infants, but that morbid conditions which involve disorder of the intestinal mucous membrane in later life may produce the same inability to prevent the passage of bacilli through the bowel's wall. It was found that when tubercle bacilli were introduced into the alimentary canal of the young guinea-pig, the cervical glands showed the first tubercular lesion. In the development of alimentary tuberculosis organs were affected in a way that would have been regarded as typical of infection by inhalation. In short, Behring's view is that bovine and human tuberculosis are the same, and that the common mode of infection in man is through the alimentary tract, and not by inhalation.

\* *Brit. Med. Journ.*, Oct. 17th, 1903.



That it is the rule rather than the exception for the tubercle bacillus to gain an entrance into our bodies at a time when the incomplete lining of the intestines fails to prevent the passage of the bacillus, and that it lies dormant until stirred into activity by some cause which determines the onset of consumption.

It must be added that Professor Sims Woodhead demonstrated tuberculosis of the tonsils and glands of the neck in pigs as the result of feeding them with tubercle bacilli, and many workers have found bacilli in the tonsils and adenoid tissues of the human throat.

Apart from the ingestion of the tubercle bacillus with tainted food, it may be carried to the mouth by dirty fingers which have picked up the microbe from the floor, or by spoons and other articles which a consumptive has contaminated. To sum up, then, **the possible modes of entrance of the tubercle bacillus into man are chiefly by inhalation and by ingestion.**

If the latter path is used, it must commonly be by the presence of the bacillus in food. Whether the primary seat of tuberculosis is in connection with the respiratory or with the alimentary tract, we must first know that tuberculous food is capable of infecting man. As is well known, this most important point is being inquired into by a Royal Commission at the present time, and until their verdict is published, we can but reserve judgment and advise the use of precautions with regard to milk and butter, in case it is proved that man may be rendered tuberculous by consuming the produce of tuberculous animals.

The chain of evidence in proof of infection by inhalation is more complete, though even here there is much that is not yet perfectly clear. The bacillus can be traced from the sputum or other discharge of its former host into the air breathed by man, and morbid anatomy adduces abundant testimony in favour of the bacillus gaining admission to the body of its next victim by the respiratory tract. But



now we come to a point where there is much conflict of opinion. While many scientists are satisfied that case-to-case infection is an established fact, a large number of practical physicians cannot admit that association with a previous sufferer altogether accounts for the incidence of the disease as they see it.

Different opinions are held by workers engaged in the study of pulmonary tuberculosis as to the relative importance of exposure to infection, and of the condition of the soil in actually determining the occurrence of the malady.

Even those who hold the strongest views on case-to-case infection being the main cause of consumption allow that **susceptibility on the part of the individual** also plays a part. But this school insists that the disease is in the ordinary understanding of the word *caught* from a previous sufferer, and that careful investigation into the history of each patient commonly discloses a definite source of infection.

Comparably to the mode of origin of typhoid fever, it is held that every instance of the disease should be traceable to infection from the ejecta of a pre-existing case, though, unlike typhoid fever, the period of incubation of consumption is an absolutely unfixed and variable term. The indefinite length of time that may elapse between the contraction of the disease and its manifestation obscures, they claim, the recollection of the true origin of the disease in many cases. An elaborate search into the past histories of 1,006 cases of pulmonary tuberculosis has been made by Dr. Niven with this point in view, and in 64.8 per cent. a source of infection was found. Dr. A. Hillier, in his work already referred to, writes: "There is in the majority of carefully recorded cases of tuberculosis a history of continued and generally prolonged exposure to the presence of another consumptive."

There are other writers who, without altogether denying the communicability of pulmonary tuberculosis,



lay less stress on it as the one and only determining cause of the disease, and affirm that proof of its being commonly transmitted from case to case is wanting. By some it is held that the tubercle bacillus is ubiquitous, and that it is contained in the bodies of those who have not been in close association with consumptives as well as in the bodies of those who have. They bring forward the researches of Birch-Hirschfeld, who, on minute examination of the lungs and bronchi in 4,000 consecutive necropsies, discovered the presence of tubercle in one of these two structures alone in 40 per cent. of the number. Naegeli stated that tubercle was found somewhere in the bodies of *all* persons who died after reaching the age of thirty, and other investigations seem to prove that the majority of mankind harbour within them the tubercle bacillus.

**Theory of Latent Tuberculosis.**—If subsequent workers confirm the widespread dissemination of the seed of the disease amongst the human race, much support will be given to the theory of latent tuberculosis as explaining the etiology of consumption. According to this view a large proportion of the population always have living tubercle bacilli buried somewhere in their systems, but disease only manifests itself when something occurs to lower the host's powers of resistance. The supporters of this view hold that the person who eventually develops consumption had been potentially consumptive for years beforehand; that it was probably incapable of detection, but that there lay buried in the lungs, in a gland, in a tonsil, or elsewhere, the microbe of tuberculosis, and that the determining cause of the patient's disease was his failure to restrain the multiplication and diffusion of the microbe.

On the theory of latent tuberculosis we assume that a large proportion of the community are always infected with the virus of tuberculosis, but leave the exact source of the infection an open question. It may be that inhalation of the bacillus directly from the phlegm of another consumptive will prove to be the common cause, but



infection having occurred, any number of years may elapse before the disease declares itself. Thus the onset of the malady bears no striking or obvious relation to the exposure of the patient to the infection. The tubercle bacillus may be more or less omnipresent where people congregate, though experimenters have failed so far to justify such an assertion.

We may learn that the milk and butter derived from tuberculous cows carry bacilli which are capable of affecting man, whether by primarily invading the alimentary tract or by passing direct into the blood-stream without injuring the bowel. Proof may be forthcoming that transmission of the virus from mother to offspring is of more common occurrence than now supposed.

I am of opinion that the impression gained in practice as to the causation of pulmonary tuberculosis can be thus expressed. The bulk of mankind are already infected, and in the case of many patients among the poorer classes, but little pains are usually needed to trace the possible source of infection to communication with a sufferer from declared consumption. In regard to the remainder of our patients, conclusive evidence of infection from another consumptive is not commonly forthcoming. If we assume, however, that infection in one way or another had already taken place, it is usually possible to account for the breakdown of the person's defensive forces.

I have already published \* certain facts which were elicited in taking the previous histories of consumptive patients, and which lend support to the notion of latent tuberculosis.

Out of one hundred consecutive cases, nearly half of the number narrated that they had in the past suffered from disorders in various parts, which disorders there is good reason for believing were tubercular in nature.

Thus, in sixteen patients there had been definite disease

\* *Practitioner*, March, 1902.



of the glands—one had suffered from corneal ulcer, and two from ischio-rectal abscess.

As many as twenty-eight of the patients gave a distinct history of pleurisy, which had occurred long before the manifestation of any disease of the lungs themselves.

In twelve instances hæmoptysis had occurred, which the patients had been assured did not arise from pulmonary disease, and which was followed by no other symptom until after the lapse of a considerable time—in one case twenty years. In all these cases it is apparent that the tubercle bacillus had established itself a long time prior to the date when consumption was recognised. Such examples of the latency of tuberculosis are so frequent that it must be a familiar subject to all practitioners. In fact, nothing is more difficult in a large number of instances than to fix precisely the date of the commencement of the consumptive outbreak. When the patient has announced with assurance the duration of his disease, it will often be found that coughs of suspicious chronicity, or unaccountable losses of weight and strength, had existed beforehand, which, in the light of after events, can hardly be regarded otherwise than as more or less masked manifestations of an existing tuberculosis.

**Case-to-Case Infection.**—An impartial consideration of the experiences of hospitals where large numbers of consumptive patients are received must, I think, throw some doubt on case-to-case infection as the one sufficient cause for pulmonary tuberculosis. It is an admitted fact that the resident officers, nurses, and servants of these institutions rarely become consumptive, although, as pointed out by Dr. H. T. Bulstrode,\* the well-known records of Dr. C. T. Williams in regard to the Brompton Hospital, and those of himself in regard to the Ventnor Hospital, covered a period when the precautions used against the spread of the disease would not now be considered sufficient.

\* *Lancet*, July 11th, 1903.



I have learnt at Davos, on the highest authority, that consumption has never been known to attack any of the numerous visitors, or those engaged in occupations there, who were free from tubercular taint on their arrival.

The incidence of consumption in the village of Görbersdorf has actually decreased since the establishment of Brehmer's sanatorium there, and no reason whatever exists for thinking that the disease has ever been spread from any of the numerous sanatoria in this country. If the infection of the healthy by the sick is not substantiated in regard to the occupants of hospitals and airy dwellings, the case is different, I think, with the poor in their homes and workshops. On investigating the etiology of pulmonary tuberculosis, the physician finds much more evidence in favour of infection amongst poorer patients than amongst the rich. Considering the speedy destruction of the bacillus by fresh air and sunlight, and its perpetuation under insanitary conditions, this is what we should expect. The records of 100 patients of my own from the upper classes furnished evidence of infection as the probable cause of illness in only three of the number. But amongst 100 patients from the poorer classes there were good grounds for attributing the disease solely to infection in eight of the number; while in an additional twenty-five the consumption might be equally fairly ascribed to infection or to heredity.

In discussing this question with Dr. Hillier he expressed to me the opinion that pulmonary tuberculosis as we see it amongst the poor is a strictly infectious disorder, but that it attacks the well-to-do classes more or less sporadically.

An important contribution to the study of the etiology of consumption has been made by Sir Hugh Beevor\* from an inquiry into the consumption death-rate of a rural county whose population has undergone but little change. The interesting point is made that decade after

\* "Rural Phthisis and the Insignificance of Case-to-Case Infection."



decade the death-rate in each one of the districts was invariably within 10 per cent. of the mean for the whole rural county. Year after year the decline in the consumption death-rate followed an even, straight line, the remarkable regularity of the rates appearing to depend on some constant factor, and not on so variable and inconstant a cause as infection.

The fact also that it is on reaching a certain age that the liability to pulmonary tuberculosis becomes greatly increased is noteworthy. We find that at one age period if tuberculosis appears it will probably attack glands or bones or joints, while at a later period the lungs are the favourite seat of disease.

**Summary.**—In conclusion it appears to me that no facts hitherto brought forward invalidate the proposition that consumption is communicable from man to man by means of the phlegm. Whether or not there are other important sources of infection must be reserved for future judgment. It is also impossible to determine at present whether close association with a consumptive is alone dangerous, or whether the bacilli are capable of such wide diffusion that a single sufferer may infect a countless number of persons with whom he has never been brought into actual contact. Fortunately the majority of mankind are not very susceptible to tuberculosis, and may perhaps be inoculated with impunity; but this fact does not make it any the less our duty to enforce all possible measures for the protection of the less-favoured section of the community.

### **Importance of Precautions against Infection.**

—Every patient must be seriously persuaded that unless certain precautions are adopted by him in regard to his phlegm, he is sowing broadcast the poison of tuberculosis. These precautions are fortunately simple and easy of observance. The consumptive must never spit on the ground or on any floor, nor must he fail to intercept the spray that issues from his mouth. Some proper receptacle



must always be used to hold the phlegm. For use during the day a pocket-spitting flask should always be carried, in which some antiseptic, such as 1 in 20 carbolic acid, is placed. Dettweiler's pattern is in common use, and may be obtained nowadays of any instrument maker or chemist. For poor patients a good flask can be obtained for one shilling. In the house and shelter an ordinary spittoon may be used, in which again some antiseptic is placed. The best way of disposing of the contents of the spittoons is by burning. This mode of destruction is simplified if a biscuit-paper lining is placed inside the mug, which can be removed bodily with the sputum and placed upon the fire. Papier-mâché or pasteboard cups are also sold for the same purpose, and are burnt each day.

The emptying and cleaning of the pocket-flask require a little more trouble. Its contents again are best destroyed by being burnt, though in private houses it may be considered occasionally allowable to deal with the sputum in another way. The empty flask should always be well boiled in water to which washing soda has been added, and then placed under a tap. Each patient should have two spittoons, so that one can be in use while the other is being disinfected.

As regards the burning of the sputum, this can be easily effected by placing the paper lining or pasteboard cup on a good fire. The contents of the flask can be emptied on to a fire or mixed with sawdust and burnt. Where the amount of sputum that has to be dealt with is larger, as in establishments for the reception of many patients, special arrangements are advisable for its destruction. Large institutions should be equipped with a proper incinerator made for the purpose. A plan which I have had adopted, and which answers satisfactorily in smaller sanatoria, is to burn the sputum in a shallow iron tray over a paraffin stove.

Where the sputum is not large in amount, and where the burning of it is impracticable, it may be emptied down a drain. In this case, however, particular care must be



U taken to destroy the contained bacilli as far as possible. A 2 per cent. solution of chlorinated lime mixed with an equal quantity of the phlegm accomplishes the result better than other antiseptics.

Remembering also the infectious nature of the spray that issues from the consumptive's mouth, the provision of a proper spittoon and its conscientious use are not the only precautions which the patient must take. Means must also be used to prevent the dissemination of bacilli in the minute drops of moisture that are expelled in coughing and sometimes even in talking. A handkerchief must be always held before the mouth in coughing. This handkerchief should preferably be a paper one, as now sold by many chemists, and destroyed each day.

Otherwise, handkerchiefs and all utensils which touch the patient's mouth should always be strictly boiled after use.

No relaxation of these precautions must be countenanced by the physician. The consumptive who spits carelessly upon the ground or otherwise disregards rules for the prevention of the spread of his disease must be impressed with the real seriousness of his offence. But in regard to the patient who conscientiously uses every care in his power to ensure the speedy destruction of all bacilli in his phlegm, and the prevention of their dissemination, there is another side to the question which also requires mention.

The consumptive's lot is already sufficiently unfortunate; we do not wish to add unnecessarily to the burden he has to bear. The present-day crusade against consumption promises, under judicious direction, to gain untold advantages for the human race, but we must guard against the danger of attempting to legislate in advance of our knowledge, and of inflicting uncalled-for hardships on the victim of consumption. That there are two sides to this most difficult question must have been brought home to many people. The chances of earning a living are now denied to many consumptives, because their fellow-workmen have



learnt to look upon them as lepers, and fear any sort of association with them. Fierce objections are raised to the establishment of sanatoria in certain localities, and the consumptive may find himself shut out from many hotels and other places. Not only may his friends more or less abandon him, but I know of an instance where a patient found herself practically banished from a village where she had taken up her residence because the laundress and other tradespeople had been cautioned to have no dealings with her. Many of these objections are not warranted by the knowledge at present in our possession. It is probable that no risk is incurred in associating with a consumptive under certain conditions. If all ordinances in regard to his phlegm are scrupulously obeyed, and if his surroundings are perfectly sanitary, the consumptive is, humanly speaking, free from danger to others. The National Association for the Prevention of Consumption have seen reason to issue the authoritative announcement that a properly managed sanatorium constitutes no source of danger to its neighbourhood. But in the case of a consumptive who neglects the precautions demanded for the safety of his fellows, or whose environment makes for the perpetuation of any bacilli that may escape the measures intended for their retention and destruction, we cannot logically say that his company involves no risk.

It is to be hoped that in the near future the profession will be enabled to come to some definite agreement, and that a common line of action will be taken in regard to our attitude towards this question of infection. If it appears that the consumptive bread-winner cannot under any circumstances be employed in factories or workshops without endangering the health of his fellow-workmen, it will surely be politic for the State to take charge of him and provide such light occupation as he is capable of, and under such open-air conditions as render him unable to spread the disease, while his life is prolonged and made comparatively comfortable.



I have given a cursory account of the ways in which it is supposed that the tubercle bacillus may become implanted in man. We will next proceed to discuss *the agencies which determine that the bacillus shall exercise its morbid powers.*

**Heredity** has recently been called in question by some writers as a predisposing cause of consumption. Whether or not the direct transmission of tuberculosis from mother to infant is so exceptional as to prove that the disease itself is not hereditary, must be left an open question. But to speak of there being no such thing as a hereditary susceptibility to the disease appears to me to be contradicting our everyday experience, as well as the deliberate opinion of all previous writers on the subject. It is argued that the supposed examples of hereditary predisposition to pulmonary tuberculosis were in reality instances of ordinary infection from a parent or other relative. But this contention fails to explain the so-called "family phthisis" which is a well-observed condition. It may be that neither parent was consumptive, yet child after child, on attaining a certain age, falls a victim to the malady, and this notwithstanding the fact that the family had broken up and separated, and that no one home had been occupied by all the members. Moreover, if it is entirely a matter of infection and not one of heredity, why are the members of the family picked out, and other occupants of the house, such as the servants, avoided? The taint, too, may apparently come from a parent whose tuberculosis affected some enclosed organ, such as the brain, was unaccompanied by any discharge, and was therefore unable to communicate the virus.

In 54 per cent. of my small number of patients the family history disclosed the existence of consumption in parents or collateral relatives. This proportion is fairly in accordance with the results obtained by those dealing with much larger numbers, and points, I think, to the conclusion that a hereditary predisposition contributes to



the occurrence of pulmonary tuberculosis in about half the number affected.

We know that in regard to other diseases it runs in certain families to contract them easily and in a severe form, and it is supposed that the hereditary predisposition to tuberculosis depends on a constitutional weakness of defence against this particular organism.

**Bad hygienic conditions** are well known to favour the development of tuberculosis, and overcrowding determines the distribution of the disease more distinctly than any other one thing. It has been found that the death-rate from consumption is, generally speaking, proportionate to the density of population in a given area, and where the country is sparsely populated, there the disease is uncommon, no matter what climatic conditions prevail. This dependence of the distribution of the disease on aggregation of human beings is explained in more ways than one. In the first place, crowded dwellings give greater facilities for the occurrence of infection. Not only are a larger number of persons exposed to the contagion from a single sufferer, but in such quarters we know that the activity of the virus is maintained for a longer time, and is probably heightened. In the absence of fresh air and sunlight the bacillus escapes extinction, and an abundance of particles of dust provide a ready means for its dissemination. Moreover, the inhabitants of these crowded areas present the soil on which the tubercle bacillus flourishes. Their powers of resistance have been weakened by under-feeding, the struggle for existence, and the breathing of contaminated air.

The nature of the **occupation** is admittedly of great importance in the causation of the disease. In the first place consumption attacks those employed indoors much more frequently than those employed out of doors, and if the indoor occupation also involves the breathing of much dust, the prevalence of the malady is increased. Enquiries directed to the point will show, I think, that in



certain factories, workshops, and offices where a number of employees spend the day in a confined atmosphere, an undue proportion are overtaken with consumption. It is under these conditions that case-to-case infection to all appearances plays a highly important part. A striking number of consumptives amongst the poorer classes have been exposed to the chance of infection from a fellow-workman, and certain work-places gain an evil notoriety in this respect. As stated by Dr. C. T. Williams, there are good grounds for believing that the improvements in the sanitary conditions of our factories and workshops brought about by legislation are largely responsible for the marked diminution of the mortality from consumption. Apart from the influence of foul air, dust and opportunities for personal communication of the disease, there are certain other factors in regard to occupation which produce a special liability to pulmonary tuberculosis. Employments which are associated with temptations towards alcoholism have a high death-rate from consumption.

The effect of underfeeding and poverty in general is shown by the way in which the disease's distribution is related to the scale of wages which obtains.

It is worth noting that clergymen are remarkably free as a class from consumption, though their calling must expose them to the risks of infection.

To my mind there are few causes more powerful to determine the outbreak of pulmonary tuberculosis than **physical over-exertion**. In at least 10 per cent. of my patients the disease seemed directly attributable to their having overdone themselves. A feat of endurance is apt to overstrain the constitution, and break down the defences of an apparently healthy man against the tubercle bacillus. It had already gained, we assume, a footing in his system, and only waited an opportunity to manifest its activity. I have been struck by the frequency with which consumption attacks men who have distinguished themselves in various athletic pursuits. This remark



particularly applies to such sports as tax the powers of endurance, such as long-distance bicycle riding or running, rowing, or, in fact, any exhausting exercise. It is important to recognise that, although such exercise be taken in the open air, it is conducive to the development of consumption if it entail exhaustion or fatigue. Still more is this the case if the exertion be undertaken in vitiated atmospheres, and the debilitating effects of impure air be added to that of strain. Many consumptives bring on their disease by consistent neglect of rest, by working too hard during the day, perhaps, and taking it out of themselves with pleasure in the evenings.

There is no point that must be more strongly impressed on the discharged consumptive, if he would maintain his restored health, than the avoidance of fatigue and the due observance of rest. As far as one cause goes, relapse is most commonly produced by neglecting to take this needful rest. Over and over again I have traced recrudescence of the disease to the tiring effects of work or of a day of pleasure, or to a journey, or to the broken rest involved by nursing a sick relative. As we shall see, too, in a later chapter, in the selection of work for the discharged patient we must first of all see that it is not of an arduous nature.

**Mental over-strain and dissipation** need only be mentioned as common causes of consumption. Here again we have the absence of proper repose, the injurious effects of irregular meals, and of the disregard of other laws of health.

**Alcoholism** has always been credited with predisposing to consumption, but recently evidence has been brought forward which points to its being directly responsible for a large proportion of the consumption in males among the lower classes. The public-house is thought to be a hot-bed of infection.

The type of consumption met with in alcoholic patients is peculiarly unamenable to treatment, and is commonly of the so-called erythritic variety. I have often thought



that one small advantage of sanatorium treatment depends on the fact that the patients are, as a matter of course, broken of the habit of taking alcohol in even small quantities.

**Other diseases** very frequently determine the onset of pulmonary tuberculosis. I will pass over the consideration of pleurisy, because it is doubtful if in such cases tubercle was not already established in the pleura. To a less extent the same thing may be said of pneumonia, for an inflammation of the lungs which appears to be followed by consumption may all the time have really been due to tubercle. But there is reason for believing that true pneumonia, by inflicting some damage upon the lung, especially if the apex is affected, may favour the subsequent development of consumption.

Chronic bronchitis with emphysema and asthma are certainly liable to become complicated by tuberculosis. Consumption was superadded to one or other of these conditions in 3 per cent. of my patients, and Mitchell Bruce's note as to the danger of overlooking tuberculosis in the presence of emphysema and bronchial catarrh is important. He draws attention to the fact that the diagnosis is usually made on the failure of the usual remedies for the bronchial condition to afford relief, on the super-vention of evening fever, emaciation and debility on the former symptoms, and on the eventual discovery of tubercle bacilli in the sputum.

Influenza is more often blamed than any other illness for starting consumption, and it is undoubtedly the precursor in a large number of instances. I am sure, however, that it is extremely common to call influenza what is in reality nothing more than the fever and constitutional disturbance of commencing consumption. In connection with the causation of relapse and with the interruption, perhaps, of satisfactory progress, Sir William Broadbent's remarks on influenza may be recalled. He said that recurring epidemics of this complaint had seriously affected



the results obtained in the treatment of the consumptive visitors at many Continental health resorts.

Sir William Broadbent suggested that during the prevalence of influenza outside a sanatorium it might be prudent to permit the visits of friends to take place only out of doors.

The possession of a **weak physique** renders the individual prone to the development of tuberculosis. Among consumptives it is impossible not to be struck by the number whose chests are small and of ill-developed form. It appears to me that the onset of the disease is frequently attributable to the patient having literally outgrown his strength. I have noted with interest that when a weakly, fragile person is overtaken by pulmonary tuberculosis, the malady by no means necessarily runs an unfavourable course. The constitution may have always been a miserably feeble one, and yet the disease is well resisted and the individual's life, contrary to expectation, is but little shortened or marred by its existence. The explanation at once suggests itself that there are different degrees of virulence belonging to different conditions of the bacillus, and that in these cases the virus is particularly mild, or the dose exceedingly small.



### CHAPTER III.

#### THE TEMPERATURE IN PULMONARY TUBERCULOSIS.

A DISTINGUISHING feature of the sanatorium system of treatment is the great account made of the patient's temperature. In fact, the exact management of any individual case is chiefly based on a consideration of the temperature chart. Not only does the proper treatment of the patient entirely depend on the readings of the thermometer, but they are also of the greatest importance in diagnosis and prognosis. When we are dealing with tuberculosis, stress has to be laid on quite small degrees of elevation of temperature, which might be disregarded in the case of many other maladies. For all these reasons particular attention is directed to thermometric observations in dealing with pulmonary tuberculosis, and in the first place a few general remarks will be made on the subject of the **taking of the temperature**.

It is important that the observation of the consumptive's temperature be so made that absolute accuracy is ensured. The method of clinical thermometry in ordinary use cannot be relied upon to recognise slight departures from the normal range. An error of half a degree, or even more, is a common occurrence when the thermometer is simply placed in the mouth or under the arm for only a minute or two.

The early diagnosis of tuberculosis may depend largely upon the recognition of half a degree or less of fever, and an elevation of temperature, which might probably be overlooked with the ordinary method of registration, may constitute the most valuable piece of evidence. Further,



when we come to the consideration of treatment we shall see that the exact management of the patient is regulated by minute differences of his temperature.

**The Rectal and the Oral Method Compared.—**

These points will be considered more fully in due course, and I will only now reiterate the importance of accuracy in taking the temperature in tuberculosis. The practitioner must assure himself that the reading of the thermometer gives him the correct or maximum temperature of his patient, and I may say once again that unless certain points are attended to this end is not gained. The ordinary method of using the clinical thermometer cannot be depended upon to record the true temperature, and important indications for diagnosis and treatment are constantly being missed in consequence. Now it is stated that the true internal temperature of the body can only be learnt by placing the thermometer in the rectum, and that the oral reading bears no reliable comparison with it. It is contended by those who discard all readings other than rectal, that not only is the heat of the mouth lower than the true internal heat of the body, but that the difference between the two is not a constant one—that, in other words, the oral and the rectal temperatures bear no constant relation to one another.

By all it is admitted that the variations of temperature caused by exercise can only be observed in the rectum.

I grant that for scientific investigations the rectal temperature should be used, because this can always be definitely accepted as correct, without any qualification; whereas in the use of the oral temperature, in the first place allowance has to be made for the difference always existing between it and that of the rectum, and in the second place certain conditions which particularly affect the oral temperature must be excluded.

I am of opinion, however, that in everyday work it is easy to obviate the special sources of fallacy in regard to oral thermometry, and to obtain by the due observance of



certain precautions a reading which is, practically speaking, accurate and sufficiently comparable to the internal heat for all clinical purposes. If, as I believe to be the case, the oral temperature may, within certain limitations, be relied upon, there are many obvious advantages in its use.

Apart from all considerations of delicacy in favour of placing the thermometer in the mouth rather than in the rectum, the former method is a more practically convenient one. In home treatment there may be some difficulty in instructing the patient how to take the rectal temperature, and it is not very exceptional to meet with objection to the procedure. For the observation of the rectal temperature the patient must probably go indoors to his own room; whereas the oral temperature may be taken wherever he happens to be at the time, and without interruption of the continued repose out of doors.

But if the temperature is taken in the mouth, it must be understood that the maximum or correct reading is not usually obtained by just placing the thermometer under the tongue for a few minutes, however delicate the instrument used. The chamber of the mouth must be warmed up to its fullest degree in order that the maximum oral temperature be recorded. Under ordinary circumstances ten minutes are occupied in fully warming the buccal cavity, during which time the lips must be kept continuously closed. It will be at once seen that the thermometer may correctly register the temperature of the medium in which it is placed within its specified number of seconds, but that from the time the lips are closed some ten minutes are required for the full warming of the interior of the mouth. The exact time necessary varies with different individuals, and under certain different circumstances presently to be recounted. Nothing is easier than to ascertain the exact time required under normal conditions for each patient. The thermometer can be removed and re-introduced without opening the lips until no further rise occurs. Or the column of mercury may be watched by the doctor



while the thermometer is all the time held in the closed mouth. It is found that less than seven minutes rarely suffice to register the maximum oral temperature under ordinary circumstances. As already stated, there are certain conditions which particularly affect the mouth as the site for observation of the temperature, and which require to be guarded against in order to avoid errors. I need not do more than mention the introduction into the mouth of hot or cold substances, which may disturb the oral temperature for as long as forty minutes. Allowance is less commonly made for the influence of cold air on the interior of the mouth, either by being respired or by mere contact with the cheek. With the help of Dr. S. G. Champion certain details connected with the observation of temperature were specially investigated, and are fully set forth elsewhere.\* Briefly, we satisfied ourselves that the contact of cold air with the cheeks was capable of powerfully depressing the oral temperature. In a cold atmosphere, therefore, the oral temperature cannot be compared with that of the rectum, and half an hour may be needed to restore the warmth of the interior of the mouth after withdrawal from the cold. Inspiration of cold air through parted lips also cools the mouth, and it may be necessary to keep the mouth firmly closed for half an hour to obviate the depressing effect of the inspiration of cold air on the oral temperature.

**Effect of Exercise.**—The influence of exercise on the temperature requires special consideration in regard both to the study of tuberculosis and to the comparative value of the rectal and oral reading. I may say at once that the elevation of temperature brought about by exercise can only be observed by placing the thermometer in the rectum or in the stream of urine, and that the mouth is unsuited for the detection of this particular reaction.

The subject of tuberculosis does not differ from the

\* *Lancet*, March, 1903.



healthy person in the fact that exercise is followed immediately by a rise of temperature. But the same amount of exercise usually produces a greater rise of temperature, and particularly a more persistent rise, in tuberculosis than in health.

Dr. Champion and I ascertained that exercise causes a physiological rise of temperature which is generally proportionate in degree to the duration and severity of the exertion. We concluded that even the act of standing induces a difference of about  $0.3^{\circ}$  in most healthy men, as compared with the temperature of absolute rest. Ordinary walking for a quarter of an hour produces an average rise of  $0.5^{\circ}$  in health, and an hour's walk a rise of  $1.0^{\circ}$ . As much as  $3.5^{\circ}$  elevation can be brought about by severe exercise for several hours. After spending twenty to forty minutes in complete repose, the temperature usually resumes its normal level. It is noteworthy that this increased heat in consequence of exercise is not attended by any of the usual symptoms of fever.

Now the effects of exercise on the temperature of the consumptive patient are not essentially different, except in degree. It will be found that the reaction is usually more marked, and that the rise is slightly more sustained. Thus, in the case of the sufferer from pulmonary tuberculosis an average elevation of  $0.5^{\circ}$  is more constantly noted as the effect of changing the lying-down posture to that of standing. Similarly, walking for a quarter of an hour and for an hour causes a rise of about  $1^{\circ}$  and  $2^{\circ}$  respectively. As a rule the influence of exercise on the temperature of the consumptive person is more enduring, and a longer time of rest is required to reduce it to the usual level. The condition of the patient can be roughly gauged by the length of time during which the temperature remains raised in consequence of a certain amount of exercise. I cannot satisfy myself that the amount of reaction to exercise affords any reliable grounds for judging of the patient's condition. Patients who are progressing favour-



ably may manifest a greater rise of temperature than those doing badly after the same amount of exercise; but it will usually be found that whatever the exact degree of elevation may be, the temperature falls more quickly under the influence of rest in the favourable cases.

The reaction to exercise may prove of some slight use in the diagnosis of early tuberculosis. In a case of suspected tuberculosis evidence of slight value could be obtained

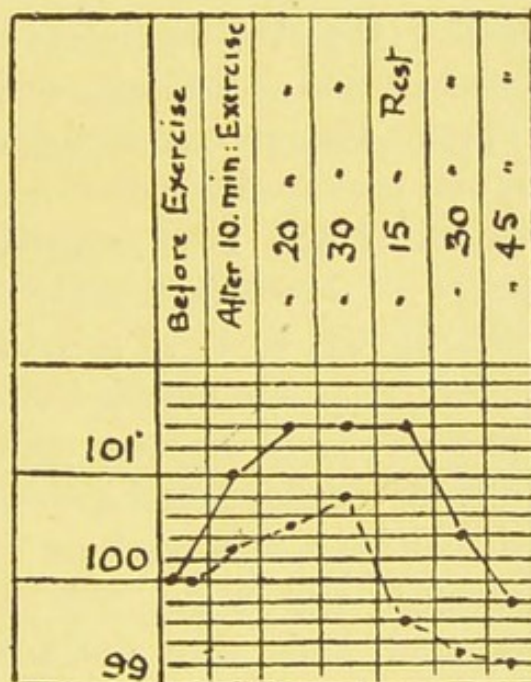


Chart I.—EFFECT OF EXERCISE AND OF REST UPON THE TEMPERATURE.

A healthy man (broken line) and a patient with pulmonary tuberculosis (continued line) found that their rectal temperatures agreed. They then walked side by side and observed their temperatures every ten minutes. It will be seen that the patient's temperature was more elevated by the same exercise, and that the effect of rest in reducing it was not observable so quickly as in the case of the healthy man. (*Lancet*, March 28, 1903.)

by observing the amount and persistence of the rise of temperature after exercise and comparing them with those of a healthy person. I do not think, however, that tuberculosis can be distinguished from other debilitating maladies by the exercise reaction.

Having regard to the delicate response of the temperature to slight degrees of muscular effort, it is obvious that where precision is required, the conditions under which



the temperature is observed should be noted. There is an important difference between the temperature of absolute rest and that of the standing posture. More than once I have known consumptive patients to be alarmed because the rectal temperature was found to be raised; but the observations had been made immediately after exercise, and I was able to assure them that under such conditions an elevation was perfectly normal.

This reaction of the temperature to exercise cannot be observed by placing the thermometer in the mouth. Exercise entails more rapid breathing, and the mouth is meanwhile held open. Its interior is therefore cooled by the passage of air, and perhaps by radiation and conduction also. The alteration of the true internal heat of the body in consequence of exercise is only transitory, and capable of detection for the space of some thirty minutes. By the time, therefore, that the mouth has recovered from the specially cooling effects of exercise upon it, the rectal temperature has already declined, and the rise is altogether missed, perhaps, if the mouth is used for its observation. A very simple example will make this point clear. A healthy man rests and finds that his temperature is—rectal,  $98.8^{\circ}$ ; urine,  $98.5^{\circ}$ ; mouth,  $98.3^{\circ}$ . After half an hour's bicycling the temperature is again taken, and found to be—rectal,  $100.4^{\circ}$ ; urine,  $100^{\circ}$ ; mouth,  $98.4^{\circ}$ . Replacement, however, of the thermometer in the mouth is followed by a further rise, until at the end of half an hour  $99^{\circ}$  is registered. By this time the rectal temperature has begun to drop and then reads  $99.5^{\circ}$ .

In conclusion, I would state that the oral temperature is fallacious as an indication of the true body heat in the following circumstances:—If hot or cold substances have been introduced into the mouth, if cold air has been respired with open lips, if very cold air has been in contact with the cheeks, or if exercise has been taken. In the absence of any of these conditions, and provided that sufficient time—usually ten minutes—is allowed for the



oral chamber to be warmed to its full heat, I believe the temperature taken in the mouth is sufficiently accurate even for the requirements of the treatment of pulmonary tuberculosis. In many sanatoria the rectal temperature is alone relied upon, but for private patients the oral method has much to recommend it. We found that the *average difference between the rectal and oral temperature was  $0.4^{\circ}$* , provided care was taken to obtain the maximum heat of the mouth. With the large amount of time which these patients perforce spend in resting, the retention of the thermometer in the mouth for ten minutes or more presents no difficulty, and the rise of temperature which immediately

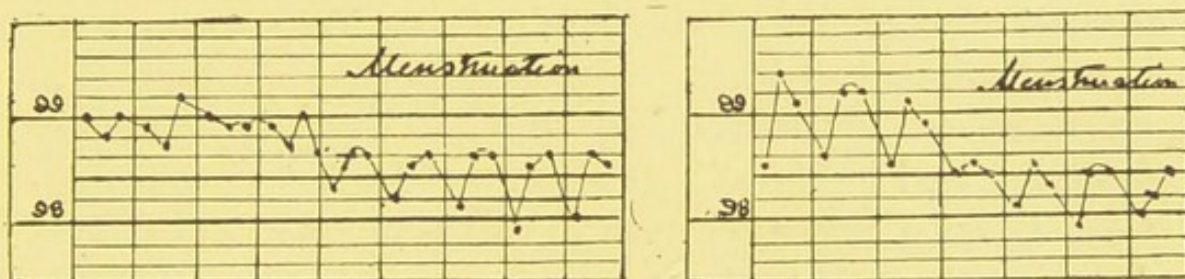


Chart II.—TWO TYPES OF ELEVATION OF TEMPERATURE COMMONLY NOTED IN PULMONARY TUBERCULOSIS TO PRECEDE THE ONSET OF EACH MENSTRUAL PERIOD.

succeeds exercise and which is incapable of detection in the mouth possesses little bearing on the treatment of the case.

A persistent elevation of temperature after exercise has an altogether different significance, and if an interval of about half an hour be allowed the mouth may be depended upon for its recognition.

**Influence of Menstruation.**—Menstruation is also able to produce a distinct effect on the temperature chart in pulmonary tuberculosis. I find that in about half my female patients a characteristic rise of temperature occurs during the week that precedes the onset of menstruation. The average increase of temperature amounted in my cases to  $0.5^{\circ}$ , and lasted for an average period of six days, ending on the day before menstruation or extending over the first or second day of the flow.



Such pre-menstrual rise of temperature is observed much less commonly in non-tubercular patients, and therefore possesses some slight value in the diagnosis of tuberculosis. The chart on page 35 refers to a patient under observation for general delicacy only, in whom no positive signs of tuberculosis then existed. She has, however, subsequently developed distinct tubercular disease.

**Fever of Pulmonary Tuberculosis.**—As regards the fever of pulmonary tuberculosis, I propose merely to touch on the salient points which bear on sanatorium treatment. It is probable that no case of pulmonary tuberculosis runs its whole course without at some time being attended by fever, and it is generally held that no activity of the disease or extension of the lesions takes place without the accompaniment of fever. Important as the recognition of an elevation of temperature may be both in the early diagnosis and in the subsequent management of consumption, we must remember that in a large number of instances the disease is encountered in a non-febrile phase. There is no more striking feature of the malady, pulmonary tuberculosis, than the way in which its natural course is almost invariably marked by periods of remission and periods of exacerbation.

Uninfluenced by any therapeutic measure, fever and other active symptoms tend to subside from time to time, and after an interval of comparative quiescence the disease in the natural course appears to break out afresh. It is probable that these variations in the severity of the symptoms correspond with the development of tubercular lesions, and with their subsequent involution.

It is generally held that high fever signifies extension of the disease, fresh areas becoming infected by the tubercle bacillus. Fever of less degree, or of short duration, may be attributed to the absorption of the toxin elaborated in lesions which are not necessarily extending. The subject of tuberculosis is characterised by instability of temperature. At his best he is always on the verge of becoming febrile,



and a slight disturbance which would not affect the temperature of a healthy person suffices to cause a rise in the consumptive patient. Allowance must be made for accidental elevations of temperature, and a definite opinion can often be only formed when the temperature has been watched for several days in succession. It is the regularity and the persistence of perhaps slight degrees of fever which become important in the detection of tuberculosis. As far as one sign goes, much more can be learnt of the patient's progress and exact condition by a study of the temperature than by any other single manifestation. Examination of the chest may reveal the amount of lung involved, and possibly the nature of the contributing tubercular processes; but the most crucial testimony is that afforded by the thermometer. The mischief discovered by the stethoscope may be very small, but the degree of pyrexia present may announce that the patient is affected with a virulent form of disease. The patient's future outlook depends less upon the extent of involvement of the lungs than upon the type assumed by the tubercular processes, and the severity or the mildness of the attack are mainly distinguished by a consideration of the temperature chart.

Generally speaking, the height of the fever is the measure of the severity of the infection. It will be found that a temperature which day after day exceeds  $101^{\circ}$  betokens grave disease. Of course, much depends on the information which can be derived from the effects of treatment for a week or two. If the fever is unaffected by complete rest and other means, the prognosis must be guarded, however slight may be the amount of lung diseased. It is certain that while any elevation of temperature persists the patient's position is unsatisfactory, and sooner or later it will probably be manifest that an extension of the disease was the explanation of the fever.

We must always be prepared to recognise pulmonary tuberculosis in its non-febrile phase. As a matter of fact, out of 200 cases presenting themselves for treatment at



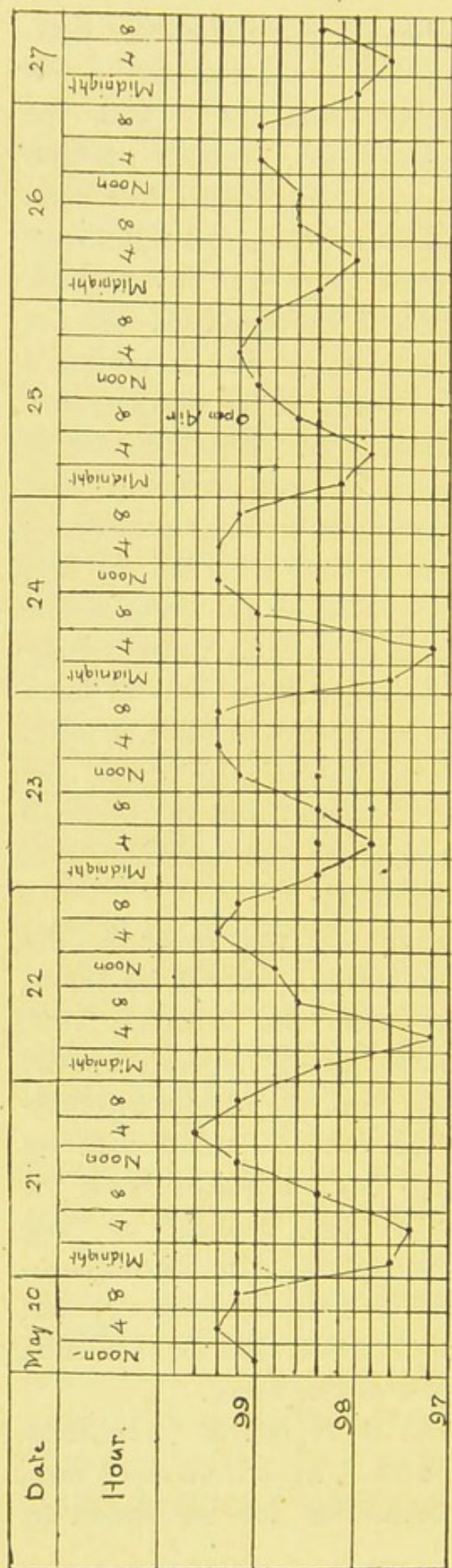


Chart III.—CHARACTERISTIC ELEVATION OF TEMPERATURE COMMONLY OBSERVED IN SLIGHT TUBERCULOSIS.

The highest point is reached at 4 p.m. As improvement occurs, it will be noted that the excursion is lessened both below and above the normal line. This improvement follows immediately the placing of the patient out of doors, confinement to bed in a ward having failed to accomplish this reduction of temperature.

two sanatoria with which I have been connected I find that about 40 per cent. were febrile and about 60 per cent. were non-febrile. The latter group of non-febrile patients consisted chiefly of cases of long-standing disease, whose activity had already expended itself. Though fever is sometimes absent in the quite early stages of pulmonary tuberculosis, it is probable that even here there has been a febrile period, but of such short duration that it escaped notice. Arrest of disease is mainly evidenced by the absence of fever. Excepting in patients debilitated by chronic disease, and whose powers of reaction have been exhausted, no development or extension of their tuberculosis commonly occurs with-



out an elevation of temperature at some time in the day.

The fever of pulmonary tuberculosis almost invariably assumes a highly characteristic form. With the utmost regularity the temperature gradually rises in the afternoon, until its maximum point is reached between 3 and 8 p.m.

With the same constancy the temperature then begins to decline, until its lowest point is reached in the early hours of the morning, between 2 and 8 a.m.

It should be unnecessary to insist upon the fact that the fever of pulmonary tuberculosis is only to be observed in the latter part of the day, but ignorance on this point is still occasionally displayed and a patient's condition is judged of when only the morning temperature has been recorded. The same maximum point is reached day after day at about the same hour, though in different individuals there is a difference in the hour when the temperature marks the highest point. My observations indicate 4 p.m. as the hour in the greater number of consumptives, but it may not be till 8 p.m. that the maximum degree is reached.

In the same way the morning hour when the temperature falls to its lowest point is different in different individuals. The fall is often accompanied by sweating, but under the influence of sanatorium treatment this symptom is usually soon conquered, and night sweats vanish before any change has necessarily been effected on the fever. I am of opinion that the night sweats of consumption are due to an independent action of the toxin, for I have noted their occurrence in a case of pulmonary tuberculosis where the temperature did not rise. It is stated that the extent of the morning depression of temperature affords information as to the patient's condition of almost equal value to the rise of the afternoon. In my experience, however, this is not the case. I do not find that the amount of the drop of temperature below normal point is at all necessarily proportionate to the gravity of the illness. The extent of the oscillation may be greater in cases doing well than in



those who are obviously unpromising. I advise that the temperature be usually taken three times in the day—before the patient leaves his bed about 8 a.m., about 4 p.m., and again about 9 p.m. As has already been stated, the temperature of some consumptive patients is at its highest point in the evening, that of others in the afternoon. My own experience points to the afternoon as the time when the maximum temperature most commonly obtains. The patient's own sensations do not afford any trustworthy indication as to the existence, or as to the degree, of the fever. A moderate elevation of temperature in pulmonary tuberculosis may be unattended by any of the usual discomforts of fever, and it is not very exceptional to be told by the patient that he is less conscious of the sense of illness during the latter part of the day, when his temperature is raised, than during the morning, when he has no fever.

The characteristic temperature chart of pulmonary tuberculosis is marked, as we have seen, by regular morning remissions, when the temperature falls to normal point or often lower.

There are, however, certain conditions of pulmonary tuberculosis under which fever is found to obtain in the morning as well as in the afternoon, and it is very necessary to recognise the great significance of this more continuous type of fever.

Generally speaking, when the temperature is raised during the whole of the day it can be inferred that active dissemination of tubercle is taking place with the invasion of fresh areas, or that some acute inflammatory process is occurring.

In acute miliary tuberculosis there may be little or no diurnal remission of temperature, and the chart may be represented by an almost straight line.

In pneumonic or in caseous tuberculosis the fever usually manifests more or less marked morning remissions, but the temperature of even the morning is distinctly



raised. Pleurisy and bronchitis may be attended by a similar type of fever, the temperature of the afternoon may be  $101^{\circ}$  or higher, that of the morning may be lower, but still above the normal point.

In watching a case of pulmonary tuberculosis, the physician's attention must always be immediately arrested

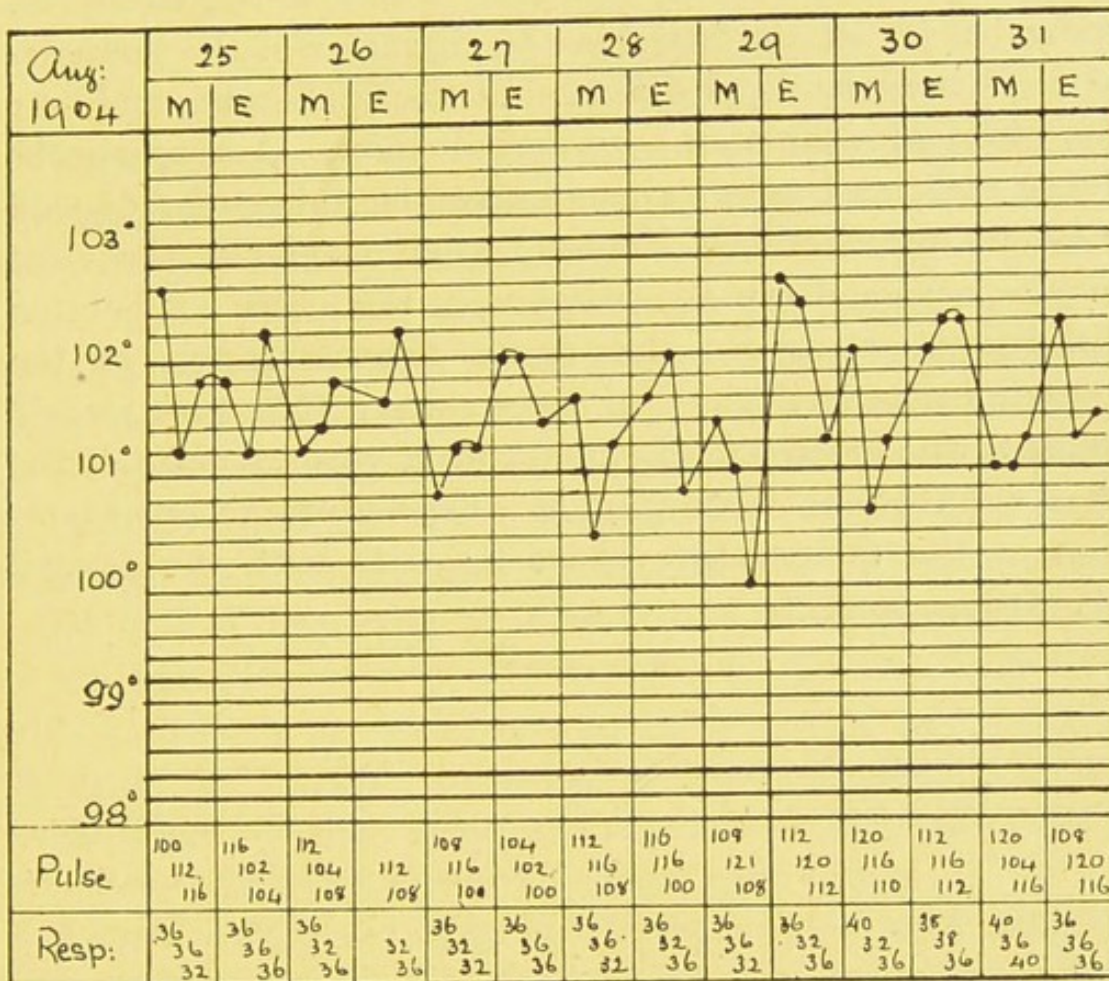


Chart IV.—THE MORE CONTINUED ELEVATION OF TEMPERATURE SIGNIFICANT OF GENERALISATION OF TUBERCLE.

There is no regular fall of the morning temperature below normal, and respiration is disproportionately hurried.

by a change assumed in the features of the temperature chart. During the course of the disease it frequently happens that the morning temperature fails to fall to its usual normal or sub-normal point, and at the same time the evening rise is exaggerated. If the influence of some accidental disturbance can be excluded and this more continuous type of fever is maintained, the occurrence of one of the conditions already named is strongly suggested.



Most commonly it will be found on examination that some pleurisy has broken out, or that a pneumonic invasion of some area below the old lesion has occurred. With these conditions the indications of the temperature chart are readily confirmed by the detection of the characteristic physical signs.

h The other condition, however, which is commonly responsible for an alteration in the character of the temperature chart is the rapid diffusion of fresh tubercles, and here the physical signs may be very indefinite. A case may be doing well, and to all appearances the tubercular deposit may be satisfactorily limited, when suddenly the virus breaks loose and rapidly overspreads the lungs. It is often difficult to recognise this acute tuberculisation of the lungs by means of physical signs alone; they may merely indicate the existence of exudation in various parts of the chest; but reliable information is derived from a consideration of the temperature chart together with the general symptoms present.



## CHAPTER IV.

## THE PULSE AND RESPIRATION.

**The Pulse.**—Next in importance to the study of the temperature, from the point of view of prognosis and treatment in pulmonary tuberculosis, comes the observation of the pulse. We are concerned with its frequency and with its strength. The pulse is generally accelerated in proportion to the height of the fever, and the exhaustion of the patient. In febrile patients the pulse is slower in the mornings, and increases in frequency as the day goes on and as the temperature rises. We have to determine if the rate of the pulse is in excess of what is explained by the elevation of temperature, and for this purpose the rule of allowing an additional ten pulse beats per minute for every one degree of fever is fairly applicable. An acceleration of the pulse which exceeds this allowance indicates cardiac weakness or general exhaustion. M

I need hardly say that to obtain reliable pulse counts care must be taken that the patient is not excited. My own practice is to depend on the observations of a trained nurse, who takes the records quietly at least twice a day—in the morning before the patient leaves his bed, and in the latter part of the day when he is at rest. It is a very useful plan to keep a record of the average morning and evening pulse rates for each week. This obviates the fallacy of any temporary disturbing influence, and the attendant can see at a glance the general progress made by the patient in respect to this particular sign. A specimen is given (Chart V.) of the average chart we have in use, and which we find very convenient. The weekly averages of 4



the temperature and pulse for the mornings and for whatever part of the afternoon when the maximum occurs are given. Other lines show the change each week in the weight, while the average daily quantity of sputum and other points can also be provided for.

The chart figured is a good example of the behaviour of these symptoms in the case of a patient responding satisfactorily to sanatorium treatment.

I would particularly draw attention to one small point in regard to the pulse which the average charts exemplify in a large number of our patients.

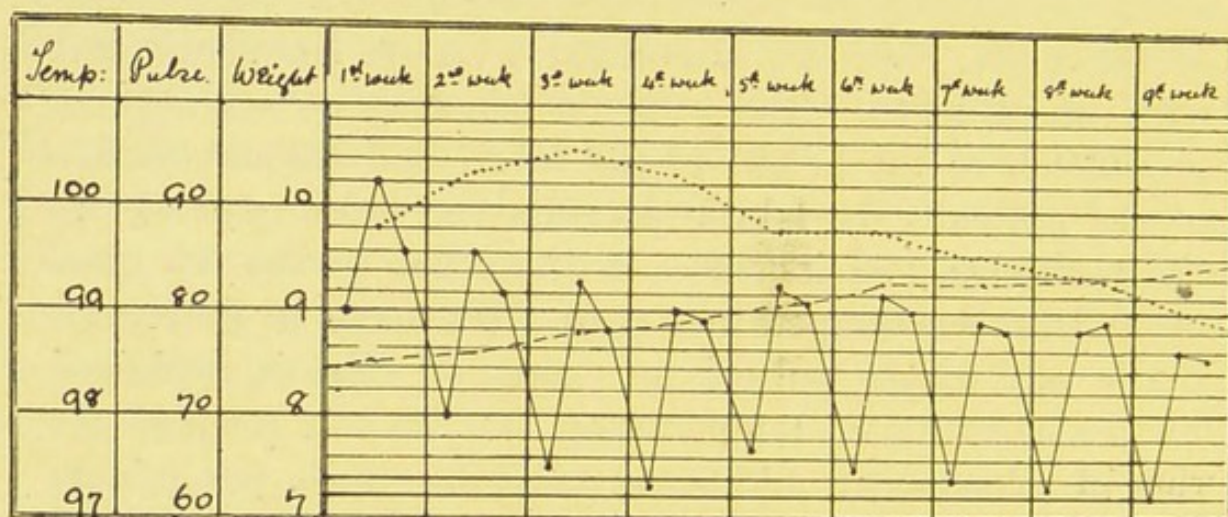


Chart V.—SHOWING WEEKLY AVERAGE MORNING AND AFTERNOON TEMPERATURE (STRAIGHT LINE), WEEKLY AVERAGE AFTERNOON PULSE-RATE (DOTTED LINE), AND WEEKLY WEIGHT (BROKEN LINE).

This average chart is a typical illustration of the commonly observed effects of treatment. The temperature is reduced immediately and gradually continues to decline. Weight is gained from the first and before fever disappears. The pulse-rate rises at first while temperature falls, but subsequently falls also.

It will be seen that the mean rates of the morning and evening pulse are increased during the first weeks of treatment. This acceleration, which is commonly to be noted on the commencement of sanatorium treatment, obviously does not depend on the influence of an elevated temperature. I imagine that it is due to the effect on the circulatory system of the increased feeding. In the course of the second or third week the system has generally accommodated itself to the large amount of food ingested and the pulse-rate returns to its original figure. Afterwards the frequency



of the pulse slowly declines, chiefly through the effect of the lowered temperature ; secondarily, by reason of the heart's gain in strength. There is no surer sign of satisfactory progress towards secure arrest of the patient's disease than a steady diminution of the pulse frequency. On the other hand, we can never feel satisfied of the patient's safety if the pulse remains too frequent, even though the temperature and weight may show improvement.

As we shall see later, some practical importance attaches

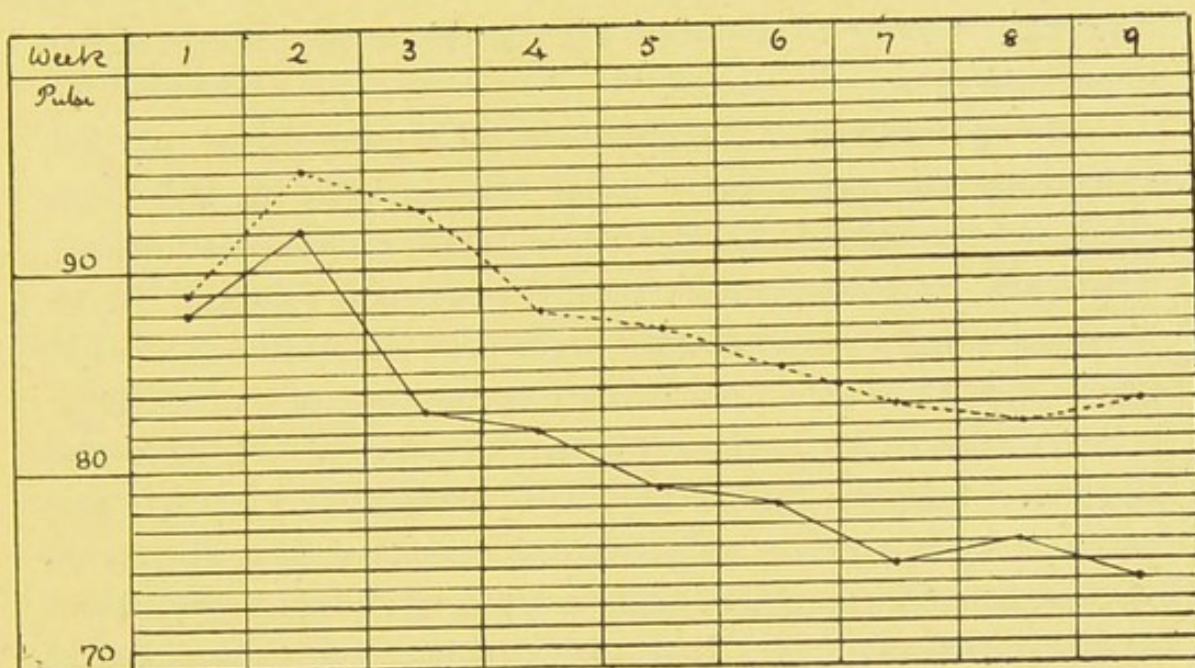


Chart VI.—WEEKLY AVERAGE PULSE-RATE FOR THE AFTERNOON (DOTTED LINE) AND FOR THE MORNING (STRAIGHT LINE), SHOWING A COMMONLY OBSERVED EFFECT OF SANATORIUM TREATMENT.

The rate is at first increased and is subsequently markedly diminished.

to the increased frequency of pulse commonly noted during the first week or two of treatment. It shows, I believe, that full feeding may be answerable for acceleration of pulse, and a reduction of the volume of nourishment certainly constitutes one of our means of improving the patient's circulation. In certain cases complaint may be made of other symptoms referable to disturbance of the cardiovascular system by the full feeding. Intolerable giddiness is occasionally noted, and may be benefited by lessening the amount of food: Sir Andrew Clark described a form



U of hæmoptysis which he attributed to the swallowing of too great a bulk of liquid, and this possibility should always be borne in mind. I must say, however, that I have never seen any reason for connecting an attack of hæmoptysis with the increased feeding of the sanatorium system.

Moderate frequency of the pulse, though it arises from cardiac weakness and is independent of existing fever, may be reduced in the course of time by patient adherence to judicious directions. But when the pulse constantly ranges, say, over 90 per minute without a corresponding amount of fever to account for the frequency, the patient's condition is one of insecurity.

**Respiration.**—Dyspnœa is by no means a constant symptom of pulmonary tuberculosis, and in the early stages of the malady no shortness of breath may be noticed. There are, however, certain conditions under which dyspnœa becomes a highly important symptom. Allusion has already been made to the occasional supervention of miliary tuberculosis in the course of the disease. When tubercles suddenly become diffused over a fresh area of lung, and perhaps light up an inflammatory process, the alteration of the breathing constitutes a pathognomonic symptom. The respirations which had not been perceptibly quickened before now become hurried and more or less laboured. Generally speaking, the charts of cases of consumption manifest much more alteration in the rate of the pulse than in that of the respirations. In the majority of severe cases there is disproportionate acceleration of the pulse, showing that the stress of the disease has fallen upon the heart, while the respirations are but little affected. But in the presence of miliary tubercle, freshly diffused over a portion of lung previously unaffected, the respirations may be quickened out of proportion to the pulse, and the pulse-respiration ratio may undergo the same change as in pneumonia. The *alæ nasi* move with respiration, in talking the patient has to pause between his words to take a breath, and any movement in bed exaggerates his difficulty



of breathing. As more and more lung becomes invaded by the miliary tubercles the dyspnœa increases in urgency and intense cyanosis may manifest itself. Such a degree of dyspnœa is highly characteristic of miliary tuberculosis, and contrasts strongly with even the final stages of the more common forms of chronic tuberculosis with cavities. Here, though little lung appears to be left for the patient to breathe with, dyspnœa is not often a prominent symptom.

On the occurrence of acute pleurisy the respirations become hurried and shallow, and the characteristic painful catch in the breath may be observed. Urgent dyspnœa of absolutely sudden onset is suggestive of pneumo-thorax having happened. Dyspnœa on exertion is a prominent symptom in chronic pulmonary tuberculosis, when fibrosis predominates over destruction of lung. With the development of much fibrous tissue we anticipate that the lesion will be a comparatively stationary one, and that the prognosis as regards the duration of life is favourable. It is important, however, to recognise that while the fibrosis safeguards the patient from the extension of his disease, it cripples him in the matter of his breathing, and incapacitates him from any active exertion. Bronchitis and emphysema are also often present, and add to the dyspnœa in these cases. In the fibroid form of pulmonary tuberculosis the alteration of the breathing generally assumes a very characteristic form. It is of the asthmatic type, expiration is particularly affected, and it is laboured and noisy rather than hurried. These patients also present signs of embarrassment of the circulation, the nose is often a bluish red, the extremities are cold, and the pulse is feeble. In these cases marked by the predominance of fibrosis over other changes in the lungs, the dyspnœa on exertion, and the other signs and symptoms, are essentially constant in character. They manifest but little tendency to change, and are not markedly influenced by treatment. But there are other cases where the disappearance of breathlessness on exertion is perhaps the first



and most conspicuous sign of improvement noted by the patient in consequence of sanatorium treatment. Such shortness of breath was in the first instance only experienced on exertion, and it probably depended on mere anæmia and debility of the heart. When dyspnœa does not arise from the nature of the pulmonary lesion, it may prove strikingly amenable to the fortifying effects of sanatorium treatment.

To sum up, the breathing is not markedly affected as a rule in slowly progressing pulmonary tuberculosis unless there is much formation of fibrous tissue, and then the dyspnœa is chiefly on exertion. Rapid respiration during rest is highly suggestive of the diffusion of miliary tubercles or of the occurrence of some inflammatory complication.



## CHAPTER V.

## THE SELECTION OF CASES FOR TREATMENT.

WITHOUT attempting to give a description of all the features of pulmonary tuberculosis, I wish to allude to the differences in tractability to treatment which distinguish different forms and stages of the disease.

As in other departments of medicine, exact diagnosis is the key to real success.

**Importance of Early Recognition of Tuberculosis.**—If the best results are to be obtained from treatment, it is essential that the malady be positively recognised in its very earliest stages. It is equally essential for the credit of the system and for the satisfaction of the practitioner that a fairly correct opinion be formed as to the measure of benefit likely to accrue from treatment, and as to the probable length of time required to secure this amount of benefit. A large number of medical men have not been sufficiently in earnest in the past over the treatment of their consumptive patients. They have not realised the importance of picking out the sufferer at the very first manifestation of the disease, and of insisting on serious measures being immediately adopted. Then when the disease is encountered in its later stages great laxity has often been shown in the opinion expressed to the patient or his friends. The consumptive, whose lung is so extensively involved that restoration to moderate health is precluded, is assured that a complete cure will be attained by a certain amount of treatment. Patients under treatment and progressing favourably towards secure arrest of their disease are permitted to return too soon to work under



the impression that they are cured, and soon, perhaps, break down again, when perseverance with treatment or making them understand their true position and their limitations would have safeguarded them from relapse. Sanatoria announcing that only early cases or such as can be restored to efficient health are admitted become inundated with patients suffering from hopelessly advanced disease. Much needless disturbance is thus caused to the patient, and the advance of the crusade against consumption is hindered by discrediting the treatment in the public mind. First of all, then, it is most important to recognise and distinguish the various phases of pulmonary tuberculosis, from its inception, when no physical signs may be present, to the stage when large areas of lung are destroyed or the general constitution is so damaged that Nature's powers of responding to any treatment are exhausted.

**Desirability of Being Candid with the Patient.**

—In the second place, it is generally politic to give the patient the benefit of a true statement of his case. Avoid the fatal mistake of buoying up the patient with false accounts of his condition. There is naturally a great temptation to prophesy favourable issues, and some strength of character is required on the part of the doctor when he finds his patient growing restless, and still knows it to be his duty to tell him that arrest is not yet secured, and that treatment must not yet be relaxed. At the same time there is nothing more forcibly brought home to the physician by a little experience in this branch of medicine than the necessity of honesty on his part in the matter of the opinions given concerning his patients. To begin with, as Léon-Petit says: "*La phtisie a tout à perdre aux pieux mensonges.*" Unless on the earliest detection of the malady the patient is made to comprehend fully the seriousness of his condition, he cannot be expected to submit to adequate measures. It is seldom wise to deceive the consumptive with the assurance that he has nothing more than a little delicacy of the lung or that he



has only a tendency to the disease. Sooner or later the truth must be divulged, and the practitioner then runs the risk of losing his patient's confidence. Meanwhile it is unlikely that the patient will be willing to make the necessary sacrifices for the stamping out of the disease, unless he is plainly informed of his real state. Further, it is inadvisable to deliver a too sanguine or purposely erroneous prognosis. At the end of some months spent in treatment the patient, whose malady perhaps never admitted of complete recovery, is apt to complain that he only embarked on the course under the impression that he would certainly be cured by so many months in a sanatorium. The false statement recoils on the head of the practitioner, and the treatment is discredited in the eyes of the laity. I have so often found myself in a very difficult position in relation to the patient or to his former medical adviser by reason of such deceptions having been practised that I have been led to dwell on this topic. I will dismiss it by expressing the conviction that it is for the good of the patient and for the credit of the practitioner that an honest opinion be given. By all means let any reasonable grounds that exist for a hopeful prognosis be made the most of, and let the patient be persuaded of the importance of time to his case, but he should not be promised that which is unattainable.

The success of treatment is more dependent on the case being taken in hand at the very commencement of the disease than on any other one point.

So the practitioner's most important duty in regard to pulmonary tuberculosis is its early detection. Bearing in mind the prevalence of the disease, especially in certain families and in particular classes, we should always be on the search for its earliest manifestations, and not be content to postpone its diagnosis until the patient himself is made aware of the existence of something seriously amiss with him. It should be our aim to recognise tuberculosis before obvious physical signs present themselves, and to place the patient immediately under treatment.



The supreme importance of the early diagnosis and prompt treatment of consumption is common knowledge, and their exact influence on the results obtained will be given in a subsequent chapter. If these facts were, however, more fully realised, a larger number of patients would be submitted to treatment before the manifest physical signs of developed disease had been allowed to occur.

It is often easy to diagnose pulmonary tuberculosis in the absence of the signs that are elicited by percussion or auscultation. **Hæmoptysis** affords the readiest means for its early detection. The patient is alarmed by the occurrence of hæmorrhage, and is usually impelled to seek medical advice without delay. In the absence of any other obvious cause for hæmoptysis, tuberculosis will prove to be the explanation in the vast majority of instances. If emphysema, bronchiectasis, new growth of the lung, mitral disease, or aneurysm can be excluded, any hæmoptysis that amounts to more than streaking or coloration of the phlegm is almost invariably due to tuberculosis. We are sometimes consulted by patients who are frightened by the appearance of blood from their mouths morning after morning with or without a cough; in fact, the blood may be found on the pillow on waking. In the class I refer to, the practitioner may usually make his mind easy, and exclude pulmonary disease by noting that the loss of blood is absolutely periodic, that it is grumous or watery in appearance, and that the patient's general condition is not suggestive of tuberculosis.

There certainly are cases where large quantities of blood are occasionally coughed up, and where the subsequent progress points to the existence neither of tuberculosis nor of other gross disease. Instances, however, of the occurrence of such unexplained hæmoptysis are infinitely rare. On the other hand, it is extremely common to see cases of hæmoptysis without other obvious signs of consumption at the time of its occurrence, but in which after events clearly prove that the original hæmop-



tysis must have proceeded from this disease. Unless there are very good grounds for its exclusion, therefore, tuberculosis should be strongly suspected in all cases of hæmoptysis. Slight confirmatory evidence—for instance, the mere inheritance of a tendency to consumption—would warrant a positive diagnosis and immediate treatment. At the same time it is easy to place the patient under observation with the view of eliciting further evidence of the existence of tuberculosis, as will be presently described.

**Other Symptoms.**—In addition to hæmoptysis there are other symptoms which may enable the physician to diagnose pulmonary tuberculosis before the development of physical signs. A cough which has persisted without sufficient change in the throat or bronchi to account for its continuance should direct attention to the possible existence of tuberculosis. The most reliable confirmatory information is then afforded by a scrutiny of the patient's weight, of his general strength, the condition of stomach, and particularly of the afternoon temperature, and of the sputum.

There is almost invariably a progressive loss of weight from the onset of consumption, and if together with obstinate cough there has been loss of flesh, tuberculosis should be shrewdly suspected. The incipient consumptive will also probably have noted some loss of strength, an unaccountable lack of energy, and a sense of unwonted fatigue after only slight exertion. Night-sweats may also have been experienced. Failure of appetite is a very common early indication of tuberculosis. Dyspepsia has often been in existence for some months before tuberculosis declares itself, and the stomach is apt to manifest a peculiar irritability, vomiting being easily excited by cough or occurring alone in the early morning. There is one other disease closely related to pulmonary tuberculosis to which I will just refer—pleurisy. Perhaps idiopathic pleurisy is always tubercular; anyhow, a history of this disorder should always put the practitioner on the watch for



consumption, which may be diagnosed in such cases on very slight confirmatory evidence. In all cases of suspicion the physician must avail himself of the invaluable information afforded by repeated observations of the temperature, especially during the latter parts of successive days. The characteristic temperature of tuberculosis has been considered in a separate chapter, and I will now only advocate strongly the plan of keeping any doubtful case of tuberculosis under observation for some days for the purposes of diagnosis. It is often impossible to arrive at a positive diagnosis one way or the other after a single interview with the patient, and I trust that the vital importance of recognising tuberculosis at the earliest possible moment has been sufficiently insisted upon. So soon as definite evidence of its existence has been obtained, there is no time to be lost. Adequate measures should be at once adopted, as delay may mean the development of lesions which no amount of treatment can obliterate. As stated by Dr. R. W. Philip: "A week or a month lost may be required to be multiplied many times in relation to the treatment of the disease," whereas if serious steps are taken before the tubercular processes have advanced, there is every likelihood of a short course of treatment permanently restoring the patient to a state of active health. In case, then, there is any misgiving in the practitioner's mind as to the existence of tuberculosis, or if he is doubtful as to the severity and tractability of the declared disease, he should arrange to have the patient under observation for a certain number of days, and not attempt to give a decisive verdict at once.

It is impossible to form a trustworthy opinion without knowing what the patient's **daily temperature** has been, and a single observation, even though it be made in the afternoon, may be misleading through the intervention of some exceptional condition. The whole complexion of a case is often completely changed on a subsequent examination, and its true nature or the prospects of its responding satisfactorily to treatment can often only be determined



after continued and close observation under special conditions.

In the case of the poor it is expedient if possible to submit the patient to a preliminary test in a hospital, while others may be sent home with some arrangement for the systematic observation of the temperature and of the effects of rest and feeding, perhaps, on weight and other manifestations.

If under conditions of rest the afternoon oral temperature regularly exceeds even so moderate a point as  $99^{\circ}$ , some confirmation of the suspicion of tuberculosis is obtained. Higher degrees of elevation give proportionately stronger grounds for its diagnosis. A single reading of  $99.2$  or more is worth nothing, especially if taken under the disturbing conditions of a formal consultation, but very different value attaches to regular elevations of a quarter of a degree observed day after day. The same applies to the pulse. If persistent frequency is noted under normal conditions, evidence of some value in favour of tuberculosis is afforded.

There remains the crucial test of **examining the sputum**, if there be any, for tubercle bacilli. If these are found, there is no longer any doubt about the diagnosis ; but it must be remembered that in the class of case now referred to there may be no expectoration. The failure to find tubercle bacilli has not a corresponding value in the shape of negative evidence. In the first place repeated specimens may have to be searched before the bacillus is at last encountered. So it must not be concluded that the sputum contains no bacilli until many preparations have been made and examined. In the second place, the tubercle bacillus does not appear in the phlegm until a deposit has softened and commenced to discharge.

I consider that a practitioner fails in his duty towards the patient if he neglects to apply every reasonable test to a suspicious case of commencing tuberculosis.

Inasmuch as the prospects of a sound recovery chiefly vary according to the promptitude with which the malady



is detected after its first inception, no pains should be spared in clenching the diagnosis at once. If the practitioner is doubtful as to the significance of such symptoms as a persistent cough, a loss of energy and strength, or diminished weight, there are two measures to be adopted which are especially valuable. One is the examination of the sputum in all doubtful cases, and the other is the observation of the temperature. In one way or another the physician can usually come to a correct conclusion, even though the physical examination of the chest furnishes negative or doubtful evidence.

**Examples.**—To give a few examples of these points, I will briefly refer to the cases of two patients. A man of twenty-three was thrown out of a cart and bruised his chest. During the next week he raised streaks of blood, which altogether did not amount to half an ounce. He had a little cough with scanty phlegm in the mornings only, but there were no other symptoms. He had not lost weight or strength, although he was naturally of rather poor physique.

There were no physical signs of disease in the chest. For several afternoons, however, the temperature rose to  $99.4^{\circ}$ . This slight elevation made me inclined to discount the accident as the cause of the slight hæmoptysis, and an examination of the sputum revealed the presence of a very small number of tubercle bacilli.

Let me cite another case illustrating these points, which is taken from a large number of similar ones. A hospital nurse who had previously enjoyed excellent health had noticed for some weeks that her work caused an unusual sense of fatigue. The appetite had fallen off, and she had suffered from some dyspepsia and headache. Her appearance was never robust, but no distinct change was now noticed. She had no cough at all, but at one spot in the inter-scapular region a single occasional click was once or twice faintly audible after making her cough. Suspicious evidence as to the meaning of these symptoms and the



questionable sign was now forthcoming. The nurse had lost a few pounds in weight, and it was elicited that a sister had died of consumption. She was immediately placed under observation, and the temperature was taken at regular intervals, with the result that is given on Chart No. III. (p. 38). Though the diagnosis in this case could not be verified by the discovery of the tubercle bacillus, I think the character of the temperature with its regular though slight evening rise, taken in conjunction with the symptoms mentioned, makes the diagnosis of pulmonary tuberculosis certain.

It should not be difficult to catch a large number of consumptives in such good time, if the practitioner will only bear in mind the prevalence of tubercular affection, and be always on the watch for the slightest manifestations of its presence.

If the best results are to be obtained from sanatorium treatment, I wish again to emphasise the point that we must not wait till the sufferer is disabled by his disease, but must actively search out suspicious cases of early tuberculosis.

We must go out of our way to take doubtful cases in hand at once, and proceed to verify or refute the diagnosis of tuberculosis. It will be seen that such cases of consumption can under good treatment be almost promised recovery, and will in all probability be restored to working capacity after a short stay of a few months' duration at a sanatorium.

**Tuberculin as a Diagnostic Reagent.**—Before dismissing this most important subject of the early diagnosis of pulmonary tuberculosis, mention must be made of the use of tuberculin as a diagnostic reagent. I have no personal experience of its value for this purpose, but it is said by many that reliable indications are afforded by the injection of tuberculin, and that it is free from danger. The profession in this country as a body have shown some hesitation in adopting this substance for the purpose of diagnosis and



treatment, on the ground that its injection is not altogether devoid of risk.

**Radiography as an Aid to Diagnosis.**—It is very possible that in radiography we have the means of displaying slight tubercular deposits which cannot be detected by the ear or other methods of examination. The X-rays have not been long enough in use to allow of a positive statement being made as to their value in the diagnosis of small tubercular lesions. It has been stated that shadows are sometimes shown when no morbid condition exists, and this is the point which especially requires further investigation. If it be true that a large proportion of mankind are always infected with the tubercle bacillus, it is impossible to refute the indications of a radiogram because no other symptom of tuberculosis is manifested. It may be that the X-rays, and they alone of our present methods of examination, are capable of demonstrating such lesions as heretofore have only been discernible *post-mortem*. A large number of control experiments will be necessary to establish this point. As far as I have seen, I am inclined to attach great value to the use of radiography in the determination of the presence of small lesions in the lungs.

Several cases of very slight tubercular affection have been examined for me by Dr. A. J. Cleveland in the new Electro-Therapeutic department of the Norwich Hospital. In all, the X-rays have correctly demonstrated lesions which gave slight signs to the stethoscope, and, in addition, have shown slighter presumable deposits of tubercle which were incapable of detection by ordinary means.

Whether or not further experience tends to prove that the shadows revealed by X-rays can be relied upon as indications of pulmonary tubercular deposits, it is admitted that valuable information is afforded about the movements and position of the diaphragm, as well as of other intrathoracic conditions, such as the presence of mediastinal tumours or glands.



**Diagnosis of Early Tuberculosis.**—For the diagnosis of very early tuberculosis we must avail ourselves of every piece of evidence that can be collected. A conclusion is arrived at by weighing the value of all the indications taken in conjunction, but I would recall the fact that tubercle affects a large proportion of mankind, and we should have this malady very constantly in our minds when investigating our patients' ailments. I firmly believe that a large number of persons who are regarded as being merely generally delicate, in reality suffer from tuberculosis in a latent form. Under this conception of the generality of the affection we shall be prepared to encounter it in all degrees of development.

There will be, in the first place, the class who present the classical signs and symptoms of declared consumption.

Secondly, there will be those whose symptoms are not manifest or pathognomonic of the disease, but in whom search has to be made for evidence of tuberculosis.

Lastly, there must be many individuals tainted by the tubercle bacillus, who cannot be absolutely convicted with our present means of diagnosis, but about whom we are justified in entertaining strong suspicions. It is some reflection on our methods that the majority of patients now presenting themselves for treatment have developed physical signs of disease which are only too obvious.

But it is encouraging to note the increased interest and hopefulness that are now displayed towards the problem of the suppression of consumption. One of the most important moves in this crusade is the forwarding by every available means of the early diagnosis of pulmonary tuberculosis. The practitioner must be on the watch for symptoms indicating that a latent tuberculosis has become active, and he should be furnished with means for the collection of necessary evidence. In the case of the poor the general hospital's greatest use in consumption is perhaps to receive doubtful cases. Their admission allows the



necessary observations to be made on the temperature and on the sputum. For acute cases a probationary period in the hospital ward affords the best means for deciding upon the suitability of the patient for sanatorium treatment. Before sending him away and incurring expense, his amenability to treatment can be judged of by the response he makes to modified open-air treatment.

Where admission to a hospital is impracticable, a district nurse should be available for the purpose of taking repeated evening temperatures, and examination of sputum should be conducted in municipal laboratories. The lack of adequate accommodation in sanatoria for the poorer consumptive renders the admission of a patient such a difficult task that some doctors feel oppressed with the futility of their efforts. Early diagnosis would be stimulated by better provision for the immediate treatment of all well-selected cases. If admission to a sanatorium followed automatically upon the declaration of the nature of the illness, as is the case with the specific fevers, more pains would probably be taken to detect pulmonary tuberculosis in its earliest stages.

**Diagnosis of Confirmed Tuberculosis.**—We now pass to the consideration of the patient whose disease is a stage further advanced, and is associated with the presence of definite physical signs in addition to the general symptoms already mentioned. Physical signs in the chest give us information as to the extent of the tubercular disease—that is to say, the amount of lung involved; and they may also give some information as to the type or nature of the tubercular processes.

As regards the extent of the lesion, the evidence of the physical signs is fairly clear and trustworthy, always allowing for the fact that they only bear witness to the more superficial and grosser changes, and that the actual amount of disease will be always slightly in excess of that manifested by physical examination. There will be deposits of tubercle of which no indications are given by auscultation and per-



cussion, and in the more central portions of the lungs even breaking down may occur without the possibility of detection. But the relation between the actual distribution of lesions and that of the physical signs may be taken as being fairly constant. It is more difficult to infer from physical examination alone what is the nature of the tubercular process assumed in a particular case. By a single examination it cannot always be determined if the pulmonary affection is acute and advancing, or if it has come to a standstill. To judge of the type or severity of the disease, the indications of the physical signs must be considered only in conjunction with the records of the temperature, the patient's nutrition, and general symptoms.

At the same time the value of the information derived from the skilful interpretation of physical signs cannot be overrated. A correct prognosis and treatment largely depend on the recognition of signs pointing to the predominance of fibrosis or, on the contrary, of caseation and softening. Inflammatory and passing affections of the pleura, bronchi, or lungs must be distinguished by their signs from more persistent or purely tubercular processes.

Let us first consider the extent of disease as bearing upon prognosis or upon the degree of success probably attainable by treatment. It goes without saying that if the malady has escaped detection while physical signs are still absent, the next best thing is to apprehend it before the signs of mischief have become extensive.

**Classification of Cases.**—For working purposes it is convenient to have some mode of classifying cases of pulmonary tuberculosis according to the extent of the disease. It will be found that cases fall fairly easily into one of the following classes :—

**CLASS I.—INCIPIENT DISEASE.**

Physical signs absent or limited to an area equal to only one intercostal space.



## CLASS II.—LIMITED DISEASE.

Physical signs denoting the affection of not more than the half of one lobe.

## CLASS III.—MODERATELY EXTENSIVE DISEASE.

Physical signs distributed over the whole of one lobe, or limited to the halves of two lobes.

## CLASS IV.—ADVANCED DISEASE.






Physical signs extending over the whole of one lung or over the half of each lung.

**How to Record Physical Signs of Tuberculosis.**—To digress for a moment, I wish to lay before my readers a very simple plan for recording the physical signs in lung disease (p. 63). In order that a case of pulmonary tuberculosis may be properly followed up, and that the physician may be enabled to satisfy himself of the occurrence of any extension or resolution of the lesions, it is essential to keep accurate notes of the conditions found at successive examinations. For some years I have constantly used a scheme which was first shown to me by Dr. W. Huggard. I cannot say how far I have modified his plan, but I find that the distribution of the physical signs can thus be represented very rapidly and clearly, and allowance is made for noting changes as they occur.

The outlines of the front and the back of the chest may be stamped upon the note sheet with one of the well-known rubber stamps, or it answers equally well to write a vertical row of figures to represent the junction of the different costal cartilages with the sternum. The posterior aspect of the chest may then be mapped out by a rough representation of the two scapulæ only. Physical signs are recorded in three vertical columns on either side, opposite to the rib to which they correspond. The inner column is used for inspection and palpation, and deals with flattening or impaired expansion of the chest-wall. The middle column records the quality of the percussion



note, and the outer column gives auscultation signs. The figure 5 in these columns represents the normal, departures therefrom are signified by 4, 3, 2, 1, according to the extent of the abnormality. Various abbreviations will suggest themselves. For instance, the triangle with the

(Auscultation.)	(Percussion.)	(Inspection.)	(Costal Cartilages.)	(Inspection.)	(Percussion.)	(Auscultation.)
B. S. cavernous, few crackles 	3	3	1	4	4	B. S. weak, few crackles. 
	4	4	2			
	5	„	3	5	5	B. S. 5
	„	„	4			„
			5			„
			6			
			7			
5 5 5		 		4	4	B. S. cavernous, few crackles 
				5	„	
				„	5	
				„	„	B. S. 5
				„	„	crackles only
				„	„	on coughing.

The above record notes, for example, that over the left anterior apex there were appreciable flattening of the chest and impairment of the percussion note. On the other side these signs were more marked. Extreme dulness of percussion would be represented by the figure 1.

apex downwards signifies that the morbid sounds diminish in intensity as the stethoscope is carried downwards. The results of subsequent examinations are recorded in other columns beneath the different dates.

In pulmonary tuberculosis the severity of the infection is of as much, or of more, importance than the extent of



the lesion. The signs of damage to the lungs may be insignificant in extent, but if the height of the fever and the constitutional symptoms indicate a severe infection, the outlook is less hopeful than when more lung is the seat of destruction, but without the presence of fever.

The classification just recommended takes note only of the amount of lung involved, and leaves all cases attended with acute symptoms to belong to a category of their own.

When systemic poisoning assumes the most favourable and slightest form the afternoon temperature will not much exceed  $99^{\circ}$  in the mouth after about a week's rest and treatment. After this form every grade of severity of infection is met with up to that of acute miliary tuberculosis. In this condition the signs of involvement of the lungs may be few, but the general symptoms may be malignant in type.

**Resisting Powers.**—In regard to every patient there are the two distinct points to be attended to in framing an opinion about the case. But in addition to the extent to which the lungs have been affected and the mildness or severity of the toxæmia, there remains a third point for consideration—the individual's resisting powers.

Due weight must be attached to the natural vigour or, on the other hand, delicacy of the constitution. We must judge of the state of the other organs, particularly of those concerned with nutrition and circulation. It is most important to ascertain how far the system has already suffered from the existing disease of the lungs. In this connection it must be stated that the mere apparent age of the tubercular affection is not necessarily of great importance. We may learn that many years previously some manifestation of disease occurred, but that the phenomena quickly receded and remained in abeyance. Such a case would to all intents be a recent one, in spite of the length of time that had elapsed since the first outbreak of illness. By the term "long standing" it is inferred that the symptoms have continued for many months or more, and without cessation.



**The First Class.**—According to our division of patients, the first class includes those who present no physical signs, and those in whom the morbid sounds are only audible in an area that does not exceed one intercostal space.

In the first group the diagnosis will have been made on the occurrence of hæmoptysis or on the presence of persistent cough associated with loss of weight and strength: Perhaps the examination of the sputum or the observation of the temperature has declared the existence of tuberculosis.

In the second group of this class physical signs also exist, but are probably only elicited by very careful examination.

The favourite sites for the primary lesion of tuberculosis have been precisely figured by Dr. J. K. Fowler in his work on "Diseases of the Lungs." As a rule the spot first affected is not the extreme apex of the lung, but an inch or an inch and a half below this. The lesion often extends in the direction of the supraspinous fossa, where the first signs may be found, instead of immediately below the centre of the clavicle or in the supraclavicular fossa. A less usual site for the primary lesion corresponds to the first or second space below the outer part of the clavicle.

There may be some flattening and diminished expansion of the chest wall and the percussion note may be raised in pitch; but in these very slight affections auscultation affords, I think, the most valuable information. The most reliable sign is the presence of a few clicks or fine crackles, which may require a forced inspiration or even a cough to bring them out. While listening to the apices in front and behind, the physician must always make the patient cough before he concludes that there is no adventitious sound. The neglect of this precaution is a very common source of fallacy. In numberless cases the pathognomonic signs are only manifested after a short cough has been given. Breath-sounds may be unaltered,



or they may be marked by weakness, or by a more or less bronchial quality. Vocal resonance is commonly exaggerated.

Patients presenting such strictly limited disease are very favourable cases for treatment, and there is great likelihood of complete recovery being brought about by adequate treatment in three to six months' time.

If high fever is present and persists for several weeks, in spite of proper measures, there is, of course, the fear that before the activity of the process has been subdued, the lesion will have overstepped its former limitations. But even then the case will remain a comparatively favourable one for treatment.

**The Second Class.**—A large number of cases of consumption are taken in hand at this stage of the disease. The signs commonly consist of a few fine crackles, perhaps requiring a cough to bring them out, and only heard in the upper two or three intercostal spaces in front, and in the supraspinous fossa only behind. With these crackles there may be slight alteration of the breath-sounds in the direction of weakness or slight hollowness. There may also be a little impairment of expansion of the chest and elevation of pitch of the percussion note. In the presence of even such limited mischief the constitutional symptoms must be allowed due weight in the formation of an opinion as to the probable issue. To come within the category of favourable cases, the evening temperature after a week's rest must not range much above  $99^{\circ}$ , and there must be no obviously untoward condition manifested, such as marked anorexia.

Otherwise, with such limitation of disease there are fair grounds for anticipating restoration to working capacity, and disappearance of the symptoms of disease, as the result of treatment. When we come to speak of the clearing up of physical signs, we are approaching a subject that it is difficult to treat fairly. So much depends on the length of time during which the case is kept under observation.



After the lapse of, perhaps, many years, adventitious sounds may eventually vanish which at one time seemed unlikely ever to disappear. It may be as well admitted at once that if the success of treatment in consumption is to be measured by the effect produced on the physical signs, the results are disappointing. A very small proportion of the patients discharged from a sanatorium at the completion of their three to six months' course of treatment are found to have lost the physical signs of disease. The gain that has been effected does not depend upon the change which has been wrought in the condition of the lung as evidenced by physical examination. It is not usually by sounding their lungs that we can ascertain the amount of benefit the patients have received from their stay in a sanatorium, for there may be no material change in this direction, although the patient's general condition may be wholly transformed in consequence of treatment. It is possible to attach too much importance to the physical signs, *per se*, and the patients themselves are very much in the habit of doing so. Unfortunately, it happens that in the larger number of patients their lesions are already too extensive when treatment is commenced to permit of the complete disappearance of the signs thereof. Generally speaking, only very limited affections of the lung are compatible with complete loss of signs. If as much as half a lobe is the seat of morbid sounds, the signs are, as a rule, persistent. It must be understood that the patient's restoration may be as complete and satisfactory as possible, but that the disappearance of all signs is inconsistent with the extent of the malady. So long as examinations conducted at intervals of a month or two prove that no extension of the signs is occurring, their mere persistence is not necessarily of grave consequence. If the damage is confined to a small portion of the lung, the patient may attain to a position of moderate security, although moist sounds are always audible.

**The Third and Fourth Classes.**—With extensive and deep-seated lesions the physician may fairly



assume that no amount of time will obliterate their signs. But in the case of disease which affects an area of lung corresponding to not more than about two spaces, or, in the case of more extended lesions, which affect only the surface of the lung, it is wonderful to observe the effect of time. A patient may have become tired of reporting himself, and of learning that signs of disease still persist; then after the passage of a year or more the physician will be amazed to find that all signs have at length cleared away. It will be seen, therefore, that it is only possible to speak in qualified terms of the permanence of physical signs. But from the observation of an unselected series of cases of limited and extensive disease, which covers a period of two years, I would say that about 15 per cent. of them all lose the physical signs of disease. A much larger proportion—perhaps about one-half—of cases of strictly limited disease may be eventually found free from all physical signs if only they are watched for a long enough time.

It is necessary to point out that, granted such strict limitation of the disease and the prompt adoption of treatment, there are unfortunately a few cases which get worse instead of better. In some instances no response is ever made to well-directed therapeutic measures, and the patient steadily declines from the first. More often it happens that for a time the temperature becomes lower, and other indications appear promising. Then, without any necessary relaxation of treatment, an accession of fever sets in, and the disease is found to be overstepping its former limitations. Though such a shattering of our expectations is a possible occurrence at any stage of the disease, and should always be borne in mind in framing a prognosis, it may be stated that something like 90 per cent. recoveries will be made if only the disease is taken in good time, and if the tractability of the temperature declares the infection to be mild in type. I need scarcely say that while fever persists the outlook is necessarily uncertain;



However limited the affection of the lung may appear to be, sustained elevation of temperature, in spite of treatment, indicates severity of infection, and in the presence of fever we know that extension of disease is occurring. In other cases a persistently rapid pulse may warn us that the patient's progress is not wholly satisfactory, in spite of the limitation of the physical signs and of the absence of fever. Or, again, with all these indications pointing favourably there may be confirmed anorexia or dyspepsia, which presents an obstacle to the restoration of health.

If physical signs of disease are present in two lobes, or if they are spread over more than a half of one lobe, their total disappearance is improbable. It is true that more widely distributed signs do exceptionally clear up, but these cases are often those where the pleura or bronchi are chiefly involved. When physical signs are due to pleural exudation and affection of only the surface of the subjacent lung it is possible for widely extended signs of mischief wholly to vanish in time. In the same way moist sounds which probably arose from concurrent bronchitis may have been audible over the whole side of the chest, and may, to the physician's surprise, completely disappear.

Otherwise, I am disinclined to prophesy the complete resolution of signs whose distribution exceeds in extent what we have defined as incipient or strictly limited disease.

The persistence of morbid signs does not preclude the attainment of relative recovery. Every lobe may be affected, and perhaps an area equal to half the lung may be excavated, and yet so long as a tendency to limitation exists, such a condition is compatible with an indefinitely prolonged and moderately useful life.

It can only be laid down that so far as the extent of disease is concerned, the greater the area of lung attacked, the more is the patient under the necessity of following the life of an invalid, and subjugating all other considerations to those of health maintenance.



When a large portion of the lung has been affected the patient is particularly disabled for physical exertion, and it is important that he should accept the fact that he is only fitted for a life of rest. However extended the disease may be, some amount of benefit may be expected from treatment. But the completeness of the recovery is in proportion to the amount of lung which is unaffected.

We must consider the nature, as well as the extent, of the lesion as evidenced by physical examination. A very large number of cases of pulmonary tuberculosis belong to a sharply defined class characterised by the predominance of fibrous tissue formation over destruction.

**Fibroid Cases.**—Correct prognosis and treatment depend upon the recognition and due estimation of the fibrous element in these cases. The physical signs of this condition are usually very clear, but their evidence must be taken in conjunction with the other features of the case. The distinguishing characteristic of the disease is its tendency to persist; so we are usually informed that the symptoms are of long standing, and have probably undergone very slow change. Active symptoms are conspicuously absent; there is commonly no elevation of temperature, though in some fibroid cases a very slight amount of afternoon fever is constantly present, and persists perhaps for years without any extension of the lesions.

Dyspnœa on exertion is always a marked symptom, and the cough and expectoration of these patients resemble those of the asthmatic or bronchitic patient. The development of fibroid changes in the lungs imposes an obstacle to the free passage of the blood through them, and certain circulatory symptoms supervene with great frequency. The extremities are cold, and there are often redness of the nose and lividity of the complexion. The pulse is small and weak, and the embarrassment of the circulation also brings about failure of digestion and a tendency to small hæmorrhages. A common terminal symptom in these



patients is albuminuria. In the physical diagnosis of the fibroid or fibro-caseous form of pulmonary tuberculosis there is no one sign which belongs peculiarly to this condition ; but its recognition depends on the just interpretation of the signs taken collectively.

The preponderant development of fibrous tissue is strongly suggested when extensive areas of lung are found to be uniformly implicated, and yet present none of the clinical signs of excavation. The same case is undoubtedly marked at different stages of its course with a disposition on the part of the tubercular deposit now to caseate and soften, at another time to become transformed into fibrous tissue. But in spite of the fact that both processes occur in the one patient, it is usually easy to determine in each case which process has played the larger part. The physician sets himself the problem of considering which process in the main will best explain the physical signs elicited. With the formation of much fibrous tissue, the lesion may be extensive, and yet there will be no clinical signs of excavation. Instead of hollow breathing, the breath-sounds may be merely weak over the whole affected area, or in one spot there may be hollow breathing and elsewhere weak breath-sounds. Sometimes diffuse bronchial breathing is heard over a large portion of the chest ; but other signs do not denote excavation.

In this fibroid form of pulmonary tuberculosis the *râles* commonly assume a highly characteristic type. Again, there is no suggestion of their arising in a cavity ; they do not possess any hollow or any consonating quality. On the other hand, the *râles* are toneless and dull, and often appear to rumble along independently of audible breathing. In other cases—and this is a common feature where the process chiefly consists of the formation of fibrous tissue—*râles* are only brought out by a cough, and then a shower of fine, dull, crackles may be heard to succeed the forced inspiration. I need hardly say that retraction of the chest-wall and impairment of its expansion are commonly



noted where fibrous tissue has been freely deposited. The percussion note may be unaltered, or it may be raised in pitch and approach dulness.

The information suggested by the physical signs will, of course, be controlled by the general symptoms already referred to as characteristic of tuberculosis with the formation of fibrous tissue.

The bearing on prognosis of the conclusion that the pulmonary lesion is associated rather with fibrosis than with destruction is extremely important. As already stated, stationariness is the prominent feature of these cases. There is but little tendency to improvement, and there is much less liability to extension or aggravation of the disease than is the case with other forms of consumption.

Moist sounds may be heard throughout both lungs, yet the patient's life may be indefinitely prolonged, though he never loses the symptoms and signs of his malady. It must be remembered that while the formation of fibrous tissue to a great extent safeguards the consumptive from an extension of his disease, it produces disablement for an active life. Sanatorium treatment cannot effect complete recovery, but it is capable of doing much good, although in some particulars the system has to be modified for these invalids. In the first place the existence of much fibrosis impairs digestion and circulation, and so the feeding has to be proceeded with cautiously. These patients have not the elasticity or the power of accommodating their systems to an altered *régime* which is possessed by the subject of recent tuberculosis, and the addition of much weight may be productive of more harm than good. Their digestions require special study, and the best diet for them is one that imposes the minimum amount of strain on the stomach, while it affords the maximum amount of nutrition. In the same way a very reduced amount of exercise should be allowed in cases with much fibrosis. Rest is the cardinal rule for their lives, and only such an amount of slow walking



as is required for the preservation of muscular tone should be permitted.

These few details of treatment have been referred to in this place to emphasise the necessity of diagnosing the exact nature of each case of pulmonary tuberculosis before embarking on a system of treatment. If all patients are submitted to the one *régime* without discrimination, the results may be very unsatisfactory.

**Constitutional Symptoms.**—So much for the guidance afforded by physical examination of the lungs in the diagnosis and prognosis of the different forms of pulmonary tuberculosis. Of no less importance is the information yielded by the clinical thermometer. However slight may be the discoverable disease in the chest, the case assumes a serious aspect if there is persistently high fever present. Excepting extraneous causes, the gravity of the infection is in proportion to the height of the fever, and, as already stated, a temperature that regularly exceeds  $101^{\circ}$ , in spite of the influence of rest, indicates severe disease. With hectic fever ranging above  $101^{\circ}$ , the prognosis is doubtful, and with even lower temperatures the outlook is not hopeful if treatment fails to effect a distinct reduction within the course of one to two months. At some sanatoria febrile cases are given six weeks' strict treatment, and if at the expiration of that term the fever persists, the case is considered to be an unfavourable one, and is sent home. The unreserved adoption of such a rule as this is not to be recommended, for it would exclude a large number of patients who are capable of deriving much real benefit even if they are not wholly restored. The point I would emphasise is this: if an appreciable effect on the temperature is produced by treatment, it is advisable to persevere for any length of time. When some weeks of strict rest and exposure to air succeed in lowering the temperature ever so little, it will be commonly found that further treatment banishes all fever in the end. Though, unfortunately, it happens



occasionally that fever is at first mitigated by treatment, but eventually returns and remains obdurate, it is, generally speaking, a hopeful sign if the temperature is slightly or even temporarily lowered by our measures. A point somewhere about  $101^{\circ}$  may be taken roughly as the dividing line between severe cases whose fever is likely to prove intractable and favourable cases whose fever should be reduced. If febrile cases are divided into two groups, according as the afternoon temperature is above or below the point  $101^{\circ}$ , it will be seen that the greater number of the latter make good recoveries, while a large number of the former group fail to respond satisfactorily to treatment. Of course, there are the other points to be equally considered. The extent to which the lung is already involved has much influence upon the chances of success. While this remains limited we shall be encouraged to take a moderately hopeful view, in spite of persistent fever, which perhaps ranges at a seriously high level. Then the general state of the patient's resisting powers has to be estimated. Often the disease has been long enough in existence to have undermined the whole constitution, and in this case but little response is possible to sanatorium treatment. The unfavourable significance of marked frequency of the pulse has already been alluded to, and the same remarks apply to obvious weakness of the pulse.

Less commonly confirmed dyspepsia presents a complete barrier to satisfactory progress. As we shall see later, the slighter degrees of indigestion almost invariably give way at once to sanatorium treatment. In these cases the symptoms may comprise some difficulty in the taking of full rations, and some sense of discomfort, with flatulence afterwards. Nothing can be anticipated with greater likelihood of realisation than that such slight degree of functional weakness of the stomach will quickly yield to treatment. It is, however, altogether different with the grave degrees of dyspepsia. When the anorexia present amounts to an absolute disinclination or loathing for all



food, the physician may suspect that a condition of stomach exists against which treatment will avail little. Instead of yielding to forced feeding, the symptoms are only aggravated. There is distressing flatulence after all food, with nausea, perhaps, and frequent vomiting.

**Complications.**—The bearing on prognosis of the more common complications of pulmonary tuberculosis must be briefly considered. Generally speaking, the invasion by the tubercle bacillus of another organ is of evil significance, as showing activity of the process. But the gravity of the prognosis is not necessarily in proportion to the number of organs or structures affected. There is a class of cases characterised by the multiplicity of their tubercular lesions, but in which life is hardly threatened. The tubercular virus appears to expend its force in the invasion of one organ or tissue after another, and though the patient may present numberless foci of disease, his general health is fairly maintained, and there is but little tendency to the destruction of his life.

The slighter forms of laryngeal disease may be wholly recovered from under sanatorium treatment, if the condition of the lungs is favourable. When tubercular infiltration or mere hyperæmia of the larynx co-exists with pulmonary disease, which is limited in extent and mild in type, the prospects are fairly good. It is probable that the sanatorium system offers the best chances of recovery to such patients, with certain modifications, suited to their complication. Of these the most important is rest for the larynx, and this can be secured by forbidding them to talk, and particularly by guarding them against any such irritants as dust, smoke, or high winds. When one or both of the vocal cords are the seat of actual ulceration, and the pulmonary lesion is still of a favourable nature, sanatorium treatment is yet capable of bringing about recovery. The outlook is usually uncertain, but without recourse to any other measures, I have seen more than one such case do very well. Authorities are not altogether agreed upon



the relative efficacy of local treatment and general treatment alone in tubercular ulceration of the larynx. But the strongest advocates of such local measures as curetting and painting with lactic acid, also attach much importance to the general treatment comprised in the sanatorium system. No treatment is very promising when marked laryngeal disease complicates extensive or active pulmonary tuberculosis, though even here some relief may be afforded by the application of sanatorium principles. As a rule, laryngeal cases may be submitted to sanatorium treatment, and they are forbidden to talk at all. If no effect is produced on the larynx in the course of a month or two, local treatment should perhaps be tried, in addition to the general measures.

Abdominal tuberculosis manifests itself not unfrequently in the course of consumption. Curiously enough, in my experience it is rare to observe the opposite order of events—that is, for the first symptom of pulmonary disease to arise during the course of abdominal tuberculosis. The pleura is often attacked secondarily to the peritoneum, but this is usually an example of well-defined serous tuberculosis, where the lungs escape while pleura and peritoneum bear the brunt of the affection.

As with other complications of pulmonary tuberculosis, the prognosis depends chiefly upon the extent and severity of the primary disease in the lungs. With serious disease here, a slight involvement of the peritoneum or intestines is of grave import.

Profuse diarrhœa, indicating much ulceration of the bowels, is seldom recovered from, and, of course, necessitates great modification of the sanatorium *régime*. Even with this condition the physician should be careful in committing himself to a hopeless prognosis, for, with the proverbial uncertainty which exists about the future of a case of tuberculosis, I have seen partial recovery occur in the case of a patient who had profuse and persistent diarrhœa with abdominal distension and tenderness as a complication



of moderately severe lung disease. As a rule, the prospects of amelioration under treatment are greater when the peritoneum or the glands are the chief seat of affection than when the bowels are ulcerated. It must be remembered that abdominal tuberculosis does not respond in the same specific manner to the open-air life as is the case with pulmonary tuberculosis. At the same time these cases often do well in a sanatorium, for the all-essential prolonged rest can be secured in this way, and undoubtedly a useful part is also played by the attention bestowed on their nutrition and by the open-air life.

Nearly all tubercular diseases, whether the bones, the joints, the urinary or other organs, are implicated, benefit, to some extent, from the open-air treatment. It is only, however, when the lungs or air passages are affected that fresh air exercises its specific effect. In pulmonary tuberculosis exposure to the open air exerts an influence which is unquestionable, and which cannot be obtained with other agents. In the case of other tubercular diseases, open air does no more than improve the general health, and thus aid the natural powers of resistance.



## CHAPTER VI.

## TREATMENT OF THE FEBRILE PATIENT.

I WILL first of all describe the routine generally adopted in the case of a patient who is just embarking on a course of sanatorium treatment.

**Rest in Bed.**—The first point to be considered is : Should the patient be wholly confined to bed, or should he be allowed up for the whole or part of the day, in the bedroom or out of doors ? The answer to this question is chiefly supplied by the observation of the patient's temperature.

The rule generally laid down is that if the morning temperature is above  $98.6^{\circ}$ , or that of the afternoon above  $100.4^{\circ}$ , the patient should be kept in bed. I advise, however, greater stringency than this at the very commencement of a course of treatment. Such a large proportion of all our patients are strikingly benefited by a preliminary course of rest in bed that I would multiply the indications for starting treatment with confinement to bed. Moreover, I would include among these indications several conditions apart from fever. Taking first of all the question of the temperature of the patient just coming under treatment, I think it is a good plan to start the course with rest in bed if the temperature at any time of day exceeds  $99.5^{\circ}$ . If the practitioner is in any doubt as to the advisability of retaining the patient in bed, let him always incline towards that course. Many patients with these slight degrees of fever are strikingly benefited by a short period of absolute rest, and though the reduction of such temperatures will probably be accomplished in a longer time



without enforced rest in bed, yet it will be done more surely and more rapidly the more absolute the rest. Even a slight degree of fever may prove unexpectedly refractory, and supposing the other items of open-air treatment fail to lower it, we may in the end have to resort to confining the patient to bed, in which case we should regret not having taken this step at the commencement. Another advantage of keeping the patient in bed for the first few days of treatment is that we are thus enabled to ascertain the precise temperature curve under the influence of absolute rest, and to gauge the subsequent effects of even slight degrees of exertion.

Apart from elevation of temperature, there are other conditions commonly encountered for which I strongly recommend a preliminary course of rest in bed. The important significance of a rapid pulse has been already referred to, and when this symptom is present it should receive almost as much attention as fever. Rest in bed constitutes our best means for combating pulse frequency when this depends on mere weakness or on nervous irritability. A few weeks' confinement to bed at the outset of a course of treatment will often reduce the pulse rate strikingly; whereas patients subjected to strict sanatorium treatment, but without rest, are a very long time in losing this symptom—increased pulse-frequency.

Then experience has shown that many symptoms connected with the digestive system yield more surely to rest in bed than to any other therapeutic measure. If vomiting, diarrhoea, or even certain forms of dyspepsia are complained of, I am disposed to order complete rest at once. In the same way excessive emaciation would, to my mind, suggest the advisability of commencing treatment with bed, as everybody knows that the fattening process is powerfully assisted by the avoidance of the slightest exercise. I find that in my own practice, about half of my patients have been put to bed for a longer or shorter time to begin with. Experience has gradually taught me to

Pulse

Vom  
diarrhoea

Wash

W



adopt this plan of preliminary confinement to bed more and more. As a purely precautionary measure, it is particularly to be recommended in the case of fresh patients who have had to make a long journey to the place of treatment. All sanatorium physicians can probably recall to their minds instances of the occurrence of some unfortunate exacerbation of the tubercular malady within a day or two of the patient's arrival after a long journey. The outbreak of a pleurisy, a pneumonia, or a hæmorrhage in consequence of fatigue and excitement may be possibly averted by putting the patient straight to bed on his arrival, and keeping him there for some days. The most characteristic physiognomy of the disease is often a certain worn expression of the face; this seems to tell us how, with the malady gradually sapping his strength, and, in spite of increasing weariness and weakness, the patient has persisted in dragging himself about through the usual rounds of duty or pleasure. For such an individual, a week or two in bed, with the attendance of a sympathetic nurse to anticipate his every want, often works wonders.

But we will now leave these general considerations, and return to the treatment of a patient whose pulmonary tuberculosis is accompanied by fever. It is generally allowed that the proper treatment for a consumptive who is known to have a definite rise of temperature at some time of the day is to order him rest. The degree of fever which we take as an indication for continued confinement to bed, is a point on which practitioners and writers have differed, and much must depend on a consideration of each case by itself. It is first necessary to decide what is the best result that can reasonably be hoped for in each individual case. If the disease is slight and we resolve to aim at recovery or complete arrest, the course of treatment will be more strict, and I should say it would be wise, as a rule, to insist on the confinement to bed if the temperature exceeds  $99.5^{\circ}$  at any time of the day. If, on the other hand, the type and extent of the disease allow of only partial



improvement, slight amounts of fever will be dealt with less strictly. Perhaps no length of time in bed will wholly reduce the fever, and—anyhow, in these cases—it is not so essential to stamp it out in the shortest possible time for fear of the recoverable stage being passed.

Stress must be laid on the obligation of the medical attendant to lose no time whatever in commencing active treatment for patients whose tuberculosis has recently manifested itself. Every day may be precious, and the postponement of the adoption of proper and adequate measures may cost the patient a development of the disease, making good recovery impossible. In the case of early or remediable consumption no pains must be spared to ascertain if at any time of the day the patient is febrile. If fever does exist, it is the practitioner's duty to make the sufferer realise his position, and to advise that no time be lost in putting himself under treatment for the banishment of the fever.

In no particular is the specific action of sanatorium treatment better demonstrated than in its influence over the fever of pulmonary tuberculosis.

In the first place, absolute repose is secured for the patient by confining him to bed, which, as far as one thing goes, is the most essential factor in reducing fever. Most extraordinary laxity is often displayed about the fever of consumption, and I would like to repeat that there is actually no reason why the fever of early tuberculosis should not be treated as seriously as fever arising from other causes.

**Time as a Factor in Treatment.**—The essential factors of the open-air treatment are air, rest, feeding, and supervision, and to these might be added another factor—time. An important advantage is possessed by the physician who has had considerable personal experience in sanatorium treatment, in this respect. He has seen that the reduction of fever is often accomplished by persevering for months, when at the end of weeks perhaps the object seemed as



far from attainment as ever. Half the secret lies in the attendant being clear in his own mind as to the exact nature of the patient's affection. Having determined that the particular case is one that should yield eventually to treatment, he must have the courage of his opinion, and strongly resist all temptation to relax any regulation before the proper time. Failure to obtain the best results for our patients so commonly depends upon a lack of insistence and thoroughness. The adoption of a *laissez-faire* policy is answerable for the drifting into chronic invalidism or death of many patients, who might have been restored to useful and enjoyable health had sufficiently serious and continued measures been promptly urged upon them. We are all the time speaking of the fever of early or remediable pulmonary tuberculosis. The case is different when, after mature deliberation, we decide that even relative recovery is past hoping for, and that it is inadvisable to insist on such measures as strict confinement to bed and forced feeding, which are, perhaps, particularly irksome to the patient. Whenever, however, the nature of the disease admits of material improvement, it is the physician's duty to study the symptoms presented, and especially to ascertain if at any time of day fever occurs. If there is fever, an adequate trial must be made of absolute rest in bed.

In the first instance, or after the first few days of treatment, the patient is not confined to bed unless his temperature exceeds  $99.5^{\circ}$ . Such small degrees of fever as are represented by temperatures between  $99^{\circ}$  and  $99.5^{\circ}$  will probably yield readily to the open-air life without the co-operation of absolute confinement to bed. But a temperature that exceeds even so low a point as  $99^{\circ}$  demands consideration, and if, after the adoption of other measures for a week or two, this slight amount of elevation persists, we must have recourse to strict rest in bed. My point is that, however slight may be the elevation of temperature in pulmonary tuberculosis, we cannot afford to disregard it. The patient manifestly benefits by having



his temperature lowered, even by a quarter of a degree. The virtue possessed by absolute rest is well exemplified in these cases with fractional degrees of fever. Every other measure may have been faithfully carried out, but the afternoon temperature regularly rises above  $99^{\circ}$ , and the patient's general progress is not wholly satisfactory. The patient is then made to rest completely in bed. Without the intervention of any other change in treatment, it is likely that the temperature will be lowered in a few days, and that his general condition will be obviously

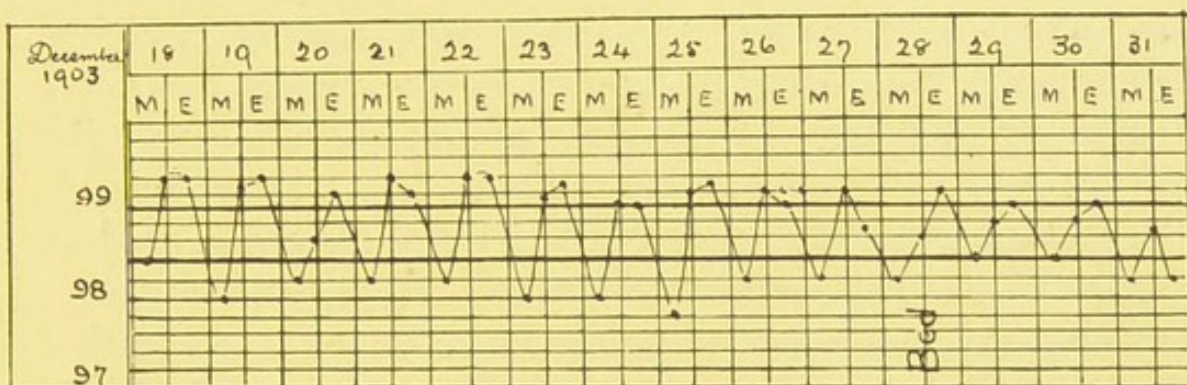


Chart VII.—SHOWING SLIGHT ELEVATION OF AFTERNOON AND EVENING TEMPERATURE WHICH HAD PERSISTED WHILE THE PATIENT WAS UP, BUT WHICH WAS IMMEDIATELY AND PERMANENTLY REDUCED BY CONFINING HIM ENTIRELY TO BED.

advanced. The rationale of this factor in the modern treatment of consumption depends upon the well-known fact that bed is the only perfectly safe place for any febrile patient. We have seen how the temperature is raised by the slightest muscular effort, and the complete relaxation of all muscles secured by the recumbent posture probably explains much of the virtue possessed by confinement to bed.

Not only are the voluntary muscles rested, but the demands made upon the heart and other organs are reduced, so that opportunity is afforded for the recreation of the whole system.

The bearing of the mental state upon the fever of consumption must not be forgotten. Confinement to bed



constitutes the surest means for secluding the patient, and for securing complete mental repose. Altogether it is easy to appreciate the effect of proper rest in bed upon the consumptive. All unnecessary demands upon his constitution are avoided. He is given every chance of gathering strength for the repulsion of his malady, instead of being allowed to divert his energy from the task of overcoming the bacillus. Next in importance to rest, as an agent for the reduction of fever in pulmonary tuberculosis, comes the application of fresh air.

**Acclimatising the Patient.**—Though the patient is in bed, it is allowable to feel one's way somewhat at first as regards the extent to which he is exposed to air. I begin by allowing the bed to stand in the middle of the room, and, of course, have all windows widely opened. The attendant will see that sufficient blankets are used to keep the patient comfortably warm; there is no objection to allowing him a hot-water bottle and an extra covering may be placed on the foot of the bed, which the patient may draw over him if desired during a cold night. The patient's garment should be quite loose, and of some flannel texture. Closely fitting vests are an abomination, and should be dispensed with at once. Their removal alone may stop distressing night sweats; and, anyhow, they retain the exhalations from the skin, and interfere with its free action. During the daytime a loose bed jacket should cover the arms and shoulders, when the patient has these out of bed. Much depends upon the time of year when treatment is commenced, and upon individual susceptibilities; but perhaps some days should usually be spent in acclimatising a new patient. It is universally admitted that the cold is much less felt after the first few days, and it is often advisable to make some concession to the patient's timidity about air and cold by increasing the exposure gradually. Having got the patient accustomed to fully-opened windows day and night, and being satisfied that the cold is well borne, the next move will be to place the



bed right against the window. Here again the exposure may be graduated, if necessary, according to the weather, and the way in which the patient tolerates the cold. At first the bed may be moved back from the window for the night, and in certain cases during damp or particularly boisterous days. Later, supposing the temperature shows no inclination to fall, day and night may be spent directly beneath the widely-opened window.

In the larger proportion of febrile case whose fever proves amenable to treatment, the satisfactory reduction of the temperature is brought about mainly through the instrumentality of continued rest in bed, with the help of such access of fresh air as the above-described measures provide, and also of feeding, to be presently discussed. Merely for the sake of giving a rough idea of the length of time commonly needed for the reduction of different degrees of fever, I append an analysis, which shows how many weeks' treatment was required by various elevations of temperature. The table also shows that the higher the fever which obtains, the smaller are the chances of success, however persistent the treatment.

<i>Average maximum temperature for first week of treatment.</i>	<i>No. of cases.</i>	<i>Percentage of cases in which temperature became normal.</i>	<i>Average number of weeks required to reduce fever.</i>
Between 99° and 99.5°	37	87.5	3.6
„ 99.5° „ 100°	18	54.4	5.7
„ 100° „ 100.5°	11	46.6	4.8
„ 100.5° „ 101°	9	34.2	6.5
„ 101° „ 101.5°	6	37.5	17.5

In this chapter the influence of strict rest and of exposure to air is alone dealt with. It will be understood, however, that the nourishment of the patient and his general management contribute to the effects produced on the fever of pulmonary tuberculosis by our present method of treatment. Separate chapters will be devoted to the consideration of the diet and of the supervision of the



consumptive. I will only say here that from my observations I am inclined to credit rest and exposure to fresh air with having the most active controlling power over fever. Important as the feeding of the patient is, it does not happen so commonly that we can satisfy ourselves of its definite antipyretic effect, as is the case with strict rest and with full exposure to the air.

**Indoor and Outdoor Air.**—We will now go a step further and consider the difference between the air of a thoroughly ventilated apartment and the air of out of doors. It can be asserted that, judged by the therapeutic effects of the two on consumption, there is a marked difference; but upon what this difference between the air of a room and the open air depends is not perfectly certain. Dr. J. S. Haldane has devoted himself especially to the elucidation of this subject, and he shows that the inferiority of the air of occupied rooms does not depend either upon the increased percentage of carbonic acid or upon the diminished percentage of oxygen present. Neither can it be shown that any volatile organic poison exists in the air expired by man or animals. But numerous observations point to the fact that the air of occupied rooms is always characterised by the presence of more bacteria. Nobody can doubt the injury effected by pathogenic micro-organisms; but it is probable that only non-pathogenic bacteria are found in an apartment which has been thoroughly aired and cleansed from dust. We cannot definitely say, therefore, that the inferiority of a well-aired room, as compared with the open air, depends upon the relatively increased number of bacteria present, but it is possible that it is all a matter of different degrees of asepsis. We may learn that even in the best-ventilated room bacteria exist which, though they are regarded as non-pathogenic, play some part in tubercular processes, and that the outer air alone is devoid of such organisms.

The remaining feature which has been brought forward to explain the difference in their effects between the outer



air and that of any room is some quality supposed to depend upon motion.

It is possible that air in motion generates some particular property which exercises an influence on health, as suggested by the exhilaration felt from passing rapidly through the air, and during the prevalence of certain winds.

It may be that only by constant removal of the whole volume of air around us, and by its rapid replacement with fresh volumes of air, can perfect asepsis be assured. There is no need to dwell upon the fact that an outdoor life is conducive to the attainment of the best health. While the explanation of the difference between the outer air and the air of any room remains obscure, there exist no misgivings in the minds of most physicians who have made trial of both about the distinctly superior action of the outer air in the control of consumptive fever.

In a certain proportion of cases confinement to bed, with the partial exposure to fresh air, may have been faithfully practised without achieving the banishment of the fever, or even that mitigation of fever which encourages us to persevere with the same methods. For experience tells us that if the temperature manifests even an inclination to become lower, perseverance with the same line of treatment usually accomplishes its total reduction. Failing success, it will be advisable now to push the supply of air without interrupting the course of strict rest which all the time constitutes the strongest measure against fever.

Supposing that up to this point the patient's bed has occupied an ordinary room, and that the maximum amount of fresh air has been admitted, it is now our business to move the bed out of doors. There is no reason, in my opinion, why the patient should not be advised at once to spend night and day out of doors. But supposing that objection is offered to this somewhat revolutionary measure, we may begin with placing the patient out of doors during the daytime only, and allowing him to return to his room for the night. The appliances used for the accommodation



of the bedridden patient out of doors will be described in the last chapter. If practicable, the bed and patient may be wheeled each morning from the room to a balcony or shelter. If arrangements do not permit of this, he may be carried to another bed out of doors each day, unless the remaining fever is, indeed, so slight that a few minutes' walking is not thought objectionable. When the beneficial effects of strict rest alone have been exhausted, fever will often be definitely affected by lying in the open air. Speaking generally, it is impossible to overdo the supply of air, and a little experience will convince the attendant of the real potency of this therapeutic agent. For myself, it was not until I had repeatedly observed a fall of temperature coinciding with the patient's removal completely out of doors that I was satisfied of the distinct superiority of placing the patient in the open air, as compared with placing him close to an open window in a room. Let it be understood that rest in an airy room suffices for many patients, and it is only when a good trial of this proves ineffectual that it is our absolute duty to proceed further. When slight degrees of fever persist, it usually indicates that more absolute rest is required. On this point I would only say that, however slight is the elevation of the temperature, it is our duty to take steps for its reduction. By wholly confining to bed a patient whose afternoon temperature registers perhaps so apparently insignificant a height as  $99.4^{\circ}$ , we shall probably accomplish the complete subsidence of the temperature, and definitely advance his recovery.

But when we are confronted with higher ranges of fever, which defy the ordinary measures already described, there is a further step that can be taken. In a fairly large number of instances, when I had despaired of ever being able to reduce high fever or alleviate the attendant symptoms, the patient has been persuaded to spend day and night out of doors, and astonishing success has followed the change.

Chart VIII. shows the course of a case of tubercu-



Normal weight 8 st. 6 lbs. clothed.  
W. E. L. Admitted March 27 1903.

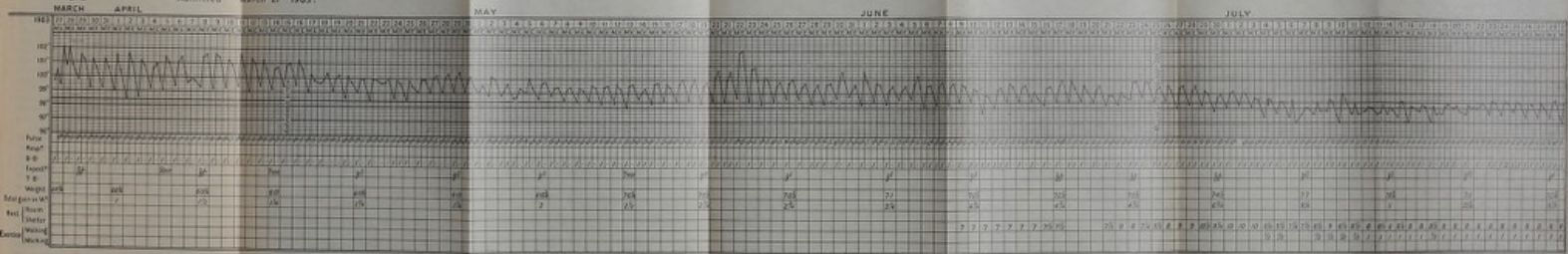


Chart 1111—Given up a Case of Tuberculosis under Treatment (p. 160).



Normal weight 8 st. 6 lbs. clothed.

Admitted

W. E. L.

APRIL

MARCH

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losis in a delicate boy, limited to the extreme apex of one lung, with somewhat acute symptoms which had progressed rapidly. From the commencement of treatment fourteen weeks were occupied in finally reducing fever—it will be noted that distinct drops of temperature followed increased exposure to open air, and that fever finally subsided on removing the patient's bed out of doors. In spite of determined efforts to increase the amount of nourishment, his weight was scarcely affected until the fever was conquered. It may be claimed, of course, that better feeding stopped the loss of weight which had previously been taking place, but no material gain occurred until after the fever had been reduced—apparently through the agency of air and rest. The limitation of the lesion encouraged us to persist with strict treatment, and in the end the boy's temperature became stable, he added 31 lbs. to his weight, and has now kept at work for more than a year.

I can honestly say that the more I watch the effects on consumption of the weapons we use in its modern treatment, the more do I believe in the power they exert. To my mind, there is no more convincing proof of the direct action of fresh air on pulmonary tuberculosis than is afforded by the drop of temperature which frequently occurs on moving the patient from a room to an outside shelter.

As shown by results, there is all the difference in the world between placing the patient in a thoroughly aired room and exposing him in an outside shelter. The greatest advance recently made in the therapeutics of consumption consists, I think, in recognising the fact that the outer air possesses a superior action to that of a room with windows ever so opened. There is no point that I am more anxious to emphasise in this short account of the treatment of pulmonary tuberculosis than the propriety of making this unstinted use of the open air in certain cases.

**Indications for Keeping a Patient Out of Doors.**—Let us consider the indications which especially



call for this procedure of keeping the patient continuously out of doors. In a word, I would advocate placing the patient and his bed in an open-air shelter in cases where milder measures fail to reduce fever, but where the nature of the affection of the lungs is not such as to preclude all hope. The fever, let us say, has defied continued treatment in the shape of absolute confinement to bed, abundant admission of air to the room, and efforts aimed at bringing the patient's nutrition up to the highest level; not only is the fever persistent, but it probably touches a point which indicates gravity of the tubercular affection—above  $100.5^{\circ}$ , we will say; the constitutional symptoms are those of acute disease; there is great muscular weakness, and rapid emaciation, perhaps, in spite of a generous dietary; the nervous system is excited, and there are apt to be tremors, headache, and disturbed sleep; there is undue acceleration of the pulse, and often an excessive amount of cough is present; it is difficult usually to get sufficient food taken, and complaint is made of dyspepsia, and perhaps of vomiting; the patient is troubled with sweats, and soon becomes haggard and cachectic.

On turning to the examination of the patient's chest, we satisfy ourselves that the disease is not hopelessly advanced, but that the signs indicate a more or less limited affection, with a large amount of presumably healthy lung. As regards the type of the process, care must be taken to exclude patients suffering from dissemination of tubercle. Patients with fibroid changes, with weak circulation, and inability to withstand cold, would be unsuitable for the life, except under certain conditions.

It would also be a mistake to subject a patient for the first time to the rigours of this life while he had any inflammatory complication, such as pleurisy, pneumonia, or bronchitis. Lastly, in the presence of any formidable condition, like severe laryngeal affection, which is not notably amenable to increased exposure, it would be unwise to prescribe it.



There remain the cases whose disease, as far as can be ascertained, is not necessarily hopeless, but who fail to respond satisfactorily to treatment conducted indoors.

I can recall more than one instance where the persistence of the high fever and the severity of the constitutional symptoms had brought the attendants to a state of utter despair, but where marvellous improvement immediately followed the removal of the patient to a shelter outside.

**Precautions.**—The harmlessness of this exposure in proper cases is so universally testified to that any reference to the subject may seem unnecessary. A few precautions are, however, worth mentioning. For the first week or two the effects of sleeping out of doors should be carefully watched, and the patient may, perhaps, be brought indoors from time to time should the weather be very inclement. The physician must particularly see that there are ready means of communication between the patient and his nurse during the night. The shelter and its equipment will be described in a later chapter, and I will only say in this place that it should be near the house, and be connected with it by a bell or telephone. As already pointed out, the power of withstanding cold grows rapidly under treatment and as the patient becomes habituated to his new mode of life. As a matter of fact, it is not difficult to keep comfortably warm in very cold weather so long as the recumbent posture in bed is maintained. It is only a matter of a sufficiency of coverings, and perhaps of hot-water bottles, gloves, and a warm cap. At the same time, the different powers of reaction of different individuals require study. In the majority of cases this continuous out-of-doors life may be followed with nothing but advantage in any sort of weather. Several patients have continued of their own choice to sleep out of doors winter and summer after the necessity for the procedure had passed. But in a few cases the discomforts incidental to cold or unsettled weather, or the occurrence of rheumatism, have made it desirable to



choose a particular climate for the carrying out of the treatment.

I do not pretend that this procedure of moving the patient from his room to the outer air invariably succeeds in reducing fever. Unfortunately, there must always be a certain proportion of our patients who fail to respond to every effort we may make for them. But even when no material lowering of the temperature is effected, it is usual for the consumptive to volunteer the statement that the change to a shelter has relieved some of his symptoms. He wakes up more refreshed by his sleep, cough is lessened, breathing is easier, and appetite and digestion are improved. In a word, he is less sensible of the feeling of illness. Any healthy person who has ever slept in the open, or under canvas, is struck by the increased sense of well-being with which he awakes in the morning. The improvement, whether it is material or not in its amount, that follows perpetual existence in the open air is too frequent and striking an occurrence to be explained by mere coincidence.

If these enhanced virtues are possessed by the outside air, why, it may be asked, do we ever treat any consumptives elsewhere than in a shelter? An increasing number of sanatoria for pulmonary tuberculosis are now discarding orthodox buildings, and are accommodating all their patients in sleeping chalets or other forms of open-air shelter. It is claimed that their results are 25 per cent. better in consequence. Of English patients treated at their own homes, too, an increasing number willingly pass both night and day out of doors.

When I speak of sleeping out of doors, I assume that the patient has a roof above him, as well as some form of lateral protection from wind and rain; but the principle to be observed is that the whole volume of air surrounding the patient is constantly changed.

In the ordinary way this principle can only be complied with by a building especially constructed for the purpose, and no apartment of a common house can fulfil the stipula-



tions in regard to the constant movement of all the contained air. But this part of the subject must be deferred till we come to speak of appliances used in the open-air treatment.

In the case of a patient commencing the treatment, it must be allowed that his recovery is probably both more assured and accelerated if the maximum amount of fresh air is supplied him day and night from the outset. All sanatoria should certainly arrange for the accommodation of a certain proportion of their beds out of doors, and when a special structure is contemplated for the home treatment of a consumptive, the propriety of using it as an open-air bedroom should be kept in view. Whether or not the treatment be started with the bold adoption of the strongest measures at once, will generally depend upon the facilities which exist for sleeping outside, and upon the disposition of the patient. A large proportion of our patients make very satisfactory recoveries, though their nights have all been passed in well-ventilated rooms only, and there is, of course, a great advantage in making use of existing arrangements, and in revolutionising habits as little as possible. Many people are hopelessly opposed to sleeping out of doors, and I should be reluctant to deny them the possible attainment of recovery without doing so.

There are other patients, however, whose disease can only be arrested by their avoidance of any room, and by their consenting to spend night and day in some form of outdoor shelter. Supposing that a start has been made in an ordinary room with good windows, but that the patient's progress has not been satisfactory, it will be necessary to consider the advisability of moving the patient and his bed entirely out of doors. The indication for this procedure is, as we have seen, sustained fever. When absolute rest in bed, with as free a supply of air as is obtainable through windows, when regulation of the patient's feeding, and other points have been thoroughly, but ineffectually, tried, there is nothing for it but to increase the exposure to air.



When confronted with obstinate fever, it is, of course, always right to have grave misgivings about the ultimate issue, whatever is done, for the fate of the patient all hangs on this one crucial symptom. The practitioner may, however, feel satisfied that, as far as our present knowledge goes, no other line of treatment offers prospects of success: The patient is naturally inclined to think that a particular climate will effect the reduction of his obstinate fever. Recourse has been had to the use of anti-streptococcus serum in these cases of inveterate fever. I have tried it myself, but without success. I can only say that in these intractable cases I have watched the action of many drugs with an open mind, and have never seen the smallest reason for attributing much good to them. On the other hand, in an appreciable number of apparently hopeless cases, unexpected success has followed the adoption of open-air treatment in its most active form, and especially when time has been given unlimited scope. This removal of the patient into a shelter would not be urged if the nature of the pulmonary lesion was very extensive, or the constitutional symptoms were hopelessly grave. Though even in such cases, as already stated, if the patient chooses to live outside, he often volunteers the statement that such distressing symptoms as night sweats and incessant cough are ameliorated, and he is less oppressed by the sense of illness.



## CHAPTER VII.

## TREATMENT OF THE CONVALESCENT PATIENT.

IN the preceding chapter we have especially considered the treatment of the patient whose pulmonary tuberculosis is accompanied by fever. We must now briefly describe the routine followed by those whose fever has subsided or has never been manifest, and who present no other condition necessitating strict rest. It will simplify this account if the patient's ordinary day at a sanatorium is here described.

**Routine of Sanatorium Life.**—The first thing in the morning the temperature is taken, and the patient understands that unless this is found to be below a certain point he must stay in bed until visited by the doctor, who decides whether or not he is then to get up. I would fix  $98.4^{\circ}$  as this point, for a very slight rise in the morning temperature usually betokens a distinct elevation in the latter part of the day. It is also a good plan to have the pulse-frequency recorded by a nurse before the patient leaves his bed, and thus secure its rate during absolute rest. If the patient is on the full quantity of milk, a glass is brought to his bedroom, which he sips before dressing. The patient then comes down to breakfast, but the remarks about to be made upon diet apply to the afebrile patient, and this meal need not be further described.

Breakfast finished to the doctor's satisfaction, the patients adjourn to their long chairs out of doors, and settle themselves for their morning rest. About this part of the "cure" the essential point is to secure strictness on the patient's side. Unless under supervision, it is difficult to get them to take the rest sufficiently seriously, and when

T.

h

Milk  
Gets u

brea



*Rest*  
treated at home patients are particularly apt to under-rate the importance of this rest being unbroken.

*h*  
*mb*  
If the full benefit is to be derived, the reclining posture must be maintained without interruption. The patient should be established with everything he may require within his reach, and the prescribed number of hours spent without moving from his chair. So many hours are passed in the long chair or couch that its pattern is a matter of importance, to which reference will be made in a subsequent chapter. Protection against wind and rain must be afforded by some sort of shelter, the different forms suited to this climate being also described later when dealing with the appliances necessary to the treatment. In the summer it is equally essential to provide protection from the sun. Nothing is more powerful to produce headache, anorexia, prostration, and even fever than exposure to the glare of the sun. To many individuals the notion of lying out of doors in the winter seems an impracticable one, though the same person would be quite ready, perhaps, to drive in an open carriage without any protection from the increased wind to which he would thus be exposed. Granted sufficient protection from the wind and adequate powers of circulation, it is chiefly a question of sufficient wraps. A fur coat is invaluable for this purpose, and the sheepskin sacks made to envelop the feet and legs are great comforts. Otherwise, besides a heavy coat, one or more rugs should be properly wrapped round the lower parts of the patient, and, if required, foot-warmers and gloves should be also used. The cold is withstood more easily in the horizontal posture than when sitting with the feet down, and, on all considerations, the patient's best position is to recline with the body nearly at a right angle to the legs. We want to secure complete relaxation of all the muscles and that inclination of the body which promotes the freest respiration and circulation.

*mb*  
At eleven o'clock a second glass of milk is taken to some of the patients for whom it is ordered.



The patients who are on exercise start for their walk at some time in the morning, according to the extent of the prescribed exercise. A universally observed rule directs that the patient shall rest for a clear hour before and after each meal. *W*

Lunch is usually served about one o'clock in the dining-room, but for certain patients it is better that they should remain lying down in their shelters and have their lunch brought to them there. In the case of home treatment, this gets over all difficulties in regard to the patient using any room which does not absolutely comply with regulations, and, as we have seen, the occurrence of vomiting after meals can often be prevented by allowing the patient to maintain the recumbent posture while he eats.

In other cases, on account of a noted instability of the temperature, which, though afebrile, does not allow of any dependence being placed on its keeping normal, it is advisable that the meals be taken in seclusion, and without interrupting the spell of strict rest out of doors. After the rest that follows lunch, the more convalescent patients take their second walk, while the others persist with their strict course of rest.

About four o'clock, or a little earlier, is a good time for the observation of the afternoon temperature. As already stated, the maximum elevation of temperature in pulmonary tuberculosis is commonly found to obtain from about 4 to 6 p.m. So it is essential to have a record taken between those hours. The exact time must be fixed so as not to interfere with exercise, and not to follow too closely the drinking of hot tea. *W*

About half-past four a light meal is partaken of, consisting of milk or tea, with bread or other vehicle for a large portion of butter.

Afterwards rest is continued till dinner-time, at seven or half-past seven.

A certain proportion of patients do well to retire to bed soon after the completion of this meal. Others, again,



adjourn to their shelters, and lie down till 9.30 or 10, when all the invalids should go to their rooms for the night. Another observation of the temperature should be made about this time, and afterwards a final glass of milk is swallowed by some of the patients. For those likely to awake in the night or be troubled with cough, one or more tumblers of milk may be set by the bedside and taken at the patient's discretion.

The patient should be visited the last thing before going to sleep to see that the windows are properly opened, and to adopt any necessary precautions against his getting wet or cold during the night. Some means of ready communication with the nurse must always be provided, in case of sudden illness or other necessity occurring in the night. Except when actually dressing and undressing, the bedroom windows are always opened widely.

**The Nordrach System.**—In some respects the *régime* adopted at certain sanatoria differs from the foregoing account. The Nordrach system has some strongly marked features which distinguish it from the routine I have advocated for practice in England.

No form of shelter or *Liege-halle* is used, and the only systematic rest which is insisted upon for the convalescent patients is taken in their bedrooms before dinner and before supper. Otherwise, as we shall see, the patients are allowed to sit down and rest in the course of their walks, no stress being laid upon continued repose out of doors in a long chair.

No milk or other form of nourishment is given between the three chief meals of the day, but these consist of much larger amounts of food than are comprised in our standard dietary, and are characterised by certain ever-recurring dishes which do not commonly figure on English tables.

Let me briefly describe the patient's ordinary day as spent at Nordrach.

The rectal temperature is taken before rising about



7 a.m., and soon afterwards the patient is visited in his room by Dr. O. Walther, who gives directions about the morning walk. At the eight o'clock breakfast no compulsion is used, but the inmates are offered cold meat or pounded meat, with plenty of bread and butter, and half a litre of milk, perhaps, in addition to tea or coffee.

Breakfast concluded, the convalescent patients start off on their appointed walks. At his morning visit the doctor has instructed each inmate as to the direction and extent of the walk, which varies according to the temperature and the general condition of the patient. On their way, or only after reaching their destination, they rest for a time seated on benches which are found along the paths or stretched upon the ground, using for the purpose a piece of oilcloth, which is carried in wet weather. By twelve o'clock they are supposed to be in their bedrooms, where they lie down and take the rectal temperature. While resting the patient is again visited by the doctor, and directions are given for the remainder of the day. At one o'clock the patients assemble for the chief meal of the day, which consists of two courses of meat, or of fish and meat, large helpings of vegetables, and a plentiful supply of sauce, which is mostly composed of butter. Lastly come large portions of puddings, and the patients usually take half a litre of milk or a cup of coffee, according to their weights.

Dr. Walther personally presides at the patients' meals, and a great point is made of the necessity of each plate being cleared.

Not only is the Nordrach dietary considerably larger than that advocated by many physicians, but it contains articles, such as raw meats, German sausages, and many sauces, which are not calculated to tempt an English invalid. The afternoon is spent in another, but shorter, walk by the more robust patients; while others rest on seats or in hammocks placed amongst the woods. By six o'clock they must return to their rooms, where, after making the third rectal temperature observation, they rest until supper,



which is served at 7 p.m. At this meal there are again two courses of meat to be got down, the second often consisting of ham, or sausage, or pounded raw beef. Vegetables and bread and butter, and, in the case of some patients, half a litre of milk, complete the meal. Afterwards the patients do very much as they like till nine o'clock, when they all retire to bed, taking their temperatures for the last time.

M The points about the Nordrach system to which I would especially draw attention are the following:—Except for the two hours preceding dinner and supper, which are spent by the patients on their beds, no stress is laid on methodical rest for those who are up and about. In the course of the walk the patient sits where he can for a while, but no continued repose in the open air is insisted on. Personally, I am biassed in favour of arranging the daily routine so that all rest be taken in the open air, and the necessity of the patient going to the bedroom and thus depriving himself of some air seems to me an objection to the rectal temperature. I prefer that the rest be systematically taken on a proper chair and under supervision; if seclusion is thought advisable, the patient can be kept as quiet in his shelter as in a bedroom. The ordinary individual is more inclined to be reposeful if settled with proper appliances near the house than if obliged to go some distance to his resting-place.

Dr. Walther, again, discountenances the giving of milk or any other nourishment between the three large meals of the day. Whether or not it is preferable to make the meals somewhat smaller and get a certain quantity of milk swallowed between them is a matter of opinion, and one that must partly depend on individual conditions.

**Exercise in Sanatorium Treatment.**—At all sanatoria exercise plays a recognised part in the treatment of the afebrile consumptive. As a rule, no exercise should be allowed if there is any elevation of temperature. I would say that if  $99^{\circ}$  is exceeded at any time of the day the



patient should wholly abstain from walking. As far as my experience goes, the exceptions to this rule are very few. I would restrict them to cases occasionally met with where obvious disturbance of the digestive organs exists, which presumably depends on mere want of exercise. It is stated that tubercular fever has been exceptionally noticed only to subside after exercise has been allowed. I have never observed this occurrence myself, while times without number discontinuance of exercise has had the effect of reducing an obstinate, though slight, irregularity of the temperature. Cases are met with every day which demonstrate the delicate control exercised by rest over the temperature. When a long time has been required to reduce the temperature to normal, it is better to postpone exercise till a week has elapsed without  $99^{\circ}$  being exceeded. The purposes served by exercise in the sanatorium treatment of pulmonary tuberculosis are the strengthening of the heart and general muscular system, and the promotion of digestion and elimination.

After the subsidence of fever, we have no more effective method for restoring tone to the flabby heart than by carefully regulated walks. However satisfactory the condition of the lungs and that of the temperature may be, the patient should never be lost sight of while his pulse remains too frequent. So long as there is hurried action of the heart, the patient's condition is one of insecurity, and he is apt to break down unless he is carefully supervised, and devotes some portion of each day to treatment.

The weight gained with full feeding during the course of rest is due rather to increase of fat than of muscle, and the final indication is to transform this soft flesh into hard muscle by systematic exercise.

As with the other items of the treatment, exercise should be commenced tentatively; its extent must be exactly regulated, and its effects carefully noted. In cases where marked instability of the temperature is apprehended, or where great weakness is present, the patient walks for



only a few minutes at a time to begin with. With other patients, exercise is commenced by half an hour's gentle walk on the level, and at such a pace that neither breathlessness nor fatigue is induced. If no unfavourable effect is produced, the exercise is increased week by week both as regards vigour and extent. A marked improvement of the breathing and of the strength is commonly soon manifested, and the patient may then with advantage begin moderate ascents. Brehmer attached great importance to hill-climbing for the improvement of heart and lungs, and most sanatoria have paths of different gradients which the patients systematically use for exercise. It is usual for the walk to commence with an ascent which the patient takes at a slow pace at first, but as improvement occurs, it is made at about three miles an hour. After a short rest, if the journey has been a long one for the patient, the homeward walk downhill is taken. The patient is directed to take a long and deep inspiration every few steps as he walks, and to inflate his chest.

Towards the end of the "cure," during the "hardening off" stage, the consumptive walks twelve miles, perhaps, during the day. The chief criterion of the effect of exercise on the patient is the observation of the temperature. We have already seen that in perfect health the temperature is found to be raised in the rectum if taken immediately after exercise, and I contend that in the subjects of pulmonary tuberculosis the temperature taken within half an hour of returning from exercise supplies information of doubtful utility.

In judging the effects of exercise on our patients, we must watch the records of temperature that are made in the afternoon and evening after a sufficient interval of rest has been allowed. The significance of an excessive elevation of temperature immediately after exercise has been already referred to in the chapter dealing with the temperature (Chap. III.).

If the temperature taken at four or seven o'clock, when



the immediate or transitory effects of exercise should have passed away, is found to exceed  $99^{\circ}$ , recourse must be had again to rest. For some weeks the patient may be on exercise for a few days, then obliged to rest again for a few days, and so on until the temperature becomes steady.

The next point to be studied is the behaviour of the pulse. If this is characterised by over-frequency, the physician looks for a gradual diminution of its rate as the result of methodical exercise. Such diminution, if it occurs, can only be produced very slowly, and for its appreciation it is almost indispensable to keep a record of the average daily pulse-rate for each week. The proper apportionment of rest and exercise constitutes our best way of dealing with rapid pulse. Generally speaking, it is advisable gradually to increase the exercise as the patient's breath and strength allow, and to insist on the remainder of the day being spent in resting. In these cases it is particularly necessary to see that the patient plods steadily along and keeps to so slow a pace that neither the breathing nor the heart is hurried. The progression should suggest exercise on a treadmill, and, if necessary, frequent halts may be made to ease the respiration and the action of the heart. This simple exercise often has most gratifying results, and during a year, or even a longer time, the pulse may be watched gradually gaining in strength and diminishing in frequency.

The persistent use of exercise and rest does not represent the only treatment for rapid pulse. Attention has already been called to the definite influence on pulse-rate of different amounts of food consumed. In the presence of increased frequency of the pulse it is always necessary to see that the patient is not being overloaded with nourishment. Definite reduction of the number of pulse beats per minute may often be quickly accomplished by lessening the amount of food or milk, when these are in excess of the patient's capabilities.

A very long time—it may be a year or more—must be



allowed for the above measures to produce their full effect, and few things are more striking than the change that may be brought about in the condition of the heart if treatment is persevered with for some such time. So long as any improvement is perceptible, we shall be encouraged to persist with the same lines of treatment, and allow ourselves to entertain reasonable hope of recovery ensuing. But in a notable number of consumptives the rapidity of the pulse is maintained, or even increases, and constitutes the most unfavourable feature about them. Massage, resisted movements, and various exercises have been tried, and are reported to have benefited the heart in some cases. My own experience has been that when cardiac weakness did not respond to more general measures, these special methods for helping the heart have also failed. The same statement applies to the use of drugs. A prolonged course of arsenic, iron, digitalis, or strychnine is indicated in appropriate cases, but they seldom exert a demonstrable influence, and only occupy a subsidiary place in the management of the debilitated heart of pulmonary tuberculosis.

A word must be said about other forms of exercise which are permissible in the sanatorium treatment. In suitable cases the patient indulges in golf, croquet, fishing, shooting, bicycling, or riding on horseback. Before any form of game or sport is allowed it is premised that the patient's temperature is steady, and has stood the test of serious walking satisfactorily. It must also be understood that no form of exercise can replace that of walking as a definite therapeutic agent in cases of cardiac debility with rapid pulse. Lastly, the following conditions should be borne in mind, which would render anything approaching active exertion especially risky. If the patient's illness has been marked by the occurrence of recent hæmoptysis, the physician should hesitate to sanction any exercise that involved the possibility of strain. Pleural adhesions might be broken and lead to pneumo-thorax or other troubles.



Short of this accident, there is always the possibility of disturbing the formation of sound scar-tissue.

With advanced disease the risks are always too great to warrant any exercise beyond that of walking, and in all cases the necessity of avoiding fatigue or violent effort should be enjoined. Thus the golf-player must only use an even swing, the bicyclist must never strain up hills or against the wind, and the rider must be content with the quietest of horses and the easiest of paces.

I may say that golf links adjoin the Mundesley Sanatorium, and are constantly used by the patients. Great care has been taken in the selection of patients allowed to play, and in their supervision while playing, and no instance of injury from the game has come to the physician's notice.

In the case of the poorer classes, and during the final stages of their course of treatment, the patients' exercise may take the form of work. If the patient is to derive the fullest value from sanatorium treatment, advantage must be taken of the excellent opportunity the constant supervision affords for testing his capacities and limitations. He should leave the sanatorium knowing exactly the amount and the quality of the work he can safely undertake, and the extent to which he must still practise treatment. Further reference will be made to this subject when we come to speak of after-care, and at this point I need only reiterate the opinion that there is nothing more carefully to be avoided by the subject of arrested pulmonary tuberculosis than over-exertion.



## CHAPTER VIII.

## DIET IN THE TREATMENT OF PULMONARY TUBERCULOSIS

THE third main factor in the sanatorium treatment aims at improving the patient's nutrition, enriching the blood, and generally strengthening his powers of resistance. I do not like the term "over-feeding," which correctly described, perhaps, the indiscriminate stuffing which was once in vogue, but does not apply to more recent teaching on the subject of food in the treatment of pulmonary tuberculosis. Over-feeding was certainly capable of doing harm to the stomach, heart, and other organs. In some cases, moreover, the increased weight actually impaired the general health, and impeded the development of reparative changes in the lungs.

Our object in the dietetic treatment of pulmonary tuberculosis is to bring the patient's nutrition up to a standard which is judged to be consistent with the highest level of general health, and at the same time to improve digestion and assimilation.

**A Systematised Diet.**—In early times it was recognised that the consumptive benefited by being fed on a rich and sustaining dietary; but the physician did no more than recommend his patient in general terms to eat plenty of good food. The pioneers of sanatorium treatment have made the advance of systematising this like other branches of the new method of combating consumption. They learnt the importance of insisting on definite amounts of nourishment being ingested, and showed that the patient's power of resisting the march of the malady depended on the enrichment of his blood and tissues. Quite recently



there has been some revulsion of feeling against what is considered the excessive feeding practised at certain institutions. The view now generally accepted, I think, is that the patient's weight is satisfactorily increased by a moderately large dietary, and that this is the most suitable for his general requirements. The dietetic treatment of pulmonary tuberculosis depends upon our present knowledge that, in order to obtain the best results with patients, definite quantities of the different foodstuffs must be got down. It has been demonstrated that satisfactory progress is not made if the patient's natural appetite and inclinations alone regulate the amount of food taken. Here, again, success depends on precision, and the physician, having determined upon the indications for treatment in respect to his patient's nutrition, must satisfy himself that the prescribed diet, both as to quantity and quality, is administered. No part of the sanatorium *régime* has taken more hold of the public mind than the artifices commonly supposed to be required to get the patients to swallow their enormous meals. One hears of doctors overcoming patients' want of appetite by threats of immediate expulsion from the institution. One hears, too, of patients leaving the room to vomit, and then, perforce, returning to attack their dinner again. Personally, I have never known it necessary to resort to any such drastic measures, nor do I advise any line of action which is inconsistent with Dr. Jane Walker's excellent definition of the open-air treatment—"elaborated common-sense."

As I have already said, the patient's own inclinations and habits cannot be allowed to decide the amount of food taken. He has usually been on a diet too small to prevent loss of weight, and insufficient to reinforce his powers of resistance. A small addition to what may be roughly considered a healthy man's normal diet has usually a marked effect on patients suffering from pulmonary tuberculosis. To satisfy myself on this point I have repeatedly kept patients under observation till their condition became



more or less stationary. Then, without making any other change in their treatment, the diet has been increased, the state of the stomach being always carefully watched, and usually a distinct, though gradual, improvement is manifested. Moreover, the stomach itself shares in a striking manner the general invigoration; it responds apparently to the increased call made upon it, and both appetite and digestion are benefited. Of course, fresh air and the other factors of the system are all the time contributing in the ordinary way towards the improvement of the digestive organs. The vast majority of consumptives presenting themselves for treatment must have their dietaries increased. Let us refer first of all to the exceptional cases, whose dietaries do not necessarily want enlarging.

1. There is the obvious case of the patient who has already passed his highest known weight in health, or the normal weight for an individual of his height and build.

2. Patients presenting evidence of disease of the abdominal viscera in the form of tuberculosis, or of albuminoid degeneration.

3. Patients whose pulmonary tuberculosis is of old standing, and associated with obvious development of fibrosis which impedes the circulation and interferes with digestion.

4. Patients manifesting marked enfeeblement of the heart.

5. Patients in whom the failure of appetite and of digestion is judged to be in excess of what would proceed from general constitutional weakness.

6. The subjects of acute tubercular processes, whose fever is very high.

Excepting the above groups, it may be stated as a rule that the consumptive patient must have his dietary increased in order that the best result may be achieved.

In my experience this full feeding is carried out with little or no difficulty in the greater number of our patients.

The individual is made to understand the rationale of



being obliged to eat and drink more than he is naturally disposed to do. Then, if his good sense is properly appealed to and if a little persuasion and tact are exercised by the attendant during the meals, most English patients will be found to comply readily with this part of the system. They must see that full feeding is an essential part of the treatment, and is regarded seriously. If its administration is in the hands of a nurse, it is important that she should be experienced and capable in the matter, and be a woman of some strength of character.

**Precision the Secret of Success.**—The secret of success in this part of the work is precision. If the physician is content to regulate the amounts of his patient's different foods by using perfectly uncertain terms, such as "large helpings," he runs the risk of having his intentions misunderstood, and of failing to score every possible point against the malady. The whole mischief may be that the patient has always been too small an eater, and with his impaired appetite he may consider he has eaten a large helping when, as a matter of fact, the amount consumed fell far short of what is needed to bring him up to fighting strength.

It must be understood that the essence of this system of treatment is attention to detail, and to ensure success we must not let slip a single opportunity of advancing the patient's health. If, then, as is usually the case, the patient's restoration can be materially assisted by an improvement of his nutrition, it is advisable for the physician to be precise in his directions as to the quantity of food. The patient's own judgment often leads him to take amounts which fall far short of what we shall presently state to be required for the gaining of the best results. If the exact quantity of food consumed is known and the desired effects are not obtained, variations in the amounts can be made according to indications which will be presently given.

The attendant should learn to estimate at sight the



weight of the several articles of diet. Ordinary letter-scales do very well for the purpose, and the doctor, or nurse, should practise with them till able to guess fairly correctly the specified weights of meats, butter, and bread.

Nobody lends himself more to scientific treatment than the average sanatorium patient, provided that he is convinced of the soundness of the principle, and of the fact that method is used in its application.

Few effects of the open-air life are more striking than the rapid disappearance in most cases of signs of disorder of the digestive tract. With the subsidence of fever, supposing this to occur through the instrumentality of exposure to air and of rest alone, the patient invariably finds his appetite and digestion improved. Less constantly, even before any reduction of temperature has been brought about, the new conditions of life are found to clean the tongue, and to remove anorexia and dyspepsia. In a very large proportion of the patients subjected to sanatorium treatment I have noted with some surprise that no serious difficulty or objection is encountered in getting the increased quantities of food taken. Some horror is perhaps affected at the size of the helpings on the plates, but with a little display of determination on the attendant's part the regulation amounts of nourishment are consumed. It is important to observe that forced feeding is the means of actually curing much anorexia and dyspepsia in tuberculosis, as in the analagous cases of neurotic failure of appetite and digestion. Not only does the stomach participate in the gain of strength consequent on the absorption of more nourishment, but it also appears, from an observation of these patients, that the stomach can be roused to greater functional activity by increasing the demands made upon it.

After a few days' study of the patient it is easy to discriminate between the anorexia which depends on insuperable failure of the stomach, and that which will yield to determined persuasion along with the other factors of the sanatorium system.



In practice, then, the physician first determines in respect of the particular patient before him what are the indications for dietetic treatment. The amount of nourishment administered must, as already stated, be usually increased; but the particular indications for this increase are as follows:—

1. The patient's weight is low. It is a good rule to ascertain what was the maximum known weight in health, and to aim at bringing him up to a weight which exceeds this by at least half a stone. Account is also taken of what is found to be the normal average weight for an individual of the patient's height and development. Then the physician must use his judgment as to the weight which coincides with the fullest amount of bodily health and vigour for the individual. It may be found that even in health the patient has always been much under proper weight. In this case the acquisition and maintenance of a heavier build will constitute an important remedial and prophylactic measure.

2. Moderate activity of the disease, as evidenced by extension of the physical signs, and especially by persistent fever, affords a distinct indication for reinforcing the patient's nourishment. The patient's temperature may reach  $102^{\circ}$  in the afternoon, and yet large meals of solid food will be found not only to agree with the stomach, but to improve his general condition. While a moderate degree of fever forms no objection whatever to full feeding in pulmonary tuberculosis, the same cannot be said of higher ranges of temperature. With fever much exceeding  $102^{\circ}$ , or in cases of acute tubercular processes—pneumonic or broncho-pneumonic—the diet requires considerable modification, though even here much larger quantities of easily-digested nourishment should be given than in other maladies attended by a like amount of fever.

3. Lastly, the actual existence of anorexia and dyspepsia calls for increased food if it can be ascertained that they depend on the mere debilitating effects of the lung



disease affecting the organs of digestion in common with other parts of the organism.

**An Excessive Dietary.**—The diet that I advocate for consumptives is a considerably smaller one than that used at many sanatoria. As an example of a dietary that is now considered by many observers to be excessive and to constitute bad treatment, I may state that at certain institutions the consumptive is required to swallow more than half a pound of cooked meat in the day, five pints of milk, and other articles in proportion. I have ascertained that the dinner eaten by a patient on one occasion weighed exactly five pounds. Now the consensus of opinion is opposed to the administration of such enormous amounts of food. We shall presently see that fat may be laid on freely by patients whose disease continues to run an active course. Large increases in weight do not necessarily exert a favourable influence on the malady, and they are, moreover, apt to be attended in the case of certain patients by evils of their own. Sir R. Douglas Powell has especially called attention to the risk of strain to the heart and vessels which follows over-feeding in these cases. Allusion has already been made to the frequent affection of the pulse-frequency by even moderate feeding. It is certain that intractable dyspepsia and dilatation of the stomach have resulted from the injudicious feeding practised at some sanatoria, and it is possible that the occurrence of kidney disease has also been favoured. When undue importance is attached to great increments of weight, the patient's recovery of health is apt to be more apparent than real, and the ultimate result of disregarding the stomach and other organs so long as the patient gets stouter and stouter is too often disastrous. Relapse comes and disappoints the expectations that were built on the fictitious gain of weight.

The unsuitability of excessive amounts of food is sometimes demonstrated by the fact that the patient fails to gain weight until his diet has been reduced. I have



repeatedly observed this to happen, and the diet which I now recommend as the standard one to commence treatment with is moderate in size, but has been proved to be sufficient to increase the weight in a very large number of consumptive patients. Our aim is, then, cautiously to increase the patient's weight by the use of a diet which imposes no undue strain on stomach or other organs. Thanks to the valuable researches of Dr. F. W. Goodbody, Dr. Noel D. Bardswell, and Mr. J. E. Chapman,\* the subject of feeding in pulmonary tuberculosis has now been placed on an accurate and scientific basis. Their investigations, which serve as guides in the actual drawing up of dietaries for consumptives, were conducted on six patients with the object of ascertaining the effects of overfeeding on their metabolism, and the maximum amount of food "which they could take with advantage and without causing too great a strain on the organism from a clinical point of view." The six patients were first kept on ordinary diets, and the exact weight of all food-stuffs consumed was noted, each article being weighed before it was served, and anything left on the plate being afterwards weighed. The quantities of food eaten during this first period of the observations may be taken as representing the diet the patients adopted when guided only by their inclinations. The investigators' experiments and results have such a direct bearing on the practical management of our patients' feeding that I propose to present to my readers a short account of their method.

The ordinary diet consumed at first by Case I. consisted of:—

	<i>Grammes.</i>			
Proteid .. ..	116.13	=	18.58	grammes of nitrogen.
Fats .. ..	123.28			
Carbo-hydrates ..	296.71			

The urine and fæces were each day carefully collected

\* *Med.-Chir. Trans.*, Vol. lxxxiv,



and weighed. Their analysis showed that on this first diet the patient absorbed :—

91.25 per cent. of the nitrogen ingested  
93.82 per cent. of the fat ingested.

During a second period the diet consumed by Case I. was increased, so that it consisted of

*Grammes.*

Proteid .. ..	137.50	=	22.0 grammes of nitrogen.
Fats .. ..	136.96		
Carbo-hydrates ..	296.32		

On this larger diet the patient absorbed

97.45 per cent. of the nitrogen ingested  
98.15 per cent. of the fat ingested.

During a third period a very large diet was given, consisting of

*Grammes.*

Proteid .. ..	232.50	=	37.20 grammes of nitrogen.
Fats .. ..	183.93		
Carbo-hydrates ..	321.37		

On this diet the patient absorbed

94.20 per cent. of the nitrogen ingested  
97.90 per cent. of the fat ingested.

It will be observed that up to a certain point an increase in the amount of food eaten was actually accompanied by an increase in the percentage absorbed, but that when the third period's diet was given this point was passed, and while more food was being ingested a smaller percentage was being absorbed. This, of course, necessitates the passage of a large amount of material through the alimentary tract to no purpose, and, it may be assumed, to the detriment of those organs. It is, anyhow, recorded that during the third period the patient suffered from anorexia and dyspepsia.

During the second period of a week the patient's gain of weight was 1.1 kilo, and during the third period it was



as much as 2.1 kilo. But it is important to realise that progress cannot be estimated solely by the amount of weight gained. If the increase is brought about at the expense of the integrity of the digestive organs, it is obviously of no advantage. In this case the more gradual increase in weight during the second period was associated with general improvement of the patient's condition, including that of the stomach. The cardio-vascular balance is less disturbed when weight is added gradually. These experiments emphasise and endorse the opinion long held that consumptives can take with advantage large amounts of fat. They show that its absorption is particularly active, and that large quantities of this class of food can be satisfactorily dealt with even when the intestines have been deranged by excess of nitrogenous food, and when this is being absorbed badly.

The conclusions arrived at by Dr. Goodbody, Dr. Bardswell, and Mr. Chapman are that "the most suitable diets for patients suffering from pulmonary tuberculosis that we had the opportunity of observing consisted roughly of about

120 grammes of proteids  
140 grammes of fats  
300 grammes of carbo-hydrates."

Translating these amounts into English weights, we should arrange the consumptive's standard dietary to contain, roughly,

$4\frac{1}{4}$  ounces of proteids  
5 ounces of fats  
 $10\frac{1}{2}$  ounces of carbo-hydrates.

This diet chiefly differs from that ordinarily taken by a healthy man in the large amount of fat it contains, and attention has already been drawn to the consumptive's peculiar power of absorbing fats. The desirability of including plenty of oil or other fatty food in the consumptive's dietary has received the endorsement of generations of writers upon the subject, and it is now confirmed



by accurate research. Sir Michael Foster, basing his conclusion on information derived from a variety of sources, states that a healthy man ordinarily takes

Proteids	..	..	..	from 100 to 130 grammes
Fats	..	..	..	„ 40 to 80 „
Carbo-hydrates	..	..	..	„ 450 to 550 „

In the dietetic treatment of pulmonary tuberculosis we prescribe a dietary which is probably a distinct advance on what the invalid has been taking of his own accord, but which is not a great increase on that taken by a healthy man, except in the matter of fat. As already pointed out, the consumptive is required to swallow an increased amount of fat, but, on the other hand, his carbo-hydrates are somewhat lessened. The proteids are nearly the same, but the consumptive has the advantage over the healthy man of probably being at rest. For some years I have had numbers of patients under observation, all of whose food has been carefully weighed, and to whom varying amounts have been given with the object of determining the effect on their weight and general health.

**A Standard Dietary.**—What I shall designate the standard dietary for consumption is the smallest on which the average patient gains weight satisfactorily. I have found that the majority of amenable fresh cases gain one to three pounds a week under the influence of this diet, combined with other items of the treatment. As already stated, I have observed an increase of weight to occur when the patient has been placed on this small diet, though on a larger diet he has failed to gain weight. If the patient has been on too large a dietary, not only will the stomach and general feelings be benefited by its being reduced, but a commonly observed effect will be a lessened frequency of the pulse.

I do not wish it to be understood that one dietary can be recommended for the initial treatment of every patient: modifications must be made according to individual re-



quirements, and the physician must always be an opportunist. If the desired effect is not produced, variations of the diet must be tried until that which suits best is arrived at. At first it may be easy to increase the patient's weight, and the earliest weeks of treatment usually witness large gains on a small amount of food. Subsequently, if the weight still falls short of the proper mark, the standard dietary may need to be considerably enlarged. It is important to note that, generally speaking, patients who gain much weight do better than those who put on little flesh, and that amongst the former the prognosis is particularly favourable if the large gain has occurred without forced feeding. The advocated standard dietary comprises :—

						<i>Approximate Value.</i>	
						<i>Proteid.</i>	<i>Fat.</i>
Meat	..	..	5 oz.	..	..	1 oz.	$\frac{1}{2}$ oz.
Milk	..	..	3 pints	..	..	2 oz.	$2\frac{1}{2}$ oz.
1 Egg	..	..	2 oz.	..	..	$\frac{1}{4}$ oz.	$\frac{1}{6}$ oz.
Porridge	..	..	Plateful	..	..	$\frac{1}{3}$ oz.	—
Bread	..	..	8 oz.	..	..	1 oz.	—
Butter	..	..	2 oz.	..	..	Trace	$1\frac{1}{2}$ oz.
Potatoes, etc	..	..	4 oz.	..	..	—	—
Puddings	..	..	Plateful	..	..	—	—
Total, about						$4\frac{1}{2}$ oz.	$4\frac{1}{2}$ oz.

The total quantities of proteids and fats contained in the above dietary will be seen to approach very closely those indicated by the experiments of Goodbody, Bardswell, and Chapman. The approximate values of the different items in proteid and fat are given to serve as a rough guide to the practitioner. The proper quantities of each of the three classes of food-stuffs should be adhered to, when he thinks proper to substitute another article of diet for one of those named above. The weight of meat given is in the cooked form, and would represent about six ounces of raw meat. Let me repeat that this standard



dietary is a small one, and represents the minimum amount that should ordinarily be given. A very large number of consumptives gain weight satisfactorily on it, and start the processes of restoration with its help. But the physician must understand that it is only ordered tentatively, and he will be prepared considerably to increase the various items as time goes on, according to the indications of the particular case. The meat, for instance, may with advantage often be increased up to seven or more ounces in the day, supposing the patient's digestive powers are good, and he is wanting in weight or in the power to throw off his fever. The items of the standard dietary are thus distributed during the day :—

## BREAKFAST.

Porridge or bread and milk.

1 egg. Bacon or ham, or fish or brawn, etc... 1 oz.

Bread. Butter .. .. ½ oz.

Tea, coffee, or cocoa. .. .. Milk ½ pint

## 11 A.M.

Milk .. .. ½ pint

## LUNCH.

Meat .. .. 2 oz.

Bread, vegetables, puddings. .. .. Milk ½ pint

## TEA.

Tea, coffee, or cocoa. .. .. Milk ½ pint

Bread, biscuits, etc. Butter .. .. 1 oz.

## SUPPER.

Meat .. .. 2 oz.

Bread, vegetables, puddings. Butter .. ½ oz.

Milk .. .. ½ pint

## BED-TIME, or on waking in the morning.

Milk .. .. ½ pint

Dr. N. Bardswell has kindly supplied me with the standard dietary now in use at Mundesley Sanatorium :—

## BREAKFAST.

Coffee or cocoa, made with milk .. .. 1 pint

Toast or bread .. .. 3 oz.

Butter .. .. 1 oz.

1 egg. Bacon, fish, or tongue .. .. 1 oz.

Marmalade .. .. 1 oz.



## LUNCH.

Meat	..	..	..	..	..	2	oz.
Fish	..	..	..	..	..	2	oz.
Bread	..	..	..	..	..	2	oz.
Milk pudding	..	..	..	..	..	5	oz.
Butter	..	..	..	..	..	$\frac{1}{3}$	oz.
Cheese and biscuits.	..	..	..	..	Milk	$\frac{1}{2}$	pint

## DINNER.

Same as lunch.

The value of this dietary is—

Proteids.	Fats.	Carbo-hydrates.	=	Calories.
120 grammes.	110	240		2,500

The patient before us, then, in whom it is assumed we find no condition contra-indicating an increased dietary, is tentatively placed on what I have called the standard dietary for consumption. I need hardly say that some consideration should be paid to the individual's likes and dislikes, and to any well-grounded statement on his part of inability to eat certain articles of food without discomfort. It is only necessary in substituting other foods for those that disagree to keep to the proper quantities of the three essentials as far as possible.

**The Patient's Digestion.**—Subsequently we have to satisfy ourselves by repeated observation of its effects that the diet is fulfilling its purposes.

The first point for inquiry is the manner in which the regulation meals are got down and digested by the patient. If the case is a favourable one, it will commonly be found that the proper quantities have been consumed without difficulty, or with only a trifling amount of force-work. If any disagreeable after-effects have been felt, these only consist of a sense of repletion, with some flatulence and, perhaps, occasional pyrosis. In a large number of instances it can be confidently predicted that these symptoms will gradually vanish as the generally invigorating effects of the fresh air, of the rest or regulated exercise (as the case may be), and of the systematic feeding itself come into play.



**Effect of Diet on Weight.**—Besides satisfying himself that the diet is suiting the patient's stomach, the physician watches each week its effect on the weight. Except in hopeless cases or some form of acute tuberculosis, it is the invariable practice of all sanatorium physicians to weigh each patient at regular intervals of a week. This should be done at the same time of day always, conveniently the first thing in the morning or the last thing at night, in sleeping garments, dressing-gown, and slippers.

Many patients gain weight rapidly on our preliminary, or standard, diet. From three to seven pounds a week is often added to their weight by consumptives receiving this moderate amount of nourishment as the result of their changed conditions. Rest saves the wear and tear that characterised their lives beforehand. In response to fresh air, fever perhaps is abating, and digestion and assimilation are more perfect, while even our small standard dietary is probably an increase on what they were previously taking.

We will now indicate the circumstances in which it is usual to see weight gained easily—that is, without the necessity of much forcing or of variation of the diet.

If the disease of the lungs is mild, and of very recent development, no time has been given for the degeneration of the digestive organs, and we find that flesh rapidly lost is also rapidly regained.

On the final disappearance of fever, weight often increases very readily. The same amount of food may have been forced down for weeks without any gain in weight being recorded, but so soon as the fever is vanquished the diet is managed easily by the patient, and without any increase of the allowance he quickly puts on flesh. It is certainly found to be true of the consumptive that his appetite furnishes an index to the state of his stomach and powers of absorption. The same amounts of food and milk may be consumed by two patients, without difficulty or disinclination in the case of one, and only by means



of forcing in the case of the other; it will usually be observed that the weight of the first increases rapidly, while that of the latter remains stationary or decreases. A healthy appetite, therefore, commonly indicates that weight will be readily gained without the necessity of very large dietaries.

While speaking of those who may be expected to put on flesh easily, I would refer to the consumptive occasionally met with who gains weight too readily. Several such instances have come under my notice. These patients, without any great increase of dietary, but so soon as they succeed in checking the disease and directly the scale turns at all in their favour, at once put on flesh at an astounding rate. It appears that this natural tendency to corpulency is of favourable prognostic significance in pulmonary tuberculosis. Such cases have done well, and the excess of weight has subsequently been removed by exercise and dietetic means. We all know that weight may be gained by the consumptive who is going steadily downhill, but, taken along with other favourable indications, aptitude at gaining weight is a good sign in consumption.

Though larger gains are of frequent occurrence, one of about a couple of pounds a week is quite satisfactory, and if the diet proves suitable for the stomach, it need not be changed, so long as weight is steadily added, pound by pound. In this case the same scale of feeding can be continued until the required amount of weight has been added to the patient—that is, as we have already seen, until he is about half a stone above his maximum known weight, or until our judgment tells us that he has reached a weight that goes with the best general health. On the attainment of this desired end the physician should commence reducing the amounts of foodstuffs administered. The diet gradually returns to that of the normal individual, the first article to be reduced being usually milk. This may be altogether omitted, or, perhaps, a pint may be distributed over the day's meals.



We must next consider the patients who, in spite of some week's trial of exposure to air, of rest with or without intervals of regulated exercise, and of the administration of the specified diet, do not manifest satisfactory progress. We have, of course, always to reckon with the somewhat large class of patients who are unable to respond fully to our efforts, notwithstanding all the perseverance and resource that may be shown. Even here we shall often be amply repaid by giving the invalid the benefit of a long trial. The most unlikely cases frequently derive at last an unexpected amount of benefit, and I may repeat that one of the great advantages which may be claimed for this system of treatment of consumption lies in the fact that amelioration of symptoms is almost constantly obtained, even though recovery is hopeless.

**Persistent Fever.**—Confining our remarks for the present to the patients whose condition warrants the opinion that persevering treatment should eventually succeed, we must first refer to persistent fever, which commonly forms the obstacle to successful feeding.

Practically speaking, definite anorexia is encountered under two distinct conditions. Firstly, in the presence of active disease characterised by considerable elevation of temperature the ingestion of sufficient food commonly involves more or less struggle, though this is not invariably the case. In these cases of active pulmonary tuberculosis the digestive organs are free from structural change, but the toxin appears to exert a powerful influence in inhibiting the functions of the stomach and bowels, and there is usually an associated irritability of the coughing and vomiting centres in the brain.

The almost constant disappearance of these symptoms within a short time after the final reduction of the fever points to the action of a toxin on healthy organs.

According to Drs. Bardswell and Chapman,\* the most

\* *Brit. Med. Journ.*, Nov. 1st, 1902.



pronounced anorexia and dyspepsia may co-exist with normal absorption, and the gastric analyses in such patients afford evidence of normal secretions.

Secondly, anorexia, dyspepsia, and defective assimilation are frequently dependent on structural changes in the stomach or other abdominal viscera. These may or may not be associated with fever. They include actual deposit of tubercle, albuminoid degeneration, the congestion consequent on pulmonary fibrosis, and catarrh or dilatation of the stomach.

A large number of febrile patients suffer at first from anorexia and dyspepsia. The indication is to reduce the fever, and if this is accomplished we usually note the simultaneous disappearance of the stomach symptoms. The part played by increased feeding in the conquest of fever is not so easily demonstrated as is the case with the effects of strict rest and of exposure to fresh air. There can, however, be no question but that the effect of the attendant's efforts in forcing the patient to consume full amounts of nourishment is to increase the weight, or at least to check loss of weight. It is established that improved nutrition constitutes an increase of forces for the counteraction of the toxin which is responsible for the fever. Hence in our treatment of obstinate pyrexia, the administration of a large dietary is recognised as an important factor. These are the cases where the attendant must exercise his efforts of incessant persuasion. As it becomes more and more apparent that rest and exposure to air alone are not vanquishing the fever, it is necessary thoroughly to try the effect of increased feeding. The physician satisfies himself by an inspection of the stools that the food is not being passed undigested, and by a consideration of the patient's disposition, he determines if his fullest efforts at eating are really being put forth. Then, supposing that fever persists and that weight is not added on the original diet, gradual increments of the amounts are made as the condition of the appetite and of the stomach permits.



But in a certain number of patients, though physical examination detects no objective signs of disease of the abdominal viscera, we are faced by the most extreme anorexia and dyspepsia. In spite of some months, perhaps, having been spent resting out of doors, food is positively loathed, and such morsels as are forced down set up discomfort, which ends in vomiting, perhaps, or diarrhœa. The degree in which these symptoms present themselves, and their persistence in spite of treatment, enable the physician to distinguish the subjects of serious anorexia from those whose appetites improve with regained strength.

Confirmed loss of appetite and indigestion may become the most serious features, and defy all remedies. Supposing, however, that the pulmonary lesion is not of an unfavourable nature, the anorexia and dyspepsia must be patiently treated by every expedient at our command. Some assistance is afforded by drugs, prescribed according to general indications.

The well-known mixture of soda bicarbonate gr.xv., tinct. nux vomica ℥vij., tinct. gentian ʒss., aqua chloroformi to ʒi., is particularly useful. It is prescribed, perhaps, more frequently in pulmonary tuberculosis than any other medicine. Appetite is commonly increased by its use, and the lesser manifestations of indigestion, such as flatulence, distension, and pyrosis are remedied. It may be continued for long periods with advantage. Less commonly the administration of mineral acid with nux vomica and gentian is indicated. When the symptoms depend on mere slowness of digestion, pepsin in one form or another may be taken with the meals. Salicylate of bismuth is particularly useful when there is much pain or evidence of catarrh. It is also our best remedy for diarrhœa. A convenient method of its administration is to supply the patient with the pure powder, and direct him to measure out a level teaspoonful, which is equal to about 20 grains. This quantity he places on the side of his plate at each meal, and eats with successive mouthfuls of food like



salt. When flatulence is the prominent feature of the gastric or intestinal derangement, the most generally serviceable drug is creasote. The addition of gr.  $\frac{1}{8}$  of menthol to  $\text{m}i.$  of creasote enhances the value of the latter as a remedy for flatulence.

The possible dependence of the failure of appetite and digestion upon the fever must always be borne in mind, and though they have been distressingly present for months, yet if only the fever admits of reduction there is every reason to hope that appetite, digestion, and assimilation will all be recovered. The indication, therefore, in these cases is to adopt every measure that is of recognised utility against fever, and to be prepared to persevere with a strong line of treatment for several months. While chief reliance is placed on absolute rest and on laying the patient boldly out of doors, these agents must be supplemented by those that aim at improving the nutrition. I have no doubt but that the satisfactory issue is contributed to in the favourable cases by insisting on as much nourishment being got down as the stomach can deal with. I do not believe in the necessity for doing violence to the feelings of the patient, but let the reinforcement of his dietary be brought about with some regard to the dictates of his own senses and according to a study of the individual's appetite and digestion. Attention has already been directed to the remarkable way in which defective appetite and digestion are often cured by the expedient of pressing more food upon the stomach for a few weeks. This especially applies to the consumptive who has yielded to the disinclination to eat, and has allowed the general nutrition, including that of the stomach, to become desperately low. Partly, therefore, with the object of eliminating the patients who, in spite of fever, are to be cured of their anorexia and dyspepsia by forcing them to consume the regulation allowance of food, it is desirable to commence treatment with a dietary as nearly resembling the standard one as possible. The physician is also enabled to form an estimate of the



digestive derangement by watching the effects of the trial with this amount of food. If no obvious increase of symptoms referable to the stomach manifest themselves the physician will cautiously proceed to make additions to the diet while weight fails to be gained and fever persists, until the limits of toleration of the digestive organs are reached or sufficient weight is made. In my experience the majority of patients who are destined eventually to lose their fever and make good recoveries present but little difficulty with their feeding from the first. Before any decline of temperature occurs the appetite and digestion usually respond to the rest and fresh air, and the standard dietary, or a larger one, is managed with increasing ease.

**Anorexia and Dyspepsia not necessarily dependent on Fever.**—But there remains the smaller class of patients, whose anorexia and dyspepsia are perhaps independent of fever, and who are unable to digest the standard dietary. To persist in the stuffing of these patients is to do actual harm, and the consequent disorder of the stomach and bowels is often responsible for some of their fever. We can recognise that the amount of food is in excess of what is good for the patient by the appearance of ordinary symptoms of over-taxation of the digestive organs.

It will first of all be found that the struggle exercised by the patient to get the nourishment down and retain it is all to no purpose, the successive weights showing that he fails to absorb it. The over-fed consumptive suffers acutely from a sense of distension in the stomach and bowels, which no length of interval between meals may dissipate. A particularly characteristic symptom is pain in the lower part of the abdomen, which is increased by all food. If there is any tendency to diarrhoea this may be increased, but more often constipation is present. It will be obvious that the general condition is less good; besides maintained or possibly increased fever, the pulse will be more frequent. The increased frequency of pulse



is the chief symptom of the unfavourable influence of forced feeding on the circulatory system with which I am familiar. I have not detected a definite rise in arterial tension with the sphygmometer, but dyspnœa and palpitation are often complained of, and I have repeatedly ascribed troublesome vertigo to the effect of over-feeding on the vascular system. Any liability to hæmorrhage must be increased. Headache is apt to be troublesome, and sleep is often interfered with, partly because of increased cough, partly from the perpetual uneasiness felt in the body. The tongue becomes more coated and the breath may be foul, while flatus distends the stomach and bowels, and the fæces contain mucus and fragments of undigested food. On examination it may be discovered that there is appreciable dilatation of the stomach and bowels, and, moreover, these bad effects may be more or less persistent even after the removal of their cause. Lastly, I have noted transient albuminuria in these sufferers.

In other cases the capability of the patient may be very definitely gauged by the regular occurrence of nausea at a certain stage of each meal, when, with or without the consumption of more food, vomiting may ensue. These symptoms may be determined by cough, which is inevitably excited by a certain repletion of the stomach. It is in the more acute forms of tuberculosis with high fever that this irritability of the centre for vomiting and coughing is generally encountered, and so soon as the potency of the toxin lessens and allows the fever to abate, the distressing stomach symptoms also vanish. This nausea peremptorily marks the amount of nourishment at which the patient must stop. In the face of this difficulty there is always one expedient to be adopted, which is usually more or less successful. The meals should be taken quietly and very slowly in the patient's own room, while he remains in the recumbent posture. For a full hour afterwards he should keep lying down and avoid any movement, or even talking.

In addition to the above-mentioned precautions, the



diet of many of these febrile patients must be reduced rather than increased. In spite of determined efforts to consume all the food offered, appetite and digestion do not improve and weight is not increased. Knowing that the limits of toleration have been reached, the physician should administer a diet more easy of digestion than the standard dietary. It may only be necessary to make slight changes in certain items, as with an ordinary case of dyspepsia. The indication may be to cut off all rich articles, to substitute cold meat for hot dishes, to avoid bread, potatoes, etc., as on general lines laid down in the management of indigestion. These modifications of the diet can be readily effected without interfering with the proper quantities of the three chief classes of foodstuffs.

But in other cases more or less essential constituents of our dietary may be objected to by the patient, and it may be difficult to replace them without departing from the regulation amounts of proteids, carbo-hydrates, and fats.

**Place of Milk in the Dietary.**—Milk, for instance, is an article which we can hardly afford to omit from the consumptive's dietary, so obvious are the advantages that attend its free administration.

Almost daily the physician is assured by some patient of his peculiar inability to take milk. Fortunately, however, it is infinitely rare in my experience to meet with a consumptive to whom milk, in one form or another, cannot be readily given. I have had under my care patients who certainly became bilious whenever they took milk, but this is so very exceptional that the patient's statement must not be accepted without convincing evidence.

As a rule, milk should be given in one of the forms that make it easier of digestion. When any dyspepsia arises from its use, the best plan is to add twenty grains or an eggspoonful of bicarbonate of soda to each tumblerful of milk. The milk may also be given warm, or thickened with some farinaceous food, or it may have a little spirit added to it. The milk should not be swallowed in bulk,



but should be slowly sipped. With these modifications it will usually be found that milk will agree, even when drunk at meals with other food. A great deal of milk can be administered in the form of junket or other pudding, to which cream may be added. The addition of soda-water or other diluents has the disadvantage of increasing the already large bulk of liquid that the patient is probably required to swallow; but it is a good plan to aerate the milk in a seltzogene or sparklet apparatus. It is agreed that the boiling of milk lessens its nutritive value, so for the sake of rendering it more digestible it should only be warmed, and the possibility of the milk conveying tubercle bacilli should be guarded against by securing non-tubercular cows for its supply.

As already stated, it is difficult to conduct the dietetic treatment of any tubercular patient without using a considerable quantity of milk. In the majority of cases two or three pints are taken along with ordinary meals without anything but benefit accruing, and the ingestion of this milk, with its high nutritive value, imposes a relatively small tax on the appetite and digestion. It is, in fact, by varying the daily quantity of milk administered that we can most delicately affect the patient's weight. If a patient presents the symptoms which are suggestive of overfeeding, hurried action of the heart, dyspnoea, general puffiness or deranged stomach, the first point I should inquire into would be the amount of milk taken. I have repeatedly observed in sanatorium practice that the frequency of the pulse can be definitely reduced by diminishing the amount of milk, the patient having exceeded his capacity in this direction while only eating a moderate amount, perhaps, of solid food. If, on the other hand, there is difficulty in adding the required amount of weight to an individual, one of the simplest procedures—which is also one of the most effective—is to increase the quantity of milk, while other items are, if necessary, proportionately diminished. In the after-care likewise of discharged patients,



we shall see later on that by varying the amount of milk the weight can be best maintained at the level considered proper for the individual.

**Modifications of Diet.**—We are considering the cases where our ordinary diet obviously disagrees, and where, in spite of perseverance, the appetite and digestion do not improve. Failing meat in any form, chicken and fish would first be used to replace it. Regarding the former, it must be remembered that fat is deficient in amount as compared with meat. Contrasting fish with the same weight of meat, it is to be noted that the stimulating extractives of the latter are wanting in fish, and that the proteid in fish is less in amount, and is in the form of gelatin. This substance is not a builder of tissue, but only spares tissue consumption.

When chicken, therefore, is used to replace meat, the amount of fat food should be made up by giving additional milk. When fish is allowed to replace meat, proteid should be added in the form of pounded meat, meat juice, or beef-tea. In case the weakness of digestion and appetite is such that not even chicken and fish are tolerated, we must make the diet more liquid. Supposing we had to confine our patient to a wholly milk diet, over seven pints daily would be required to supply the necessary four and a half ounces of proteid. This quantity would yield more than the stipulated amount of fat. We have seen that this last item of nourishment is particularly well borne by consumptives, but there is usually a difficulty in getting such a large quantity of liquid consumed for any length of time.\* The disadvantages of a purely milk diet are its bulkiness and the necessity for overburdening the system with a considerable surplus of water. There is a deficiency of carbohydrates, and the nature of the residue left by milk is not suitable for the stimulation of intestinal peristalsis.

The necessity of aiding the evacuation of the bowels

\* "Food and the Principles of Dietetics." By Robert Hutchison, M.D., F.R.C.P.



with frequent doses of cascara sagrada, or other aperient, particularly obtains when the patient is taking large quantities of milk.

Though milk, therefore, is utilised to replace meat to a great extent, it is not usually advisable to confine the patient to milk entirely.

Perhaps four or five pints of milk are administered in the course of the twenty four hours, in portions of half a pint at a time. To make good the deficiency of proteid, and also for the sake of making the milk more agreeable, it may be fortified by the addition of various foods. Casumen, plasmon, and tropon are particularly useful. To quote Dr. Robert Hutchison again, these preparations contain the same amount of proteid as four parts of meat.

Another valuable article of diet for pulmonary tuberculosis is eggs. In a good many cases recovery has been attributed to the sole fact that a large number of eggs were swallowed daily. I am very fond of recommending eggs beaten up and taken with milk, and ascertaining how many can be digested. Though many patients are upset by attempting to take more than two or three in the day, there are those who can swallow half a dozen eggs or more a day with nothing but advantage.

As further means for supplying proteid in a concentrated and easily digested form, we have the various meat preparations. Pounded raw meat sandwiches, meat-juice, and meat jellies are all serviceable. Then we have various forms of broth, which are of somewhat less value. The milk or other foods may require to be peptonised. The shortage in carbo-hydrates is easily supplied by thickening the milk with any of the foods commonly used in invalid cookery. Benger's or Mellin's food, cornflour, arrowroot, revalenta are all valuable. Lastly, we can avail ourselves also of various farinaceous puddings, and of rusks and biscuits. When prostration is a marked feature, stimulants are decidedly beneficial, otherwise the less that wine or spirit is used the better. Beer occasionally helps a



flagging appetite, but as a matter of routine I am sure it is advisable to abstain from alcohol entirely.

**Care of the Teeth.**—As a point of practical importance, I would make the suggestion that the patient's teeth be thoroughly overhauled before he goes to a sanatorium. As might be expected, the increased amount of work thrown upon the teeth in masticating the large meals, and the exposure of the patient to cold, are apt to discover weak points. Much loss of time and discomfort, and perhaps some actual lesions, might be saved by a visit of the dentist.



## CHAPTER IX.

RESULTS OF SANATORIUM TREATMENT AND SUBSEQUENT  
CARE OF THE PATIENT.

I HAVE no intention of describing the achievements of the open-air method in too glowing terms. I am aware that the true interests of the cause are not forwarded by placing a too optimistic view before readers. We may as well admit at once that we are fighting a disease which is powerful to destroy life, and that our most recent manner of attacking it falls very far short of being universally successful. Faced with so pernicious a malady as consumption, we may be encouraged if our efforts succeed in only a certain proportion of our patients. On all sides it is allowed that the sanatorium treatment of pulmonary tuberculosis constitutes our most effectual and most rational method of combating the disease, but of late there has been heard some murmur of criticism in respect of the ultimate results. I shall make no attempt to deny that the critics have some grounds for their strictures. It is, unfortunately, only too true that a large proportion of patients discharged from sanatoria have been unwisely declared to be cured, and have relapsed soon afterwards. I do not know that there is any substantiation for the statement that has been made in one quarter that patients die the quicker for having undergone sanatorium treatment. As far as I am aware, the only accusation that can be brought forward is this : Many patients have been received into sanatoria whose disease never admitted of satisfactory arrest, their eyes have not been opened to the incomplete-



ness of their recovery, and they have not been duly impressed with the necessity for continued treatment.

Those who question the durability of sanatorium results and who express any misgivings as to the final advantages that will accrue from the efforts now being made to provide sanatorium treatment for the poorer classes can be readily answered, in my opinion. We have two main difficulties to contend with in regard to the treatment of consumption amongst the poor, and we must strive at perfecting our organisation for overcoming them. In the first place, it is difficult to catch the disease in its early stages, and in the second place it is difficult to adapt the after-lives of poor patients to the requirements of their health. Certain suggestions which offer themselves towards the solution of these difficulties will be referred to presently. Meanwhile I may claim that when these two especial causes of failure are allowed for, the results of sanatorium treatment are sufficiently encouraging even with patients drawn from the poorest classes. Future progress must be looked for in the direction of schemes for the earlier detection and handling of the disease, and a better organisation for the after-care of discharged patients. Our actual weapons for arresting the malady may undergo no improvement, but with reform in the above-mentioned directions it is certain that a larger proportion of lasting recoveries will be obtained.

**Classification of Results.**—It is very desirable that some uniform method for the classification of the results of treatment in pulmonary tuberculosis be agreed upon. At present a variety of terms are in use, and even the same terms are differently understood by different writers. Such expressions as cure, relative cure, arrest, and so forth, require definition, for we do not know exactly the meaning to be attached to them.

“*Absolute cure*,” says Dr. Claude Chidell, “like happiness, can be predicated of a man only when he is dead, or possibly during life by the diagnostic use of tuberculin.”



For some years our own results have been classified under the following headings, which have been found applicable for practical purposes, and which convey, I think, a fairly definite meaning :—

*I. Recovery, with fitness for work.*

*II. Arrest of disease, with fitness for a certain degree of work.*

*III. Arrest, but with the necessity of continuing an invalid life.*

*IV. Improvement.*

*V. No improvement.*

Let me now offer a few remarks in explanation of these headings.

In Class I. are placed patients who might be classified by some writers as cures, though we do not by any means all attach the same significance to this word.\* Dr. Clifford Allbutt has proposed that the test of a cure should be “that for a year the patient shall have gone back to his occupation under reasonable conditions, without signs of recurrence.”

I readily accept this criterion, but as the lapse of one year is necessary, we cannot use the word cure in this sense for the description of the immediate result of treatment. It is obvious that the real test of any plan for combating consumption is the durability of its results, and sanatorium returns have but little value unless they furnish information as to the condition of the patients both at the time of their discharge and after the lapse of a certain period. Returning, however, to our heading, “Recovery, with fitness for work,” we have this reservation to make. I do not think that a person who has once manifested tuberculosis can ever afford altogether to disregard his health, however complete his recovery may appear to be. So when a patient is declared to be fit for work, it is meant that he is fit for any work or condition of life which is not

\* “Discussion on the Open-Air Treatment of Tuberculosis,” Royal Med.-Chir. Soc., 1900.



admittedly injurious to health. The patients who fall under this class have, of course, recovered their full bodily health and vigour; they have probably surpassed their previous maximum weight. The temperature must be normal and stable, and the pulse must be satisfactory. While many patients belonging to this group have lost all cough and signs of secretion from their lungs, I would not necessarily exclude from it certain patients who have a small amount of persistent cough, and who may always have a few moist sounds to be heard at some limited spot in their chests which does not spread. If the lesion be strictly limited, it may to the end present signs of its existence; there may also be a little expectoration containing, perhaps, tubercle bacilli, and yet the individual may live his full term of years without curtailment of his activity or usefulness.

II. The second class we make to include patients, again, whose temperatures are steadily below  $99^{\circ}$  at any time of the day, and who are quite free from any symptoms of progressive disease. But either the amount of permanent damage to their lung or the drain suffered by the constitution precludes their safe adoption of anything like a strenuous life. The maintenance of their ascendancy over the malady is only securable by the adoption of work which entails no fatigue or prejudicial conditions, and which allows them perhaps some opportunities each day for cultivating their healths. Their work must be specially selected for them to suit their particular requirements. In some cases it may be necessary to stipulate that the occupation involve no exercise, and can be followed without the patient having to leave his chair. In other cases perpetual existence in the open air may be more important than the adoption of a sedentary life. For this class it is always necessary that some part of the day be devoted to rest.

III. Our third group comprises patients in whom arrest has been secured, but for whom continued treatment is necessary if they would maintain their position. They are



so far under the necessity of following the sanatorium life that serious work is precluded. Every other consideration has to be subjugated to the preservation of their resisting forces, and unless they devote their lives to the maintenance of such health as they possess, it is judged that they will relapse.

IV. We describe as *improved* those patients for whom arrest cannot be said to have been obtained. The constitutional symptoms have been ameliorated, but probably no dependence can be placed on the improvement being maintained.

V. In this class we place the patients who make no lasting response to treatment or who retrogress in spite of our efforts.

Adopting these headings for our patients on the completion of their course of treatment at Mundesley Sanatorium, we obtained the following total results with 143 cases. It must be noted that our patients were not strictly selected.

<i>Recovery, with fitness for work.</i>	<i>Arrest, with fitness for a certain degree of work.</i>	<i>Arrest, with necessity of continuing invalid life.</i>	<i>Improvement.</i>	<i>No improvement.</i>
11	36	36	38	22
or 7.69 per cent.	or 25.17 per cent.	or 25.17 per cent.	or 26.57 per cent.	or 15.38 per cent.

Roughly speaking, we find that taking all patients as they come, without strict selection, and suffering from various degrees of pulmonary tuberculosis, arrest of the disease or distinct improvement is obtained in 84.6 per cent., and that 32.86 per cent. are restored to working capacity. Now, if we confine our treatment to strictly selected cases, and only deal with patients whose disease is in the earliest stages, and of a favourable type, very different results are obtained. We find that if we deal only with strictly favourable cases of pulmonary tuberculosis something like 80 per cent. are restored to fitness for work.



The figures published by various sanatorium workers give very similar results. At the Victoria Hospital for Consumption in Edinburgh, which was amongst the first to institute the open-air treatment, 782 patients have been received since 1887. Of this whole number 25 per cent. were, to all appearances, *cured*, while 50 per cent. were ameliorated to a satisfactory extent. If we take an example from a Continental sanatorium, there are the statistics of Dr. Rumpf, of Friedrichsheim, dealing with 541 cases of pulmonary tuberculosis. Taking only the patients whose malady was in the first stage, 75.6 per cent. were discharged *able to work*.

To sum up, then, we are probably fairly near the mark if we state that without the exercise of strict selection of cases for treatment, about one-fourth recover their healths sufficiently to return to work. Another one-fourth are not strikingly or materially improved.

The remaining one-half are distinctly benefited, but are unable to lead ordinary lives.

When only favourable or strictly selected cases are dealt with, it may be claimed that about three-fourths of them are restored to fitness for work. It will be seen, then, how strikingly our results are affected by the selection of cases for the treatment. Success may be said chiefly to depend upon submitting the patients to treatment while their disease is in its early or tractable stage.

**Durability of Results.**—We must now pass to the consideration of the more crucial point—the durability of the results obtained by sanatorium treatment. For the purposes of this inquiry we must appeal chiefly to the statistics of the German sanatoria, as our English institutions are of too recent origin.

Dettweiler's important report states that out of 1,022 cases of confirmed consumption treated during a space of ten years at Falkenstein, 132 patients were discharged as *absolutely cured*.

After a period of from three to nine years, he wrote to



99 of the 132 patients, and received 98 replies to his inquiries about their healths.

Dettweiler learnt that 11 patients had died, for the most part of affections which were not tubercular; 12 had suffered from a recrudescence of their consumption, and had again recovered completely; 3 were still ill with consumption; the remaining 72 patients maintained their recoveries. That is to say, that about 72.5 per cent. of the patients discharged *cured*, retained their satisfactory positions after the lapse of from three to nine years.

The results obtained by Dr. Rumpf at Friedrichsheim are almost identical, but refer to a period of only two to three years subsequently to the discharge of the patients. Of those received in the first stage of their malady, 75.6 per cent. were still able to work.

It is now five years since the first of our patients left the Mundesley Sanatorium, while over two years have elapsed since the last of those referred to in the following figures were discharged from treatment. As already stated, 47, or 32.86 per cent. of the whole number, were considered fit for work at the end of their course. All of these patients have been followed up during the succeeding two to five years, with the following results:—

Out of 47 patients received in various stages of their disease and discharged, from two and a half to five years ago, as fit for some work—

Satisfactory condition maintained by	36, or 76.6 per cent.
Relapsed .. .. .	3, or 6.39 „
No history .. .. .	6, or 12.76 „
Dead .. .. .	2, or 4.25 „

Of the last number, one died from appendicitis and the other from pneumonia.

The Kelling Sanatorium for the treatment of consumption amongst the poorer classes has not yet been opened quite two years, but I give our results there for what they are worth.



During our first year 54 patients were received who had only been subjected to a moderate amount of selection. The following results were obtained.

Fit for work .. ..	26, or 48.15 per cent.
Fit for light work .. ..	12, or 22.22 ..
Improved .. ..	7, or 12.96 ..
Not improved .. ..	9, or 16.66 ..

The number of those whose condition was fully maintained after one year was 20, or 76.9 per cent.

It is interesting to compare these figures with the Mundesley results. With better selection at Kelling, a larger proportion are restored to fitness for work. On the other hand, one year witnesses as many Kelling patients fall away as occurred in two to five years with our Mundesley patients. Our Mundesley patients were drawn from the affluent classes, and could afford to adapt their work and their conditions to the requirements of their health. Our Kelling patients, on the other hand, were poor, and found themselves perhaps obliged to accept work which was prejudicial to their health, or suffered privation from inability to obtain suitable employment.

I am convinced that so far as the poorer classes are concerned, our chief task commences after their recovery has been completed. It is comparatively easy to arrest the disease; we only require early diagnosis. But the prevention of relapse is a different matter, and will be again referred to. Impressed by these facts, the Kelling Sanatorium now directs its attention towards securing suitable conditions for its patients on their discharge.

But the results of sanatorium treatment cannot be fairly represented by tables setting forth the percentages of patients whose disease is arrested or improved. The evidence furnished by statistics in regard to any treatment for pulmonary tuberculosis is particularly inconclusive. We have had repeated occasion to remark that the extent and the type of the affection have much more to do with



the result obtained than any perfection or imperfection of the system of treatment. Moreover, considerable allowance should be made for differences in the judicial qualities of different reporters. It would never occur to me to use the returns made by sanatoria for the purpose of contrasting the therapeutic methods of one institution with those of another, though they might serve to demonstrate the success of any plan for the selection of cases for treatment.

I have brought forward certain figures merely with the idea of putting on record the course pursued by pulmonary tuberculosis in its different stages under the influence of the sanatorium system.

If it were desired to publish a very high record of recoveries, that could be accomplished by refusing admission to all patients whose disease was at all advanced or of an unfavourable type. Such a course may be highly commendable on economic grounds, and should probably be aimed at in the case of sanatoria for the poorer classes. Where the number of applicants for admission is always greatly in excess of the available accommodation, it is obviously making the best use of the beds if only such cases are treated which promise to be lastingly restored to capable health. But on other grounds I confess that I should be extremely loth to shut out the less favourable cases. With the exception of patients in the very last stages of the disease, and of those affected with the most acute forms of tuberculosis, the vast majority of consumptives are susceptible of material, if only more or less temporary, benefit from sanatorium treatment. So common an experience is it for apparently hopeless cases to improve, that some writers declare that the only way of forming an opinion about the suitability of a patient is to submit him to the treatment and to watch the effect. A patient with extremely advanced disease is often seen to take a fresh lease of life, and the point of the late Dr. Wilson Fox's utterance is emphasised : " I know of no last stage in consumption."



**Educational Effect of the Treatment.**—The mission of the sanatorium is not only to afford all the possible alleviation to the patient while he is an inmate; it also fulfils the important function of educating the patient. He picks up information as to the best way of keeping his disease in check, and he also learns how to minimise the danger of infection for his fellows.

It is a great mistake to regard sanatorium treatment merely as a course which is to be gone through, and there let its benefits cease. The greatest amount of good effected by sanatoria depends on the practical instruction received by the patients in the care of their health. It cannot be too clearly realised that the subject of pulmonary tuberculosis is a person who is always under the necessity of living by rule. Every patient who leaves a sanatorium should receive precise regulations for the guidance of his future daily life, based upon the prolonged observation of the individual and upon the indications of the tests to which he has been submitted. The patient's chief secret is always to maintain a close watch upon his health, and he gathers during his course of treatment what are the points to be especially noted. In order that the ascendancy which he has gained over his malady may be maintained, the patient must be on the look-out for the earliest signs of its recrudescence. Such signs will probably be afforded by a variation in the height of the afternoon temperature, by the weight failing to keep at its proper level, by a falling off in the general strength, or by the appearance of fresh symptoms connected with the respiratory or digestive organs. Every patient who has been through a course of sanatorium treatment is familiarised with the use of the clinical thermometer, and fully appreciates the significance of its indications.

In the case of patients judged to have attained secure arrest of their disease, it may suffice if they are instructed to test their temperatures at long intervals—say, once a month—and at any time when they have any misgivings



as to the maintenance of their supremacy. For other patients it will be safer to take daily or weekly observations of the temperature, according to the estimated security of their positions. There is only this reservation to be made: we do not want our patients to be morbidly engrossed in their states of health. In some unfavourable cases the fever may be obstinate, and it may only serve to mortify the patient if he is permitted constantly to watch his own refractory temperature. In other cases the invalid develops a hypochondriacal interest in his temperature and other symptoms, and the attendant may consider it wiser to have them ignored. Though it is always well to bear in mind the possibly demoralising effect of sanatorium treatment on the patient's character, I am satisfied that such an occurrence is very exceptional, and only calls for the exercise of a little discretion on the part of the physician. In the vast majority of instances our difficulty lies in the opposite direction, and we can hardly persuade the consumptive to take sufficient care of his health.

Our discharged patient will be instructed that a sustained elevation of temperature during any part of successive days, however little above his usual point it may be, betokens something amiss and the necessity for fresh directions. In the matter of weight the patient will be told the lowest figure which assures his ability to withstand the enemy. It is probable that he will lose some of his sanatorium weight without taking any harm, but he must not allow himself to lose more than a stipulated amount of flesh without concern.

It will be scarcely necessary to impress upon the patient the necessity for taking immediate steps on the advent of any new symptom or the re-appearance of an old manifestation. Upon the completion of a course of systematic treatment, the physician has in the first place to consider how far can each patient be allowed to resume his ordinary mode of life, or how far must he continue to observe the sanatorium *régime*.



Let us suppose that certain tests have been imposed upon the patient, and that the result of mature observation is to determine that the patient comes under the category, "Recovery, with fitness for work." Even this most favourable class require some advice about their work and the conduct of their lives. Besides always keeping a watchful eye on their own health, it is generally advisable for them to report themselves at long intervals to their medical attendant. Return visits to the sanatorium or further courses of treatment at home should be recommended without hesitation. The victim of pulmonary tuberculosis may as well realise at once that he has probably a lifelong struggle before him, and must not assume that one course of treatment will rid him of his malady for ever. In reference to occupation, the question that has usually to be answered is, Can the patient return to his former employment? A decision has to be come to in each case by attempting to estimate the strength of the individual's defensive forces and the extent to which they will be taxed by the work in question.

I can only offer a few general suggestions on this subject of occupation. In the first place, the patient can always be warned that the care of his health must in the future over-ride all ambition, and the intention to excel in his walk of life. It is futile to attempt a classification of occupations according to their suitability or the reverse for tubercular persons. Everything depends upon the conditions under which the occupation is pursued. The work of a clerk, for instance, may involve long hours of pressure and drive without sufficient time for refreshment, and in a polluted atmosphere; or it may mean the leisurely occupation of a few hours in light work under favourable circumstances. From a consideration of the after-progress of our patients engaged in various forms of work, I am under the strong impression that as far as one thing goes, it is most essential to avoid strain. Whether the strain be mental or physical, there are two points of



view from which it must be looked at. It may actually exhaust the patient's store of strength, or it may merely mean the absence of opportunity for rest, and for recreation in the literal sense of that word.

However sound his recovery may appear to be, it is seldom wise to permit the consumptive to embark on a mode of living which does not allow a certain part of each day to be devoted to the cultivation of his health. In one case it may be necessary to stipulate that so much time be spent in absolute rest; in another case, in some form of outdoor exercise. The hours of work, therefore, must be shortened accordingly. Experience tells us that the most frequent cause of relapse is fatigue. The patient who consistently over-tires himself day after day is inviting a further attack by his enemy. An occupation which involves constant pressure and drive must be avoided, and the leisure time must not be spent in exacting forms of amusement, but in quiet repose. The same objection applies to physical strain. In the case of the labouring classes we have found that particularly arduous occupations, such as those of porters or farm labourers, are not well borne.

In the first place, then, it is necessary to warn the patient against any occupation which involves either incessant hurry or considerable muscular effort.

The avoidance of close rooms is of next importance, but I believe that a light indoor occupation under reasonable conditions is generally preferable to a heavy outdoor one. Notably bad air, such as exists in ill-ventilated workshops and other crowded rooms, is, of course, highly objectionable, and more likely than anything to re-awaken latent tuberculosis.

It cannot be too plainly asserted that sanatorium treatment is no more than one step in the direction of the restoration of health. It is the greatest mistake in the world to pass a patient through his course of treatment, and then to lose sight of him as if no further care were necessary.



It may be hoped that the stay at the sanatorium has arrested the tuberculosis, and has placed the patient in a favourable position for maintaining his ascendancy over the malady. Moreover, he has had thoroughly instilled into him the right way of living, and the kind of watch that he should always keep on his health. But no sanatorium fulfils its mission unless two distinct precautions are taken on the discharge of a patient.

(1) Firstly, the most careful consideration must have been given to the way in which the patient proposes to occupy his future life. His capacities should be tested by actual experiment before he leaves the sanatorium. For several weeks he should be placed as far as possible in the same conditions as will obtain on his return home. That is to say, the same number of hours should be occupied in similar work, no more rest being taken than will subsequently be possible, and his food should resemble that which he will obtain afterwards. In this way, it is easy to ascertain the nature and the amount of work which can be undertaken by the patient without apparent injury. Supposing that no rise of temperature, no sense of fatigue, nor other unfavourable symptom has been produced, the patient is dismissed on the understanding that he is not to exceed the stipulated number of hours of work, nor to neglect to take the proper amount of rest.

(2) Secondly, some arrangement should be made by which the patient is properly inspected at stated intervals for the remainder of his life. The time that may be allowed to elapse between such examinations should depend, of course, upon the extent to which the disease has been overcome. Retrogression may occur without the production of symptoms which the patient can appreciate. The doctor may discover a slight extension of disease, or he may satisfy himself that the patient is making more demands upon his constitution than is compatible with safety, and a timely return to sanatorium life may restore the patient to his former position. Serious relapse can be



largely prevented by convincing him of the necessity for perpetual care. He should always live according to rules which have been carefully framed in regard to his particular case. He should be constantly kept under supervision, to make sure that his exertions are not more than his reduced powers can safely afford. The amount and the nature of the work which can be permitted depends, of course, upon the extent of the disease, and on the inroads it has made upon the constitution. While it may be fairly easy to find suitable occupation for the consumptive whose lung is but slightly damaged, and whose strength has been wholly regained, the case is altogether different with the man who is only fit for a few hours of light work daily. He cannot be expected to be wholly independent of charitable assistance. Some organisation is needed for the care of these invalids, and for supplying them with such employment as they are capable of. The problem is an enormously difficult one, and calls more pressingly for solution than any other point connected with the crusade against consumption. It is comparatively easy to effect restoration, for the time being, of the poor patient's health, but it is difficult to prevent relapse.

We are setting ourselves to do something in this matter at Kelling Sanatorium, and have found suitable means for some of our patients to earn their livings. Appeal must probably be made to the philanthropic public on behalf of the consumptive whose health forbids his returning to his former occupation. I append two leaflets that have been used for this purpose at the Kelling Sanatorium, and that have already met with an encouraging response. I cannot omit to mention that in this and many other departments of our work we are enormously indebted to the indefatigable labours of Dr. H. W. McConnel and others.



## TO EMPLOYERS OF LABOUR AND OTHERS INTERESTED IN THE WORKING CLASS CONSUMPTIVE.

It is felt that it should be more generally recognised that, in dealing with Consumption, Sanatorium treatment is only the first step.

Of suitable cases, treated at a sufficiently early stage, a large proportion are discharged fit for work, but if the good gained at the Sanatorium is to be maintained, it is essential that the patient should, on leaving, be able to go on to suitable employment in suitable surroundings.

The Committee of the Kelling Open-Air Sanatorium, feeling the vital importance of this side of the work, have appointed a special Sub-Committee, called the After-Care Committee, who consider the future of each of the Sanatorium patients, and, where necessary, endeavour to obtain for him, when he leaves, such employment and surroundings.

Work is provided for a certain number at the Sanatorium itself, but as it is impossible to provide in this way for more than a very small fraction of those discharged, the Committee now venture to appeal to employers of labour to assist them.

They can help, it is suggested, in two ways:—

- (1) By being willing now and then to find temporary light work for a man.
- (2) By occasionally giving one of our men the chance of a suitable permanent position.

In the first case the idea would be to enable the man for a short time to earn a bare living wage in suitable surroundings while he looked about for permanent work, and, in the second, to provide him, at no doubt a moderate wage, with suitable permanent employment.

Our men are almost all skilled in some trade, and we would obtain in every case a character from the previous employer.

It would be clearly understood that no responsibility whatever, as to the man's health, should be undertaken by the new employer; if a man so employed should break down, the Committee would like to be informed, and would do all they could to secure him further treatment.

The employment may be either out of doors, or, in pure air, indoors. It should not involve any great physical effort, nor should it require to be done against time or at high pressure.

The following list contains a few of the employments suggested:

Light work about a farm or garden.

Driving.

Caretaking.

Agency work, as, for instance, Insurance Agency.

Rent Collecting.

Some forms of travelling, etc.



Clerical work if in good conditions, or some form of secretarial or literary work.

Estate work, such as light carpentering, looking after an engine, etc. etc.

Motor Car driving, or light coachman's work.

Check-taking.

Door-keeping, and many others.

The risk of infection has been mentioned as an objection, but there is no doubt that it has been greatly exaggerated, and, in any case, it is certain that a man who has been treated at a Sanatorium, whose symptoms have disappeared, and who has been taught the proper precautions, is not only unlikely to be a source of infection, but is actually a missionary of health to all with whom he comes in contact.

The preferential consideration given to subscribers with respect to the admission of patients into the Sanatorium, will be given to any employers who will consent to give, instead of a subscription in money, this invaluable practical aid.

*May we write to you when we want employment for a man?*

Please reply to the HON. SEC., Kelling Open-Air Sanatorium, Holt, Norfolk.

## KELLING OPEN-AIR SANATORIUM.

### NOTICE.

THE Committee feel that it often happens that patients, for one reason or another, are compelled to return to regular work sooner than is good for them.

The patient, after the usual period of treatment, may feel quite fit for any work, but, we find by experience, it is almost always far better for him if he can continue his life in the open air for a further period, and in gradually relaxing the discipline of strict sanatorium life, and increasing the amount of work he does, slowly accustom himself to the conditions to which he will ultimately have to return.

It is also felt that patients often have great difficulty in getting suitable work after they leave, and so a sub-committee has been formed here to advise and to help them on this point.

A small number of convalescents can be taken at the Sanatorium itself. They are no longer treated as patients, but are boarded and lodged at the Sanatorium expense, while they are asked to do any work that may be wanted about the place.

They can, of course, only be kept for a limited period.

The advantages to the convalescents are:—

- (1) That they will continue the treatment in a modified form, and have the advantage of the Doctor's supervision.
- (2) That they will gradually harden off, and learn how much work they can do.
- (3) That if there is any tendency to break down, they can



easily be taken care of, which would be often impossible once they were back at regular work.

- (4) That they will be able to look out at leisure for suitable permanent employment, while at the same time getting their board and lodging found.

A small sum will be allowed weekly to cover washing, etc.

Patients will be asked by the Committee whether they wish to avail themselves of this opportunity, and the Committee are willing to do what they can to help any patient to obtain suitable permanent work.

The other point calling for consideration is a plan for placing patients under treatment at an earlier stage of their disease. Repeated reference has been made to the bearing of early treatment on the result obtained and on the continuance of this result. Much may be hoped from a better understanding of the nature of the malady. If the poor and those who work amongst them become enlightened about the significance of the early symptoms of pulmonary tuberculosis and the importance of immediate treatment, fewer patients will wait for advice until their disease is advanced beyond possibility of cure. Every facility for the diagnosis of suspicious or very slight cases of tuberculosis should be afforded the medical man. There should be laboratories where the examination of the sputum is undertaken free of charge in the case of poor patients. The practitioner should be able to call upon a nurse to observe the afternoon temperature and pulse, for successive days, of any doubtful case. General hospitals can be of great assistance by admitting such cases for the purpose of making an exact diagnosis, and of estimating the individual's probable powers of response to treatment.

Then the medical man should be relieved of the enormous amount of trouble now usually entailed in gaining admission for a patient into a sanatorium. So hopeless, often, is the task at present, that it is discouraging to those who take pains in the diagnosis of early tuberculosis. If more accommodation were available, adequate treatment would follow as speedily and as automatically as now occurs when an infectious fever has been detected.



## CHAPTER X.

## REQUISITES FOR THE OPEN-AIR TREATMENT.

**Home or Sanatorium?**—To begin with, we must decide whether the patient shall be treated at home or sent to a sanatorium. Before this question can be answered, a variety of points have to be taken into consideration. The physician is not warranted in sending the patient from home unless there is good reason to anticipate that he is susceptible of material benefit. If the case is one of very acute illness it is always proper to wait some time before taking the step of removing the invalid, who will possibly die, away from his relatives. Let such a patient simply be put to bed and given all the air, food, and nursing that can be procured at home, and let the effect of these measures be watched. If no impression whatever is made on the height of the fever or the severity of the symptoms by a few weeks of such tentative treatment, it is not likely that full sanatorium treatment will answer. Such a trial can be given under almost any conditions, and I would strongly advocate its adoption in a large number of cases of pulmonary tuberculosis where the amenability to treatment is doubtful. No harm will be taken if these conditions are secured, and much fruitless disturbance is saved. Supposing that the nature of the illness does not preclude the patient's removal from home, it is wise in the greater number of instances to recommend that treatment be commenced in a regular sanatorium. If desirable it may be understood that the patient only goes away to receive a preliminary training, and that the rest of the course is to be followed out at home; but thoroughness, which is the



keynote of the system, is undoubtedly best inculcated in a well-directed institution.

Perhaps the most important point for consideration is, Can we secure for the invalid at his home the skilled supervision and close attendance which are such essential matters in the sanatorium treatment? In the ordinary way it is difficult to make the patient and his friends grasp the necessity for implicit obedience to the doctor's instructions, and some reluctance is often shown to carry out the system with sufficient thoroughness. Directions are apt to be followed only so far as they accord with the patient's own views and inclinations. Because of some change in the weather, we may find that the patient has deserted his shelter, and has shut himself up indoors; or, with an elevation of temperature which demands prolonged and absolute repose, the patient may become tired of restraint and indulge in some exercise or social function. These hindrances to thorough and continued treatment are not encountered to the same extent in a sanatorium. Here everything is found to be conducive to living by rule, the occupants have come for the sole purpose of placing themselves under treatment, and the atmosphere of the establishment encourages the strict adoption of minute regulations. If the system is to be successfully followed at home, the household must unreservedly lay itself out for the treatment, and everything which stands in the way of its thorough adoption must be put on one side. Assuming, however, that the patient is persuaded of the necessity for following all instructions vigorously and pertinaciously, we have still to provide for the expert supervision to modify the details of treatment from time to time as required.

No hard and fast rule can be laid down which will apply to all cases, but the circumstances of each patient must be considered separately. If good progress is made, it may not be necessary for the physician to visit the patient at all frequently. Precise instructions may be given from time to time, and some competent person may be entrusted



with the task of seeing that they are carried out, and of noting any fresh development that the patient may manifest. If the services of a nurse who has had special experience in this class of work can be obtained, it is a great advantage; but where skilled assistance is not procurable, any intelligent person can soon be taught to take the temperature and to supply all the attendance that is required by a straightforward case. These remarks do not apply, however, to more difficult cases. Under home influence it may be impossible to get the invalid to follow out directions with sufficient pertinacity. The relatives may be unable to exercise the necessary control, or the persuasive force needed to get the proper amount of nourishment consumed. The conditions of the home life may be subversive of the absolute repose which is so essential for our patient. The systematic rest may be broken by too frequent visits from friends. In the case of a parent, removal from home may be the only way of procuring freedom from domestic worries and responsibilities.

In many cases the appointments of the house or the qualities of the air peremptorily demand that the patient be treated elsewhere. Finally, it must be borne in mind that many a patient who has done badly at home quickly responds to treatment in a well-ordered sanatorium where he enjoys the benefit of different surroundings and of expert attendants.

**Home Treatment.**—That the treatment can be perfectly well carried out at home I am satisfied. We have abundance of living testimony in proof of the fact.

I contend that the more we simplify the treatment the better. Nothing is necessary, except an intelligent application of the rules and a thorough use of the agents which, we have seen, are capable of influencing the phenomena of the disease. Supposing that we determine to institute the treatment in the patient's own home, we have only to see that certain conditions are fulfilled.



There must, of course, be sufficient and suitable ground adjoining the house to allow of the patient leading his open-air life. It is not feasible to make use of a public garden, and I insist upon the patient's chair being placed near the house. If he has to go some way to his place of rest, he is apt to miss the advantages of supervision. He finds something has been forgotten which is required, and frequently interrupts his rest to return to the house. The rest is usually neither so comfortable nor so thorough, unless it is carried out within call of the house. Privacy should be secured for the patient as he lies out of doors, for he would have to be very strong-minded to surround himself with the necessary equipments of treatment in full gaze of the public.

For home treatment to succeed, it must be realised that the proper care of the patient is an absorbing business, and entails devotion and sacrifice on the part of the attendant. The whole household must make the patient's welfare its chief thought. The amount of medical supervision required must vary with the nature of the case, and with the disposition of the patient. If perfectly satisfactory progress is made, it may only be necessary to see the patient at intervals of a month or more for the purpose of ascertaining by examination that everything is in accordance with appearances. The physician has also to decide when it is safe to allow any latitude to his patient, and to discover his capabilities for work by the application of actual tests. It probably devolves upon the doctor to keep on persuading the patient to persevere sufficiently long with strict treatment.

The essence of this system is to add continually, little by little, to the patient's store of health, and to prevent those disasters through which the unguarded patient is so apt suddenly to lose all the progress he has laboriously made.

In the first place, no relaxation of treatment must be sanctioned by the physician until he is satisfied of the prudence of such a course. I particularly mention this point,



because the display of some fortitude is required, if we would avoid the very common mistake of glossing over the patient's real condition. Time after time, if we are consistent, the consumptive has to be undeceived, and told that further care is still necessary for the restoration of his health. Finally, when systematic treatment has achieved all that is possible, the patient must be made to understand what precautions are always to be observed. During the course of treatment the most apparently trivial ailments are at once attended to, and appropriately managed. No occurrence that may set the patient at all back is overlooked, but every point which can be turned to the patient's advantage is made the most of.

The treatment of pulmonary tuberculosis at the present time consists in the intelligent use of general measures. The most active remedies at our command are fresh air and the control of the patient's nutrition and exertions. It is not sufficient merely to give him a prescription and then leave him to his own devices. But he should be constantly kept under some sort of supervision, and as indications arise the patient's mode of life must be regulated accordingly. The consumptive, who is closely watched by a skilful attendant, is in less danger of allowing some exacerbation of his malady to pass unheeded until irreparable damage has been wrought. Regular observation of the temperature is a precautionary measure we cannot dispense with. By this means warning is given of increased activity on the part of the disease, and timely treatment may avert serious consequences.

**Hydro-therapy.**—No mention has yet been made of the hydro-therapy which formerly ranked as one of the important constituents of sanatorium treatment. My object is to represent the sanatorium system in its simplest form, and to divest it of all unnecessary complication. On this score it need only be said that the customary daily bath should be taken for the sake of its invigorating effects on the system and on the action of the skin. The temperature of



the water should be so regulated as to produce the greatest amount of reaction of which the patient is capable. Shower baths and douches may be valuable stimulants to the cutaneous circulation and nerves, but are not indispensable parts of the treatment. A caution should be given to weakly invalids or those prone to hæmorrhage, not to exert themselves too much in the act of drying with heavy towels. Massage may be of slight assistance in restoring tone to flabby muscles, and perhaps in promoting circulation.

**Breathing Exercises.**—Formal breathing exercises are but little used in sanatoria in this country ; the patients are merely instructed to take long, deliberate inspirations as they walk. It is certain that the measurement of the chest can be increased considerably in a few months by attention to breathing, and in cases with badly-developed chests, or local retractions, some form of breathing exercise should be practised. I content myself with directing the patient to stand erect with the shoulders thrown back, to draw a deep breath very slowly into his chest through the nose, and retain it there for several seconds. Then the air is expired slowly, still through the nostrils. Each of the three parts of this exercise should occupy ten or more seconds.

**Shelters.**—The necessary provision for spending sufficient time out of doors consists chiefly of shelter against wind, rain, or sun. In this country some form of revolving shelter has proved the most convenient and serviceable.

176 A large number of manufacturers are now supplying shelters similar to that shown in Fig. 1, at the price of about ten guineas, or an intelligent local carpenter can often be trusted to build the same thing for somewhat less. The dimensions of the floor-space are about seven feet by six feet. The walls can be made of weather-boarding, or preferably of tongued and grooved boarding, on account of its better finish. In the latter case the joints should be covered with splines on the back wall, which faces the wind,



and in which crevices that are sure to come from shrinking of the boards are objectionable. The greater part of the side walls should be occupied by sliding windows, which are usually well opened. The roof may be made of corrugated iron or of tiles, and in either case there should be a ceiling with a ventilated space between it and the roof. The shelter revolves on a central pivot, and is also supported by wheels, which run on a circular rail. After a trial of many forms of shelter, I advise the revolving one as most generally applicable for this country.

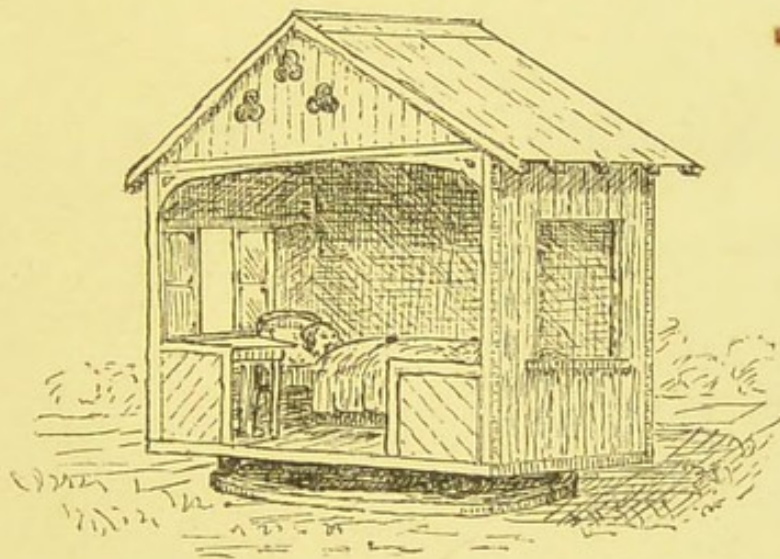


Fig. 1.—REVOLVING SHELTER WHICH CAN BE USED BY NIGHT AND BY DAY.

For about four pounds a light shelter can be made of Willesden canvas attached to a wooden framework. There is a platform with four corner posts supporting a wooden roof. By means of hooks and eyes the canvas wall can be made to protect whichever sides the wind blows on. This structure is not very durable, and hardly affords sufficient protection in exposed situations. Neither of these shelters is cool enough on hot days, but during the summer there is usually no wind; so the patient can lie outside his shelter, and can thus usually obtain sufficient shade from the sun.

For all the year round a tent is not successful in this country. If rain or snow lies on the tent, wet drips through,



and in high winds it is not substantial enough. A tent may be very useful in good weather provided that it has a double roof to prevent it from getting too hot, and an arrangement for easily opening one whole side to the air: I have been very pleased with the use of a tent for patients to sleep in during the summer, but it cannot be regarded



Fig. 2.—TENT USED AS PATIENT'S BED-ROOM DURING THE SUMMER.

as a satisfactory permanent shelter for all weathers in this country, nor is it particularly economical.

It is important to arrange for the cheerful lighting of the shelter; everything that is possible should be done to encourage the patient to spend the requisite number of hours out of doors in the short winter days. If electric light or acetylene gas is not available, it is easy to fit up oil-lamps that are unaffected by wind. A good form is that known as the punkah lamp.

**Form of Chair.**—The form of chair used for lying on deserves attention. It does not do to make use of any chair that happens to be offered. The *chaise longue*



of the Continent is in almost universal use, and answers admirably. It consists of two parts, the leg-rest being separate, and is made of cane. The addition of cushions is desirable for most patients, and they will then be found quite comfortable for the many hours that have to be spent in the recumbent posture. The back is placed at such an angle that the occupant is supported in an almost sitting-up position. This is better for the full expansion of the chest, and for the circulation than the more supine posture, and it allows the patient to read or write with ease.

In exceptional cases where large cavities have to be drained, the head and shoulders may be lowered.

**Climate.**—Much less importance is attached now to climate in the treatment of pulmonary tuberculosis than was formerly the case. In the minds of many people it is still the first thought, that on the detection of consumption in an individual he must at once be sent away. This deeply-rooted idea of the necessity of change of climate for all sufferers from pulmonary tuberculosis is erroneous on the face of it. The most diverse climatic conditions are recommended for the same forms of the disease, and the curious spectacle is witnessed of the patient from the East being sent to the West, and the dweller in the West being ordered to the East. The exact regulation of the patient's daily life is the essential point in treatment, and the precise climatic conditions under which the proper life is led are a consideration of secondary importance. Sanatoria have been built in many parts of this country and of the whole civilised world; their climates are of almost every description, and yet their results are similar. Their success in no way depends upon their elevation, upon their proximity to the sea, nor upon any quality possessed by the air of their locality.

Speaking from the close observation of a number of patients who, after undergoing a course of sanatorium treatment at home, subsequently sought various distant



health resorts, I can assert that in no single instance was the progress of the disease distinctly affected by the change of climate. In the case of patients who were doing well at home, recovery appeared to be in no way hastened by the influence of a selected climate abroad. In the case of patients who were doing badly in this country, removal to a recognised health resort did not succeed in arresting the downward progress.

I am convinced that the favourable case, who has it in him to recover from consumption, will do well either at home or abroad if he leads a life suited to his condition. I do not mean to say that climate counts for absolutely nothing, but I would emphasise the point that the adaptation of the patient's daily life to his condition of lowered health is of vastly greater consequence than his removal to any particular climate.

We like the treatment to be carried out in a locality whose air is pure and bracing, and moderately dry. It is possible that the more fully the climate possesses these qualities the more rapid will be the recovery of the consumptive. But whatever may be the precise advantages that are gained for the consumptive by placing him in a particularly pure and bracing air, it is certain that recovery may be made in any kind of climate. Theoretical considerations tell us that the air of towns is not favourable, and there is every reason to believe that recovery is expedited by placing the patient in pure, uncontaminated air, but where this is unprocurable the open-air treatment has been practised with success even in the heart of our cities. In the same way as regards other qualities of the air, the majority of consumptive patients are benefited by a bracing air. In so far as the appetite and other vital processes are sensibly quickened in a bracing climate, there must be an advantage in conducting the treatment in such an air, but success is not precluded by having to adopt the system in a relaxing climate. Dettweiler, of the Falkenstein Sanatorium, states that a damp air acts as a sedative to



the respiratory mucous membrane, and allays cough. Though I cannot say that this has been the observed effect in my patients of dampness in the air or of rain, yet any unfavourable symptom has been exceptional. I would only say in regard to excessively moist conditions of the atmosphere, that while most consumptives are unaffected, a certain small number find that their coughs and difficulties of breathing are increased, and are better if kept indoors with partially opened windows during the prevalence of fog or rain.

**Soil.**—In regard to soil we are probably right, when circumstances offer us a choice, in selecting one of gravel or sand. But where no choice exists, many cases can be pointed to which have done well on clay. It will be seen, therefore, that a pure and bracing air, with a dry, warm soil and free exposure to sun, are of relative advantage, but that there is only one absolute necessity—namely, provision for the faithful adoption of the open-air *régime*.

**Wind, etc.**—Some authorities have stated that wind is particularly prejudicial to sufferers from pulmonary tuberculosis, and have insisted on securing protected spots for their residence. Unless shelters are used, wind has, of course, a chilling effect, and the effort of walking against a high wind must always be thought of. Otherwise, I do not think there is any deleterious influence exercised by wind which cannot be obviated by artificial means. A large rainfall makes the open-air life less easy, and necessitates the provision of more artificial shelter; beyond this it has not been shown to have any distinct effect. The presence of dust is objectionable, as, besides conveying microbes, it is irritating to the throat. Sunshine in general acts as a germicide, and must therefore have a beneficial action on the patient's atmosphere. On the other hand, we must be very careful not to expose the invalid to its unmitigated glare. Exposure to the sun often causes languor, headache, and loss of appetite, and sometimes actual fever results from great heat or want of shade. In practice it is



very necessary to guard our patients from over-exposure to the sun's rays.

In this connection, two points are worth noting. It is generally agreed that better results are obtained in sanatoria during the winter than in the summer, and the majority of our consumptive patients tell us that they are better suited by cold than by hot weather.

Secondly, although writers on the construction of sanatoria have laid great stress upon the aspect of the inmates' bedrooms being towards the south, as a matter of fact, patients do equally well whose rooms happen to face a less sunny direction.

Every writer on the sanatorium treatment alludes to the fact that common colds are rarely contracted by the patients. Common sense tells us that though our patients soon become inured to cold and exposure, there is no advantage gained in encouraging them to get wet and keep on damp clothes.

For most patients whose disease is in an early or favourable stage, the nature of the climate in which their treatment is conducted does not matter very much. But the same remark does not apply to the subjects of certain specified forms of pulmonary tuberculosis. Where there is disease of old standing, where there is much fibrosis with failing circulation, exposure to cold must be avoided. Many of these patients feel miserable, and their vitality is lowered, as a result of the English winter. They are not suitable cases for sanatorium treatment unless a warm climate can be found. In these cases the effect of wintering in such mild, sheltered localities as are found in the South of Europe or the South of England, is to prolong their lives and add very materially to their comfort.

Patients whose pulmonary tuberculosis is of the catarrhal type, with much bronchitis, or, perhaps, with emphysema and asthma, often respond well to open-air treatment, but they are susceptible in the matter of climate, and may do better in one locality than in another.



Special climatic conditions may be indicated for the treatment of pulmonary tuberculosis complicated by albuminuria, rheumatism, hay-fever, or other affections. Apart from the lung disease the general constitution of the patient may demand that a particular climate be sought. Our object is to stimulate the vital processes to their fullest extent, but we must not send to a bracing climate a patient whose powers of reaction are inadequate. A person who is unable to withstand cold weather will obviously do better in a warm place.

For the majority of favourable cases, as we have said, a change of climate is not essential to their welfare. So far as the attainment of recovery is concerned, it is probably immaterial whether they spend the winter in any reasonably healthy part of England or in a recognised health resort. Those who for one reason or another are unable to go away may be comforted with the assurance that their recovery is not prejudiced by their remaining near home. But in the case of patients who are able to indulge themselves, by all means let us allow them to pass the winter where the open-air life can be followed with the greatest amount of comfort and pleasure. Wherever they are, the routine must be followed with equal strictness, and this involves the passage of the whole day out of doors. Now it cannot be denied that during the short days and uncertain weather of a part of the English winter there is no great natural inducement to be always out of doors, and lying outside becomes rather a cheerless occupation. The mental effect of a brighter sky may count for a good deal, and in the cases of many patients there is no reason why the treatment should not be pursued under the best conditions attainable. Some of our patients are directed to take a certain amount of exercise, and for them a spot may be found where the exercise can be turned to satisfactory account. The advantages in these respects possessed by the Swiss mountain resorts and other places are well known. Before sending a patient abroad, however, there are certain objections to be



weighed. The journey entails fatigue, and unless the temperature is steady, there is the risk of lighting up fresh mischief. The nature of the food supply and of the cooking should be ascertained before any place is selected. It is often difficult to get good meat, fish, and milk on the Continent, and the patient may lose in this way more than he gains in others. Some health-resorts are visited year after year by epidemics of influenza, and the impossibility of guarding the consumptive against the risk of contagion seriously detracts from the advantages of the climate. Wherever he goes, the patient must strictly adhere to all the ordinances of the sanatorium life, and his residence must be chosen with this in view. The treatment can be most readily followed by entering one of the many sanatoria now to be found in the best-known winter resorts, or by going to an hotel which caters especially for invalids. If the patient prefers, he can, of course, pursue the treatment in a private house with suitable grounds, but it does not answer to send a consumptive to an ordinary hotel or lodgings. There may be no provision for serious rest out of doors, and the routine is difficult to follow in the midst of people differently engaged and with many distractions going on.

Lastly, it must be mentioned that most writers on sanatorium treatment attach great importance to the consumptive being treated in the climate in which his subsequent life has to be passed.

**Buildings, etc.**—To my mind, there is little more to be said upon the requisites for the treatment. The fewer and the simpler they are, the less is attention diverted from the really potent agents, which are the persistent use of air, rest, and nourishment. Any good-sized room will do for the patient, so long as there is abundance of window space; this should be sufficient to ensure perceptible movement in the air of the room.

Curtains and hangings should be removed, for fear of



dust, and blinds must not be allowed to interfere with the entrance of air. In cleansing the room, damp cloths take the place of brooms, which stir up the dust in an objectionable manner. All unnecessary furniture may be taken away, and polished floors or linoleum substituted for carpets.

A discussion on sanatorium construction would not come within the compass of this small work, but I may be allowed to express a few opinions on the subject. Elaborate buildings are not necessary for the treatment of pulmonary tuberculosis. Rounded angles and glazed surfaces for the walls, with a due southerly aspect for the rooms, may be correct in principle, but they are not essential. Granted free access of fresh air, the accommodation may be planned on the simplest lines. Substantial buildings with massive walls need not be erected for the open-air treatment. It cannot be right to shut out air, which is the most active principle of the whole system. The less that the patient is screened from the outer air the more efficient is the treatment; therefore the building should be as light as possible. I need only refer again to the cases whose improvement clearly dates from the removal of the beds out of doors. While occupying a room, with windows ever so widely opened, the condition of the patient perhaps appears hopeless. But in many such cases the bold removal of the bed to an open-air shelter has led to the speedy amelioration of the persistent fever and attendant symptoms. There is every reason to conclude that what saves the situation in these desperate cases is correspondingly advantageous in the more favourable class. The more unbounded the air supply, the quicker and more sure is the recovery. In the case of a single patient the ordinary revolving shelter may be used by night as well as by day. In febrile cases the consumptive is confined to his bed, and this may be placed in the shelter and occupied continuously. In many instances I have known the patient of his own choice continue to sleep out of doors



when it was no longer absolutely necessary for him to do so.

**Balconies.**—But sometimes it is not desirable to banish the consumptive patient to a shelter in the garden. In such cases, when we want to obtain full exposure to the open air, a balcony can easily be built, for about £15, to hold

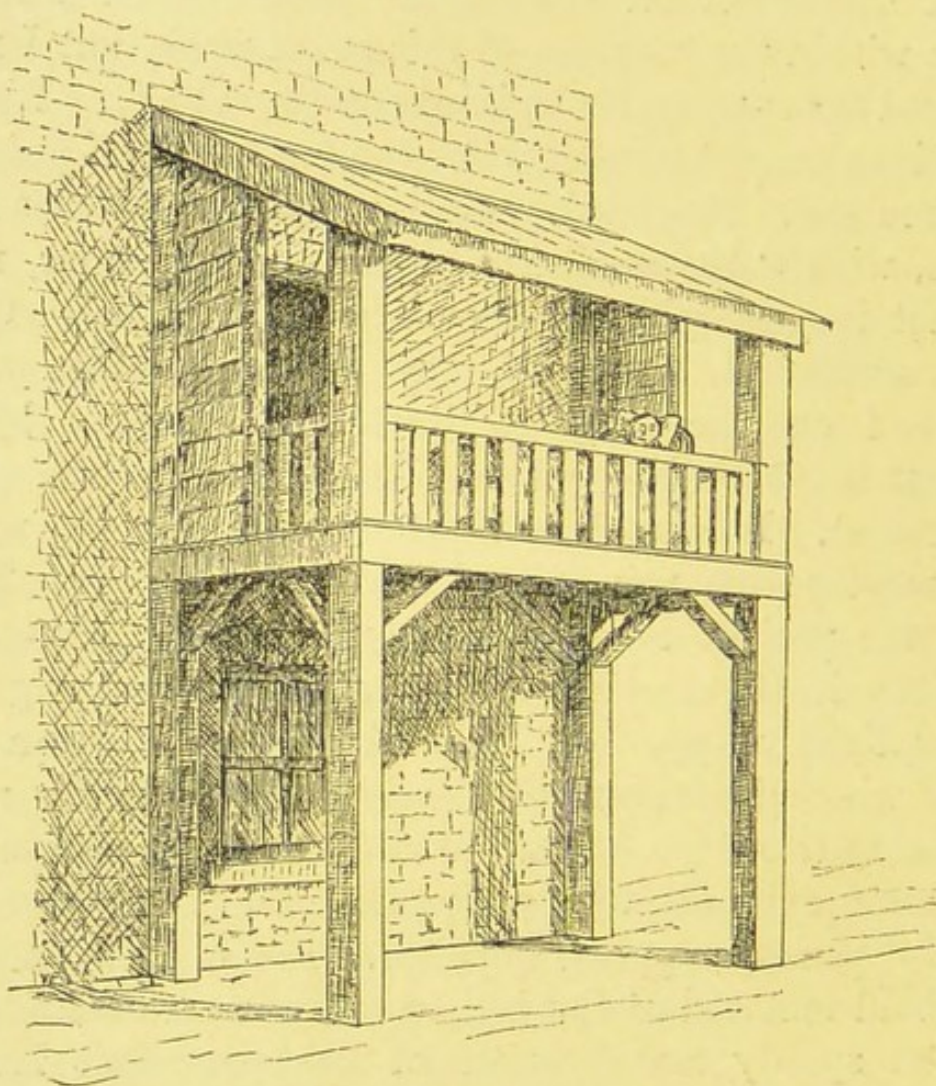


Fig. 3.—FORM OF BALCONY EASILY ERECTABLE OUTSIDE THE PATIENT'S BED-ROOM, AND ADAPTED FOR CONTINUOUS EXISTENCE IN THE OPEN AIR.

the bed, and can adjoin the patient's former room, perhaps. With this arrangement, the patient is spared the feeling of solitude and separation from the protection of others. A sense of safety is afforded by the fact that the balcony is raised off the ground, and an attendant can occupy the adjacent room. Such a balcony can be constructed entirely of wood. The floor may be twelve feet long by



six feet wide. There should be a sloping glass roof projecting one foot beyond the balustrade, and there may be glass screens, or, better, heavy curtains which can be drawn, if necessary, across a portion of either end.

In institutions for the reception of a number of patients the trouble of service and of supervision is much increased by distributing the patients in single shelters, and it is more economical to collect the patients together. The principle of the open-air shelter, however, may still be advantageously adopted for their sleeping accommodation.

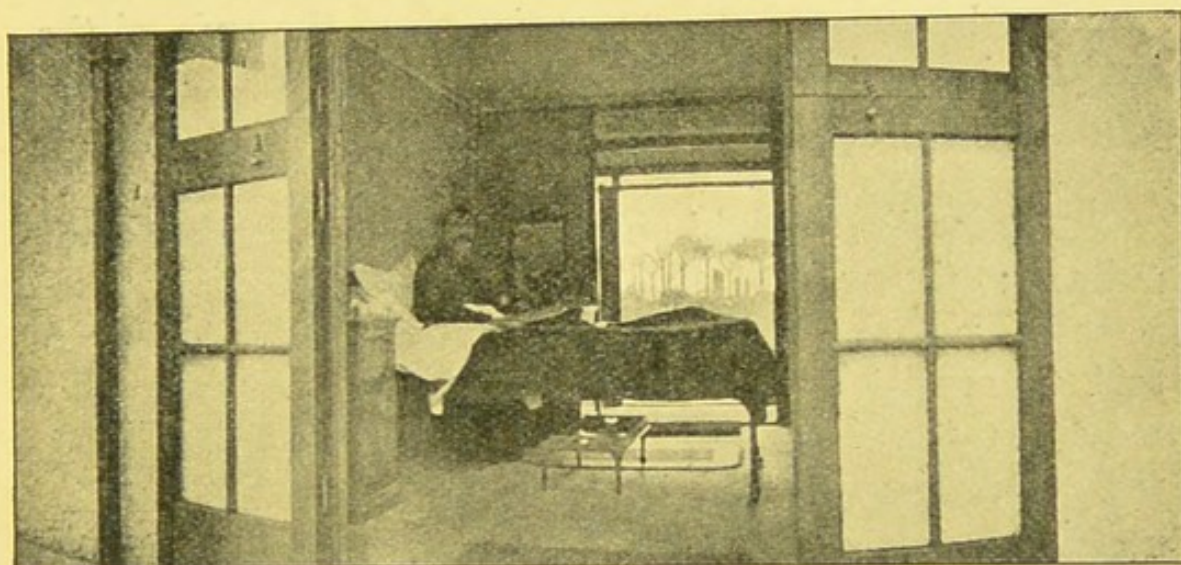


Fig. 4.—INTERIOR OF SINGLE BED-ROOM FOR FEBRILE PATIENT AT THE KELLING SANATORIUM.

Without doubt, the best plan for the building of a sanatorium is that which approximates most closely to placing the beds in the open air with a roof above them, and with the minimum amount of enclosure by side walls.

Mr. W. J. Fanning and Mr. L. D'Oyly Carte, of the Kelling Sanatorium, set themselves to work to plan a form of sleeping shelter that would combine the greatest efficiency of treatment with the least expenditure of money. The result of their labours is shown in Figs. 4 and 6. These buildings are in use at the Kelling Sanatorium, and have been found very satisfactory.\*

\* "Tuberculosis," July, 1903.



“The building consists of a roof, and walls pierced by large openings, the floor space being strictly limited to what is required for beds and necessary furniture. Thus each patient as he lies in bed has an open window close to his head, and another close to his feet, and owing to the restriction of the floor space, even should it become desirable to close the windows on one side of the building, those on the other side are still so close as practically to keep the patient in the open air. The building, in fact, is only sufficient to provide the necessary privacy and protection from high winds and driving rain. Patients wash in a common lavatory, and easy access along the ends of the cubicles is obtained to all the beds.

\* \* \* \* \*

“The walls of the building are of weather-boarding, unlined; the roof of tiles; the foundations are tarred sleepers placed upon the ground. The unit may be said to consist of a two-bedded cubicle. . . . It measures ten feet by eleven feet, and the height of the ceiling is seven feet from the floor. Both above and below the ceiling there is ventilation for the roof and the upper part of the cubicles respectively. The double windows (four feet wide by six feet high) are horizontally divided at four feet six inches from the floor, the upper parts only being glazed. A wide three-foot eave protects the upper parts of the windows from rain and weather. Hanging cupboards and shelves are provided for the patients' clothes. There is five feet between the beds, four feet of which, as may be seen, is occupied by the window. The walls, ceiling, and partitions are varnished, and all external woodwork treated with carbolineum.”

Such a wooden building without lavatory and other accommodation can be erected at a cost of about £12 per bed. It is true that a structure of wood is less permanent than one of brick, but we do not think that this necessarily constitutes an objection. It may be that before



very long consumption will be less prevalent than at present; possibly a new method of treatment will come into vogue. In either case buildings inhabited by large numbers of tubercular patients had better be destroyed when their purpose has been fulfilled.

It may be of some service to the promoters of similar institutions if I add a few further particulars in regard

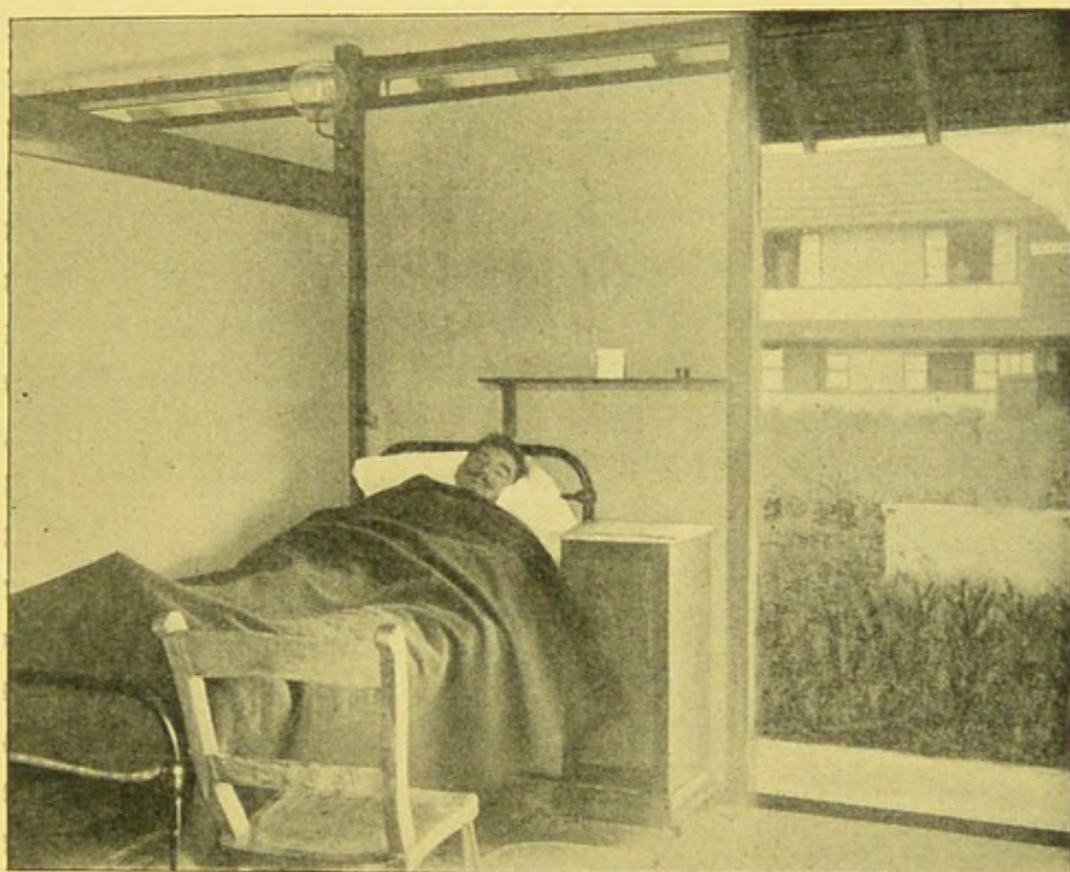


Fig. 5.—INTERIOR OF CUBICLE FOR CONVALESCENT PATIENT  
AT KELLING SANATORIUM.

to Kelling Sanatorium. With a sum of money presented for the purpose, an estate of about thirty-five acres was purchased within a few miles of the Norfolk coast and one mile from Holt railway station. We insisted that the soil should be dry, that the air should be pure and bracing, and that adjacent woods should be available for the patients' exercise during bad weather and for the partial protection of the establishment against very high winds. An existing house was readily adapted to serve



as our administrative block, and it also contains the patients' dining-room. A few bed-rooms have had their windows enlarged, and are used for the acclimatisation of patients on their first arrival. The more active part of their treatment is carried out in the buildings already described. In the designing of these shelters it has been our aim to place the patients' beds, as nearly as possible, in the open air. A roof with sufficient eaves protects the bed from rain and snow, while side walls are reduced to a minimum. The consideration of cubic space in regard to such accommodation is irrelevant; the smaller the room the nearer is its inmate to the outside air. We are satisfied that better results are obtained under these conditions than when the patient is housed in an ordinary room. Without exception the consumptives themselves have always expressed their preference for these shelters, and invariably volunteer the statement that they feel better than when occupying the ordinary rooms. This is a striking fact when it is considered that these shelters are not heated in any way. There is only a difference of one to one and a half degrees between the temperature of the shelters and that of the outside air. With the warming effect of the patient's body, the temperature inside an occupied shelter becomes about a degree higher than inside an empty shelter. It is known that an ordinary room, artificially heated, can be thoroughly ventilated without lowering the temperature by more than a few degrees. The effect of opening the windows is only to reduce the temperature one or two degrees. It might be thought, therefore, that the coldness of the shelters would constitute a great objection to them, as compared with the airy rooms of a house, for the treatment of invalids. As a matter of fact, no difficulty has arisen from this cause.

At the Kelling Sanatorium our object has been to provide the most efficient treatment with the least expenditure, and we decided, therefore, not to heat the bed-rooms in any way. If air is freely admitted into a room from



outside, an ordinary fire or radiator does not produce much effect on the temperature, except in its immediate proximity. The more closely the accommodation approaches to our standard of "camping out," the more extravagant any form of heating becomes. However cold the atmosphere, it is always easy to get comfortably warm in bed by adding sufficient coverings; and for dressing and undressing the doors and windows are allowed to be closed in the winter. The dining-room is heated, but elsewhere the patients should always be lying down, and in that

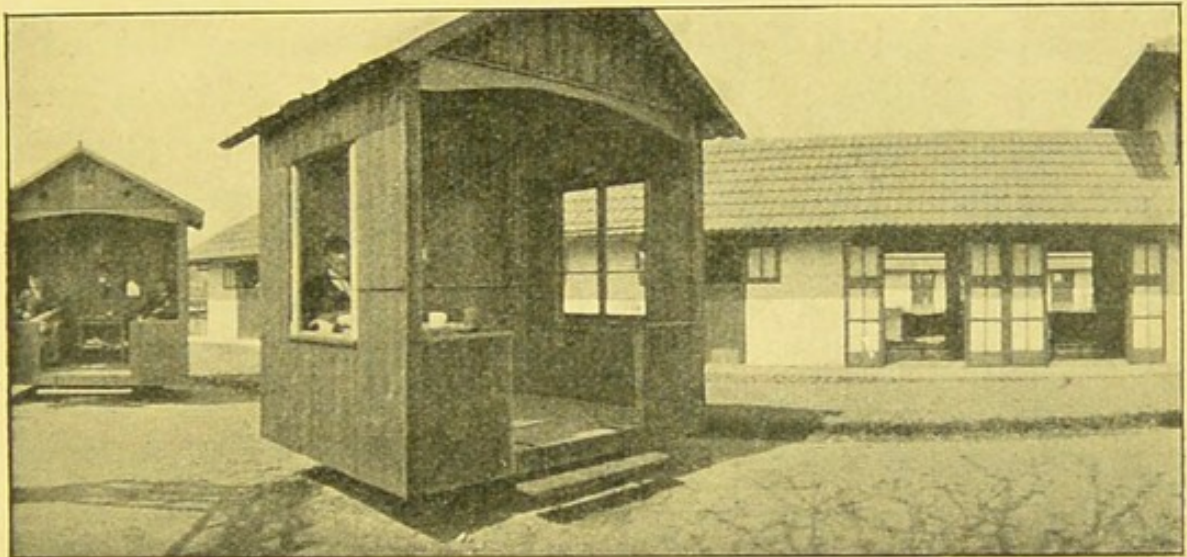


Fig. 6.—REVOLVING SHELTERS USED DURING DAY-TIME BY CONVALESCENT PATIENTS AND BUILDING USED FOR THE RECEPTION OF BEDS AT KELLING SANATORIUM.

position it is not difficult to keep warm, recourse being had if necessary to such adjuncts as caps, foot-muffs, gloves, hot-water bottles, and the little device sold under the name of "Instra." Patients become accustomed to the outside air, and forget what a warm room feels like.

For illumination the electric light has every advantage over others, except in the matter of economy. Acetylene gas costs about one-fourth of the amount to instal as compared with electricity, and the working expenses of the gas are also less. We are very satisfied with it at Kelling, and have had no trouble from its smell; it gives



a bright light, and is not affected by wind. But where it can be afforded, the electric light is more convenient, pleasanter, and more cleanly.

In the matter of drainage I am a great believer in earth-closets ; these only require proper management to prove free from all serious objections. It would only be in the case of very large establishments that the labour of tending them might be a difficulty, and then some form of septic tank is preferable. Waste water and other liquids can be conducted to some distance from the house, and then run on to the soil.

In conclusion, I would state that in our modern treatment of pulmonary tuberculosis we utilise certain agents which have proved themselves to be really active against the disease. These are open air, methodical rest, and the proper use of exercise and food. These general measures are scientifically applied according to definite indications, and are continued for a sufficient length of time. This last point, persistence with treatment, is perhaps the most important one of all. These, I contend, are the only reliable agents now at our command, and it is their intelligent application that constitutes the best treatment for pulmonary tuberculosis. The less the issue is confused by the introduction of unnecessary prescriptions the better. Let the accessories be as few as possible, and of the simplest nature, in order that the patient may appreciate which are the really essential agents for his recovery.



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