

THE OPEN-AIR TREATMENT OF CHRONIC PULMONARY TUBER-

CULOSIS AS APPLIED TO GENERAL HOSPITALS

With Special Reference to

THE RESULTS OBTAINED AT NORTHAMPTON GENERAL HOSPITAL

Being a Thesis for the Degree of Doctor of
Medicine of Edinburgh University.

by

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It is a matter of common observation in the world at large that new ideas political, ethical and religious occasionally arise, one hardly knows how, and become for the time being, the dominating question, interesting nearly the whole of civilised humanity. Numbers of books are written on such questions; acrid controversies very often arise; and finally the idea is either accepted and becomes a recognised part of the common stock of human thought, or is rejected and sinks back into the limbo whence it arose.

In the Medical Polity the same phenomena take place on a smaller scale. The unknown cause of a disease is said to be discovered, or a new remedy is devised for some hitherto incurable malady. Protagonists and antagonists hasten to the combat. The air rings with recriminations and the shouts of triumph. The question occupies a place of paramount importance in the medical journals. Even the lay press deigns to give the ever sanguine public some scraps of information, too often incorrect. If it be a new treatment, the results are lauded to the skies. Intemperate writers hasten to announce that/

that death has lost its terrors, that 70, 80 or 90% of those afflicted with some virulent disease are cured and cured easily, even in the most advanced stages (cf. Nineteenth Century, March 1899) and then comes the inevitable reaction. The intemperate prophets are shown to have drawn brilliant pictures at the expense of the truth and gloomy seers are received with favour, who announce that the new treatment is no better than the old, but perhaps, if anything, worse. Finally, after much futile and unnecessary controversy, the results of the treatment are established on the basis of common sense, statistics, and extended observation.

It is no exaggeration to say that the subject of the open air treatment of Phthisis about which this Thesis is concerned, has been, and is indeed even now to a certain extent, passing through these phases.

Dr Charles Reinhardt in his little book, "Life in an Open Air Sanatorium", draws a very brilliant picture of the results obtained. For example, on page 35, he says: "In quite incipient cases, a few weeks have effected a cure", and on page 97, talking about a foreign sanatorium, he says: "Complete recovery is the rule, not the exception", and goes/

goes on to add that even the most advanced cases of Phthisis are accepted for treatment. Lower down, on the same page, he says: "They maintain the improvement till the symptoms cease, and the bacilli are no longer found in the expectorated matter; then the next step is the healing of the cavities and the discharge of the patient, cured." On the other hand, the results and value of the treatment have been unduly belittled. This is well shown in the 83rd volume of the Medico-Chirurgical Society's Transactions.

It is only now after some few years' experience of the Treatment, not only on the Continent, but ^{also} in England, that we are able to arrive at definite conclusions as to the value of the Treatment as a whole, and also the relative value of its particular details.

The History of the origin and gradual understanding of the modern "open-air" or sanatorium method of treating Consumption is not without interest. Like so many other human advances, the full understanding in most men's minds has only come gradually and step by step.

Between two and three centuries ago, Sydenham in his writings on Phthisis, says: "The best remedy hitherto/

hitherto discovered is riding sufficiently long journeys on horseback," and later, "Whoever has recourse to this exercise in order to his cure, need not be tied down to observe any rules in point of diet, nor need be debarred of any kind of solid or liquid aliment, as the cure depends wholly on exercise."

His remedy is in many respects good, as it involves the patient being freely exposed to fresh air, and the exercise is not severe; but it cannot be accepted literally in the light of the Open-air treatment of modern times, but it shews that his observations had led him to arrive at the conclusion that fresh air was beneficial to Phthisical patients.

At the commencement of the Nineteenth Century, it may be truly said that fresh air was universally despised. Dr MacCormac of Belfast, who was perhaps the first to advocate fresh air for consumptives, gives a vivid description of the dread our forefathers had of fresh air. Bedroom windows were never opened, often not made to open, and in addition, the bed was protected from the fresh air by canopies and hangings, etc. If such was the opinion of the danger of fresh air to the healthy, much/

much more was it supposed to be dangerous for the sick. The approved method of treating consumptives in those days, was to keep them in a hot room at an equable temperature with all the windows closed, and to combat the sthenic fever, with appropriate lowering remedies, such as bleeding, purging, Antimony and low diet.

Dr MacCormac set himself against all this, and the main value of his teaching may be summed up in one pregnant sentence in his book, "On the Nature, Treatment and Prevention of Pulmonary Consumption". It is this: "Pure, fresh, untainted air at all hours, at all times and in all places is the one condition with which nothing should be allowed to interfere."

To Dr Boddington of Sutton Coldfield is due the honour of first bringing before the notice of the medical profession the enormous benefit to be derived by consumptives from the constant inhalation of fresh air. In 1840, he preached the doctrine of sanatorium treatment in the following words:- "The only gas fit for the lungs, is the pure atmosphere freely administered without fear: its privation is the most constant and frequent cause of the progress of the disease. To live and breathe freely in the open/

open air, without being deterred by wind or weather, is one important and essential remedy in assisting its progress, one about which there appears to have generally prevailed a groundless alarm, lest the consumptive patient should take cold. Thus, one of the essential measures necessary for the cure of the fatal disease is neglected for the fear of suffering or incurring another disease of trifling import. No two diseases can be more distinct from each other than Consumption and Catarrh The patient ought never to be deterred by the state of the weather from exercise in the open air. The cold is never too severe for the consumptive patient in this climate: the cooler the air which passes into the lungs, the greater will be the benefit the patient will derive. Many persons are alarmed and deterred from taking much exercise in the open air, from the circumstance of their coughing much on their first emerging from the warm room of a house; but this shows that the air of the room was too warm, not that the common atmosphere was too cold. To live in a temperature nearly equal to the latter at all times, should be the aim of the patient, who should avoid warm, close rooms as much as possible, and always keep away from the fire, taking care to keep/

keep the surface of the body warm by sufficient clothing. Thus, the equal temperature so much considered and said to be necessary, should be that of the external air, instead of that so commonly employed, the warmth of a close room," and finally, he advocated the establishment of sanatoria:-

"The generality of the medical profession have not the opportunity of thus treating their consumptive patients; if they are to succeed, they should have country houses in proper situations, well ventilated, and provided with all appliances and means to boot, where their patients should be under their own eyes and strictly watched and regulated in all respects as regards exercise, air, diet, medicine, etc., or there should be a certain class of practitioner, who should exclusively pursue their practice as a distinct branch, to whom those in the large towns should confide their consumptive cases, instead of sending them as many do, to take their chance, or probably to fall into the hands of mercenaries at distant sea-ports, where they commonly die far away from friends and home."

The treatment of consumptive cases by open air is not a new idea, but is far older than the true Pathology of the disease, which was not fully understood/

stood until Professor Koch's discovery of the Tubercle bacillus in 1882. Villèmin in 1865 promulgated the theory that it was inoculable, but his theory met with great opposition and James Blake in 1860 suggested that it was a Septicaemic condition, and pointed out the advantages to be derived by the digestive functions from living in the open air, especially in septicaemic cases, and published cases of consumption some of which had been arrested and some cured by this method of treatment.

Since this method was introduced by Dr Boddington, various theories for the cure of consumption have been devised, such as the high altitude treatment, the sunny southern climates, sea-voyaging, etc. each one having its advantages and no doubt being very beneficial to individual cases, but they are quite inapplicable to the poorer classes, and it is to them that I turn my attention and think it is for them that sanatoria should be established. Although we were taught by one of our countrymen the correct method of treatment, it is to the Germans that we owe the idea of erecting suitable sanatoria for its carrying out, as it was Brehmer who first commenced the strict sanatorium treatment at Gorbisdorf in 1854. Abundance of fresh air, abundance of food and/

and graduated exercise. This was followed later by the Liegen-halle, or rest cure in which no exercise is allowed, chiefly supported by Dettweiler of Falkenstein. In 1890 Dr Von Lyden of Berlin introduced sanatorium treatment for the poor in Germany, the expense being defrayed by compulsory insurance against sickness, and his efforts have been crowned with success. We owe a great deal to Dr Walther of Nordrach for instruction in how a sanatorium should be managed and it is on similar lines that I should like to see the treatment carried on in this country; briefly, the so-called Nordrach treatment is as follows:-

1. Abundance of fresh air at all times and in all weather.
2. Abundance of nourishing food, almost superabundance.
3. Rest and Exercise graduated according to the state of the body temperature.

This is a very brief outline of the History of the Open-air treatment, a treatment which has succeeded, and undoubtedly will succeed still more in the future, as our knowledge and understanding of this dread disease increases, because it is founded on a firm physiological basis, and further, can be applied/

applied in any part of the world. This then brings me to the discussion as to the site of the sanatorium.

Dr F. R. Walters in his book, "Sanatoria for Consumptives", says: "The open air method may perfectly well be carried out in any climate which is healthy for those who are not consumptive," and Leon Petit observes, "Here the climate may help the cure, there it may hinder it, but it only exerts a secondary influence on the treatment." Taking into consideration the majority of the cases amongst the poorer classes, there is no reason to suppose that they would improve much more rapidly in a high altitude than they do in the lower ones. Individual cases might be benefited, but the high altitude resorts do not suit a large number of cases, e.g.,

1. Those with Laryngeal Tubercle.
2. Those with Tubercle of the lungs associated with Emphysema.
3. Those subject to large Haemoptysis.
4. Those with a highly nervous or excitable temperament.
5. Those with associated Albuminuria as a complication.

But I do not propose to discuss individual cases, but/

but merely to generalise, and state that the altitude or the exact latitude or longitude of the site is practically speaking of no importance - in fact it is not necessary, nor until we have "consumptive colonies", or some such other ideal to send all the poor consumptives to, is it desirable that the working man should be sent far away from the place in which he usually makes his livelihood. If a cure can be effected in similar climatic conditions to those in which the patient is going to live and work in, it is much more likely to be a permanent cure than one effected under very different climatic conditions. Another point brought out by what I might call the "Local Sanatorium", is the proof to others that the cure of Consumption is possible in that district and also that the benefit to be derived from free exposure to the fresh air by night and day is enormous, and that as a result, the pale faced, hollow-cheeked man with the dreadful cough has returned to their midst looking in better health even than they themselves do, and that he has not increased his cough and gradually wasted to nothing and died. This perhaps is rather inclined to be an imaginative case, but I have seen such cases here, and so I am sure has every medical man who has adopted/

adopted this line of treatment. Surely it is not too much to hope for that such cases as these will in course of time convince the working classes that fresh air is beneficial and not the death-trap they now seem to think it is. How often do we find it the case with consumptive patients, who for want of room or other reasons, have to be instructed how to live at home, return to say that they kept the window open for one night but that they thought they had caught a cold so had never tried it again.

The Site, then, I consider, is not of very great importance, but in the erection of a sanatorium, one would naturally select a spot which is sheltered from cold winds, especially the east wind. In support of this argument, I wish briefly to refer to the results of the Brompton Hospital, where, of all the consumptive cases admitted, 20 to 30 per cent. improved. There would probably be a very much higher percentage of cases improved, were it not for the fact that cases are admitted in all stages of the disease. Dr Phillip also has had very encouraging results in Edinburgh. I merely quote these in support of the advantages to be gained by consumptives when treated by the open-air method, even in what are rather unfavourable surroundings.

One/

One point to be remembered in the selection of a site which is of great importance, and one which is required essentially for those patients who have so far improved as to start on their gentle exercise, is that the sanatorium should not be on the extreme summit of a hill where every road or pathway leading from it is a decline, but should rather be on the side of a hill where some paths or roadways are on the incline in order that the homeward journey to the sanatorium should require less bodily exertion than the outward, and that the invalid may have the least amount of strain thrown on him when he is a little exhausted. Personally, I am convinced that the precise kind of air is of little importance provided it is not detrimental to healthy people. The air as supplied by nature, when breathed freely, is all that is required, and the one air to be shunned is re-breathed air, and this is only found in closed rooms.

When a building has been selected in which the open-air method is going to be carried out, one of the questions which suggests itself is, Which class of case, or which stage of the disease is likely to derive the greatest benefit, and which, when benefited, is going to be of the greatest service to the community/

community? This question, in other words, resolves itself into, What are suitable cases? The answer is by no means readily furnished and in no individual instance can a cure be guaranteed even though it be in one of the early stages, as the antagonism offered against the tubercular invasion seems in some patients to be almost nil. As far as I know, there is nothing to indicate this powerlessness of some individuals to resist the attack. I have before me two such cases where there were practically no physical signs in the lungs and only very occasional slight cough. The sputum in each case was repeatedly examined for Tubercle bacilli with negative results, but eventually a very few bacilli were found, the patients then being transferred to the Open-air ward where they steadily but surely grew worse and eventually died. With exceptions such as these, the following rules which I have adopted generally hold good.

1. The local lesion must not be extensive, no extensive cavitation and not more than the upper part of each upper lobe of lung involved.
2. The constitutional evidences of the disease should not be marked.
- 3./

3. The previous and family history should give reason for believing that the constitution otherwise is sufficiently strong to give grounds for expecting that there are fair powers of natural repair.
4. That the mental and moral tone of the patient is such that he will appreciate the treatment and endeavour to carry it out (irksome though it may be) for some time after he has left the sanatorium.
5. The pulse should not be very rapid, and there should not be any albumen in the urine.

These may be accepted as general rules for the admission of patients. I do not intend to enumerate the various cases which I consider unfavourable, but there is one important point to be found out in the patient's previous history, namely, Alcoholism. This is a most important factor in the prognosis, and I believe it is a most important factor also in the causation of the disease, and one on which too much stress cannot be laid.

Briefly summarised, the most favourable cases will be found to be:- Adults, well-developed, with no antecedent disease and of good family history, out-door workers, or ^{those} engaged in an occupation which can be carried on under healthy conditions, free from alcoholic or other habits prejudicial to healthy life, country dwellers with good digestion and/

and presenting but little evidence of constitutional derangement. A quiet, orderly, and hopeful individual makes the best patient. In females, the continuance of menstrual periods is usually a favourable sign.

I do not propose to enter into a discussion on the physical signs in the lungs indicative of pulmonary tuberculosis and their relative value, but in every case the chest must be thoroughly examined and also the sputum microscopically for bacilli. Each case must be considered on its own merits and the general history, appearance, etc., be carefully weighed before anything like an accurate opinion can be arrived at. Having then selected suitable cases, what is the result to be obtained after treatment has been carried out - a "cure"? Yes, but not a "pathological cure", but a "cure" which will be such that the patient is of service to the community and may be defined as:-

1. The disappearance of symptoms (cough, night-sweats, pyrexia, etc.)
2. The return to the normal standard of weight (a point to be decided on by the physician.)
3. The establishment of healthy muscular tone and a stable circulation.
4. The capacity for healthy activity and work of a suitable kind.

5./

5. The maintenance of these conditions under competent observation for twelve months.

When a patient fulfils these conditions, I consider him cured, perhaps it would be better to say, the tubercular process in the lungs was "arrested", but that is merely a difference in terminology. I now propose to discuss at a little more length the means by which this result may best be attained.

The treatment is best considered under the four following headings.

1. General management of the Sanatorium and Ventilation.
2. Diet.
3. Temperature.
4. Exercise.

Whenever I have admitted a new case into the open air wards of this Hospital, I have briefly explained to the patient the serious nature of his illness and the necessarily tedious treatment to which he or she will have to submit if they wish to be permanently benefited, and furthermore endeavoured to shew them that the remedy really lies in their own hands, but that they will be directed from time to time what they are to do. If they are going to be treated, they must set to work in earnest and do exactly/

exactly as they are told and no more, and that they must eat all the food and drink all the milk allotted to them as their daily portion. If they feel cold they can have more clothes, but on no account are the windows to be closed unless ordered by me. Any infringement of the rules results in a severe reprimand and a further breach, in dismissal. I am glad to be able to say I have not had to dismiss many. If the working classes have the treatment explained to them and the difficulties they will have to encounter with their diet, etc., they will as a rule make good patients (at least this is my experience of them), but at the same time they must thoroughly appreciate the fact that "you mean what you say" and then all will go well.

The wards should be in such a position as to get as much sunlight as possible as, apart from the direct influence its rays may have on the virulence of the tubercle bacillus, it gladdens the hearts of the patients and makes them feel more cheerful. The windows preferably should not face the east, as the eastern winds often prevail, which although not of themselves detrimental, increase the risk of the patients contracting catarrh of the mucous membranes of nose or bronchi, besides being of an unpleasantly piercing/

piercing and biting character. The windows should be large and opened at the top and bottom as much as possible to allow of the free entrance and exit of air. The beds should be arranged so as to avoid draughts, as the open-air treatment does not consist (as some people think it does) of sitting night and day "in a draught".

Draughts must be avoided by the consumptive patient as much as by any other person. The expectorations should be received in a receptacle containing some antiseptic sufficiently strong to destroy the bacilli - I have been in the habit of using 5% Carbolic acid. The patients who have improved sufficiently to be taking exercise carry "pocket spittoons". During the intense cold in the winter, fires are lighted, as even if they do not materially affect the temperature of the ward, they produce a good moral effect by their presence, as they make the ward look more cheerful than an empty grate. The patients' chests are carefully examined on admission and once a month afterwards if they are progressing favourably, more frequently if untoward symptoms develop. The primary examination of the chest must be thorough, both apices and bases being carefully/

carefully percussed and auscultated, vocal resonance, etc., tested and notes made on the exact conditions which are present. The sputum is examined microscopically and until tubercle bacilli are found, whatever the physical signs may be, I do not definitely consider the case one of Phthisis. The relative numbers of bacilli in the sputum do not seem to bear any relation to the prognosis, but I think the exact shape does, as the patient whose sputum contains long and thin bacilli usually does better than the one whose sputum contains relatively short and thick ones. The short and thick bacilli possibly show that the process of multiplication is being carried on more rapidly either by direct fission or budding, thereby not allowing of the maturity of the bacillus as seen in the other form, but as in Progressive Pernicious Anaemia where red corpuscles are being created rapidly we get them in various forms, so have we got modified forms of bacilli being created rapidly owing to there being a suitable nidus. A nurse is left in charge of the patients night and day to see that temperatures are taken, and report the occurrence of any untoward symptoms at once.

DIET.

Diet is a very important factor, as the consumptive patient must eat a large amount of nourishing food to increase his reparative powers and enable his system generally to antagonise the tubercular invasion. It is to Debove (a Frenchman) belongs the credit of first showing that there is no necessary connection between the appetite in phthisis and the digestion, that the anorexia which is so common is not necessarily accompanied by loss of digestive power. Great difference of opinion exists on this question, some authorities advocating frequent small meals, others, few but large meals. It is to the latter form of dieting that I incline, as by its adoption the digestive organs are not constantly being exerted, but are allowed a rest and they, in a long protracted disease such as Phthisis, require a rest as much as any other organ in the body, and by giving a few meals only to our patients, can we ensure a true physiological rest. If there is much pyrexia and anorexia, one might be inclined to give a less liberal diet than in a case with none of these symptoms as in other acute diseases accompanied with pyrexia, but there is a great difference between the two, and in my experience/

experience I have never seen any ill effects from a liberal diet in cases with high fever. At first, the patient is rather staggered at the sight of the food allotted to him, but as a rule overcomes all the difficulties in a few days. At Nordrach three meals a day is the order, and I have adopted a similar arrangement. Breakfast about 7.30 a.m., Dinner at 12.30 and Supper at 7 p.m. The daily allowance for each adult is milk four pints, meat fourteen ounces, butter four ounces, potatoes and bread ad lib. and milk puddings. For breakfast, each patient has one egg, with fish or bacon either fried or boiled; seven ounces of meat for dinner with a large helping of potatoes and also milk puddings. For supper they have seven ounces of meat and mashed potatoes mixed with butter. They are allowed to drink their milk and eat their butter at whichever meal they prefer. As a rule I find they like to have a good deal of the butter left for supper to mix with the mashed potatoes. It takes them a long time to get through their meals, especially those who have to remain in bed, but the food is not taken away, everything has to be finished. The above diet has the merit of not being an expensive one, but contains good wholesome and nourishing properties/

properties, and is not, I hope, beyond the reach of many of our working classes. If the diet necessary were very expensive, the value of the open air treatment would be very greatly diminished, as it would then have to be confined to the well-to-do classes and some other method would have to be adopted for the poorer classes. To sum up the diet in a few words, it only requires plain, wholesome, nutritious food supplied liberally.

The whole organism must be treated in Phthisis and not merely one of the symptoms, the general condition of the patient, muscular, nervous, gastric, circulatory and excretory systems all require bracing up as well as the respiratory (the system especially involved), and this can only be done by the combined efforts of fresh air and feeding - neither can do it alone, but the one helps the other and the result of the combination is very satisfactory. During the period that the patient is being so liberally fed, his weight must be ascertained at regular intervals - once a week is a convenient one.- If his weight is increasing, that of itself does not necessarily show that the condition of his lungs is improving, but on the other hand, any steady diminution in weight (if he is feeding/

feeding properly) is never accompanied by improvement in the lungs. When a patient has gained so as to be about the average standard for his height and build generally, a point to be decided by the physician in charge, the amount of milk should be gradually diminished and then left off entirely, likewise the amount of potato and butter reduced to about half the original quantity, as the object in view is to keep the patient in a state of equilibrium at a high level of nutrition, and not to make him fat and flabby as is done in the Liegen-Halle or Rest Cure, where patients are made enormously stout - making the least exercise a great exertion owing to the enormous weight their flabby muscles have to carry about. In very marked cases of anorexia suitable drugs may be employed, but can usually be soon discontinued. The only complication in Phthisis that requires notice under the heading of "Diet" is Haemoptysis, when the diet should be purely a fluid one, e.g., milk, beef-tea, or any other meat soup. With this exception, I adhere strictly to the above.

TEMPERATURE:

The temperature of each patient must be taken four/

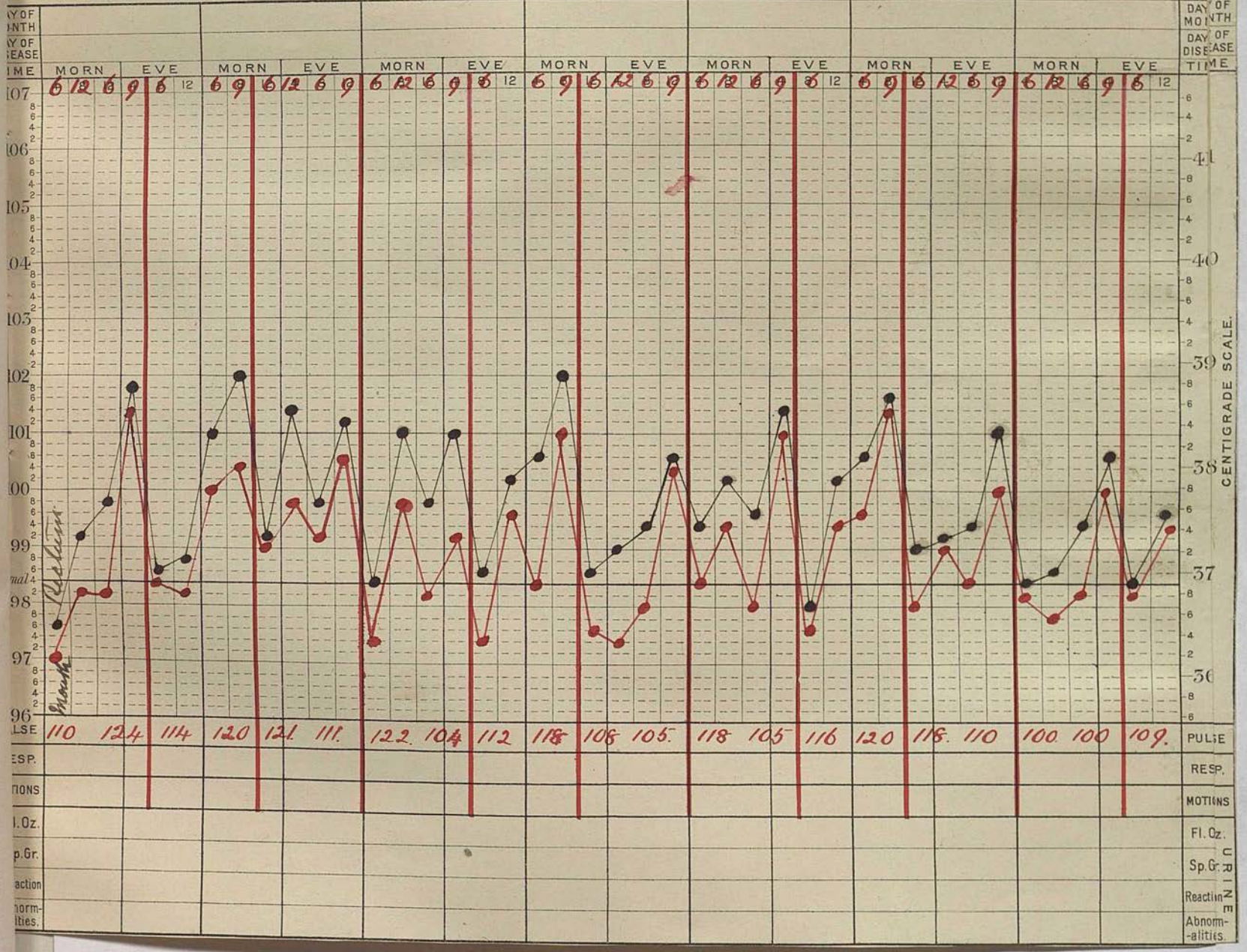
four times in the 24 hours. First on waking, say, at 7 a.m., secondly, in the middle of the day before dinner at 12; thirdly, in the evening at 6p.m. and lastly, just before going to sleep at 9.30 p.m. These are convenient times for ascertaining the temperature, but may if necessary, be altered; but if they are, and different hours for doing so adopted, the same hours must be adhered to and not varied from day to day, or the charts would be fallacious and give rise to entirely erroneous impressions as to the activity of the disease. The spread or decline of disease is indicated more speedily in the temperature chart than in the physical changes in the lungs. The patient is not to be allowed any exercise until the body temperature has remained within normal limits for at least a week. In treating patients here, I have always taken the temperatures in the rectum, because undoubtedly the rectal temperature gives a much nearer approximation to the real temperature of the blood than can be obtained in any other way. Temperatures taken in the axilla are always liable to be erroneous, as the axilla may be moistened with axillary secretions, especially in consumptive cases where sweating is frequently so profuse; and the/

Chart I

NAME & ADDRESS *W. S.*
 SE BOOK N° PAGE

AGE *27* OCCUPATION *Shoe trade.*

DISEASE *Chronic Pulmonary Tuberculosis.* RESULT



CENTIGRADE SCALE.

Chart II

NAME & ADDRESS *R. R. admitted May 11th* AGE *42* OCCUPATION *Shoe laster*
 DISEASE *Chronic Pulmonary Tuberculosis* RESULT

Y OF NTH OF EASE	Sep. 14 th		15 th		16 th		17 th		18 th		19 th		20 th		21 st		22 nd		23 rd		24 th		DAY OF MONTH	
	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	DAY OF DISEASE	TIME		
07	6	12	6	9	6	12	6	9	6	12	6	9	6	12	6	9	6	12	6	9	6	12	8	
06																							4	
05																							2	
04																							4	
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01																							4	
00																							2	
99																							8	
98																							6	
97																							4	
96																							2	
LSE	117	104	114	107	106	107	105	104	109	96	104	100	115	99	103	102	99	104	103	99	96	8	PULSE	
ESP.																							6	RESP.
TIONS																							4	MOTIONS
l. Oz.																							2	Fl. Oz.
p. Gr.																							8	Sp. Gr.
action																							6	Reaction
norm.																							4	Abnorm-
ities.																							2	alities.

CENTIGRADE SCALE.

Reaction

the method of taking it in the mouth also may give rise to error, especially in mouth-breathers, where, owing to there being a patent cavity through which air is constantly passing to and fro, the surface temperature in the cavity is almost certain to be lower than the actual temperature of the blood, and in a prolonged insidious disease like consumption, it is most important to know the smallest variations above normal. Many objections have been offered to taking temperatures in the rectum, most of them being very trivial, but the objection that it is unnecessary requires consideration. In support of this objection, it is urged by many that mouth temperatures give a sufficiently true indication of the range of body temperature, and that even if it were best to know the rectal temperatures, these can be inferred by observing the rate of difference between the mouth and rectal temperatures for a few days. Now, both these statements can be easily proved to be entirely wrong as will be seen on referring to Charts I. and II., where the mouth and rectal temperatures have been taken simultaneously - the one in a case of Phthisis with Pyrexia, the other without any. There is no definite ratio at all between the temperature of mouth and rectal cavity/

cavity. This is no doubt due to the fact that the rectum is a closed cavity and the mouth not. As a rule, though there are many exceptions, the mouth and rectal temperatures most nearly approximate after the night's rest when the mouth has been closed in sleep, but during the day there may be a difference of as much as a degree, a degree and a half or even two degrees between the two. Sometimes even the mouth temperature will go down while the rectal temperature rises. In my own mind, there can be no doubt whatever that the rectal temperatures should be taken in all cases of tuberculosis which are being systematically observed and treated, and this, I believe, is the view now accepted by the majority of the heads of sanatoria.

I now pass on to consider the question of "normal temperature". The normal temperature of the body in healthy individuals varies from 98.6 degrees or lower in the morning, to 100.4 degrees or less in the evening. Until a patient's temperature has been within these limits for at least a week, no exercise is permissible, with very few exceptions. Of the four temperature records taken in the 24 hours, that to which most importance is attached is the one taken before rising in the morning/

morning. In the quiescent and obsolescing stage of Pulmonary Tuberculosis, this is not only as low as 98.4 degrees, but generally very much lower, somewhere between 97 and 98 degrees (see Chart). If the morning temperature persistently remains at 98.8 degrees or 99 or more, it nearly always means that the tuberculous disease is not quiescent, even though during the rest of the day the temperature does not rise above the normal limits above mentioned. In my experience the chief exceptions to this are seen in women, who often have slight elevations of temperature due to their monthly periods, and also in neurotic patients who often seem able to raise their temperature from .2 to .6 of a degree by lying in bed and worrying themselves over what it is going to be.

When the temperature has been shown by observation to be within the normal limits for at least a week, the next step in the treatment is commenced, namely, Exercise.

EXERCISE:

The change from complete and absolute rest to general activity must be brought about very gradually and must be accompanied by careful and close observation/

observation of the body temperature, as any over-exertion, however slight, usually makes itself manifest in a rise of temperature. Not infrequently have I found patients who have been up for some time and who have been doing well, have a sudden rise in temperature, which is found on enquiry to be due to the fact that it commenced to rain, so they hurried in. The moment when a patient is told he, or she can get up for the first time, must be a happy one and one which marks for them a step of great improvement in their conditions, as they must then feel and realize that all is not over, but that they may reasonably hope to enjoy walks in the country, which they had almost despaired of a few weeks back. The first day out of bed consists in getting up for about one hour, lying on a couch and then returning to bed. This is increased day by day until they are allowed to go out of doors and begin their walking exercises. The rate of walking should not be greater than two miles an hour, with frequent stoppages, the distance being gradually increased provided that the temperature remains within the normal limits. The length of the walk is not left to the patient's inclination, but is carefully regulated according to his strength and progress.

The/

The intention being to allow of sufficient exercise stopping short of fatigue and that the temperature after exercise should not exceed 100.4° F. No other form of exercise should be permitted as in any more violent exercise, violent respiratory efforts are made, freshly formed scar tissue in the lung is broken down and tubercle bacilli which had been shut off by adhesions from the general lung tissue are disseminated into parts of the lung hitherto healthy. These evil effects may possibly be shown at once by a rise of temperature and a fresh out-burst of cough, but frequently untoward symptoms are delayed for two or three weeks until the bacilli have gained sufficient hold to give rise to constitutional disturbance. If this calamity occurs, the whole treatment has practically to be begun again at the very beginning - absolute rest, enforced and maintained until the temperature has again been reduced to within the normal limits, but this is more difficult to attain now, than at the commencement as there is a greater area of lung subjected to the tubercular invasion, and further the patient usually becomes depressed and consequently does not make such good progress. The open air treatment to be successful, must be carried out thoroughly/

thoroughly, but the steps in the process must be taken very slowly. Any attempt to hasten is almost certain to meet with disaster, but provided the case is a suitable one and due care and consideration be taken in observing the patient's general condition, as well as particular attention paid to the changes in the lungs, the body temperature, the pulse rate, etc., after duly weighing them over and then acting upon the conclusion arrived at as to whether the patient should or should not get up, should walk more or less, or have his diet increased or diminished, etc., the result is eminently satisfactory. The cure is not as rapidly attained as one could wish, but at present it is the best and most certain method we have. The day may, and I trust, will come when something will be discovered which will have a more powerful and more quickly acting antagonism to the tubercle bacillus, but until it is discovered, I think no stone should be left unturned in our endeavour to overcome the dread disease, namely, Consumption.

But one must add that this treatment works no miracles and in some, even early cases, utterly fails to check the progress of the disease. This is especially likely to be the case in patients with a strong/

strong family history of Consumption and people may say what they like, but personally, I am convinced that such a history makes the progress far worse.

It is not the disease itself which is inherited, but a suitable nidus for the growth of the tubercle bacillus. I have not infrequently seen such cases go from bad to worse, when, but for the family history, one might reasonably consider the outlook a hopeful one.

The results, looked at broadly, are best shown in tables of statistics. Most of the tables hitherto published have, of course, reference to sanatoria out of England, some of which are shown in the following tables.

SOLLY'S MEDICAL CLIMATOLOGY page 141.

Improved and arrested.	All Stages	1st Stage	2nd & 3rd Stages.
Lowland Climate	58%	71%	28%
Sanatoria (non Alpine)	63%	95%	58%
Highland Climate	76%	89%	63%

BREHMER'S STATISTICS OF 5,032 CASES

Stage of Disease	Number	Cured	Nearly Cured.	Total
I.	1390 = 27.62%	387 = 27.8%	430 = 31%	817 = 58.8%
II.	2225 = 44.21%	152 = 6.83%	325 = 14.6%	477 = 21.43%
III.	1517 = 28.17%	12 = 0.84%	33 = 2.3%	45 = 3.14%
	5032	551 = 11%	788 = 15.6%	1339 = 26.6%

In the "Practitioner" for 1899, Dr E. L. Trudeau of the Adirondack Cottage Sanatorium gives his results as follows.

Results on 203 patients who remained an average of 9 months.

Condition of Patient on Admission.	Apparently cured	Disease arrested	Improved	Unimproved or failed.	Died
75 Incipient cases	55	16	2	2	0
84 Advanced cases	15	38	19	11	1
44 Far advanced cases	0	7	19	13	5
	70	61	40	26	6

The following statistics, which I submit are, I think, of special interest because they are results obtained in the British Isles. Some of them have been published before, others I have obtained through the kindness of the managers of certain British Sanatoria/

Sanatoria, namely, Dr Jane Walker and Miss Chesney of the East Anglian Sanatorium, Dr Thurnam of Nordrach-upon-Mendip, and Dr Burton Fanning and Dr Fanning, who have, until recently, managed the Mundesley Sanatorium.

THE RESULTS OF DR THURNAM:-

The results of Dr Thurnam of Nordrach-upon-Mendip, for the first two years of his Sanatorium, are as follows. He uses the following terminology:-
Cure, absolute or relative; amelioration; no improvement.

Absolute cure means no fever, no tubercle bacilli in the expectoration, lung signs very much diminished, and fitness for locomotion great; able to return to work and after a year's caution, to live like ordinary men.

Relative cure means no fever, much fewer tubercle bacilli in the expectoration, much diminished lung signs, and fitness to return to work with caution. The tendency is to get quite well after a year or so.

Amelioration means improvement, but the patient is unable to return to work or life as he used to live it, and has to carry out treatment strictly at home.

Absolute Cure	24%) =	Cured 45% and
Relative Cure	21%		
Ameliorated	37%		
Not improved	18%		

THE RESULTS OF DR JANE WALKER AND MISS CHESNEY.

1. Cheshunt's Sanatorium, May 1899 to March 1900.

Total Cases	58	
Recovered	9 or 15½% about)) *
Improved	24 or 41⅓%	
Going back	1 or 1½%	
Died	15 or 26⅕%	
Under treatment	9	

* = Total improved nearly 57%.

A. Recovered - 9.

Tubercle bacilli present in 7.

Lesions: R. apex 2. L. apex 4. Both apices 3.

Gain in Weight average, 1 stone.

Length of state, average 3½ months.

B. Improved - 24.

Tubercle bacilli present in 21.

Lesions: R. Lung 4, L. Lung 5, both lungs 15.

Weight, average gain 10½ lbs.

Stay, average 5 months.

C. Unimproved in 1900:

1 case tubercle bacilli present, both lungs affected, Albuminuria as complication. Has since improved.

D. Died - 15:

Tubercle bacilli present in all.

Pyrexia present in all.

Both lungs affected in 13.

Extensive disease in R. lung, 1.

Extensive disease in L. lung, 1.

II. Brookside Sanatorium, October 1899 to June 1900.

Total Cases	31
Recoveries	8 or 25% about) *
Improved	16 or 50% ")
Gone back	6 or 20% "
Died	1 or 3%

* Total improved 75% about.

THE RESULTS OF DR BURTON FANNING & DR W.J. FANNING.

Results obtained at the Mundesley Sanatorium.

Terminology:

Arrest = total disappearance of fever and fitness to work restored.

Arrest	55.95%) Total improved (=	83.92%.
Improved	27.97%		
No improvement ..	6.29%		
Worse or died in Sanatorium ..	9.79%.		

In 1901 at the Tuberculosis Congress, Dr Burton Fanning summarised the results obtained at British Sanatoria as follows:- (Tub. Transactions Vol.III)

716 patients have been treated.

Average duration of stay, 4 months.

Quiescence or relative recovery	37.4%) Improved (=	77.6%
Amelioration	40.2%		
No amelioration	22.3%		

Compare with these English results Dr Theodore William's table of his cases treated in the High Alps:- (Tub. Transactions, Vol. III.)

Cases	Absolute arrest	Diminished physical signs	Improved	Stationary	Worse
385	174	129	303	20	59
	or	or	or	or	or
	45%	33.5%	79%	5.2%	15%

And Dr Turban's results obtained by Sanatorium treatment at Davos.

Dr Turban:- 408 cases of various stages.
 48% gave lasting results.
 34.3% died.

	<u>Patients</u>	<u>Lasting Results</u>
Stage I.	97	80.4%
Stage II.	205	48.8%
Stage III.	$\frac{106}{408}$	17.0%

He also gives the following table as giving probably the truest summary:-

	<u>Lasting Results.</u>
Stage I.	97.5%
Stage II.	54.6%
Stage III.	17.4%

The difference in terminology of all these tables of results is unfortunate, as it renders an exact comparison between them impossible. There is possibly a very slight balance in favour of High Alpine Resorts, but you will see that if you add together the relative and absolute cures obtained by DR Thurnam, they come to 45%, the exact number of absolute arrests in Dr Theodore Williams' statistics.

One/

One more table I may perhaps be allowed to add, which is especially concerned with the subject of this Thesis, namely, the results obtained at the Northampton General Infirmary during our first year's attempt at open-air treatment. Of these patients, I may remark that we do the best for them we can, on lines which I have already laid down. The Infirmary is well situated on the outskirts of the town in its own grounds, but we have no balconies or verandahs for our patients and can only utilise two small wards containing six beds for males and five for females, one looking East and South, the other West and South. The supply of fresh air is good and plentiful - our greatest difficulty is the proper regulation of exercise. This has been especially difficult since last May, as, owing to a large extension scheme, the extent of our grounds has been considerably curtailed.

Results of open air treatment of Phthisis at Northampton General Infirmary.

Case	Gain in Weight.	Duration of Stay	Result
1. C.G., (Male, moderately advanced case.)	17 lbs.	14 weeks	Arrested.
2. G.D., (Male, advanced case.)	22 lbs.	19 "	Arrested.
3. W.B., (Male, early case.)	20 lbs.	12 "	Greatly improved, since arrested.
4. W.G., (Male, moderately advanced case.)	25 lbs.	35 "	Greatly improved.
5. J.J. (Male, moderately advanced case.)	21 lbs.	14 "	Greatly improved.

6. G.G., (Male, advanced case.)	1 $\frac{1}{4}$ lbs.	9 weeks	No improvement, left at own request.
7. G.S., (Male, early case.)	21 lbs.	10 "	Greatly improved, left at own request
8. A.G., (Male, early case.)	8 lbs.	8 "	Improved. Left at own request.
9. A.W., (Male, early case.)	31 lbs.	30 "	Greatly improved.
10. R.R., (Male, early case.)	27 lbs.	21 "	Greatly improved.
11. W.S., (Male, acute moderately advanced case.)	21 lbs.	11 "	Greatly improved, left at own request.
12. A.B., (Female, moderately advanced case.)	31 lbs.	25 "	Arrested.
13. M.C., (Female, advanced case.)	5 lbs.	9 "	No improvement.
14. K.L., (Female, early case.)	30 lbs.	26 "	Arrested.
15. M.H., (Female, early acute case.)	?	27 "	Worse, since died.
16. A.Y., (Female, acute case.)	?	4 "	Died.

STILL IN HOSPITAL.

17. G.D., (Male, early case.)	16 lbs.	6 weeks	Improving
18. W.B., (Male, early case.)	12 lbs.	10 "	Improving
19. A.H., (Male, moderately advanced case.)	14 lbs.	18 "	Improving
20. F.R., (Male, early case.)	20 lbs.	16 "	Improving
21. J.W., (Male, moderately advanced case.)	24 lbs.	13 "	Improving
22. E.J., (Female, early case.)	3 lbs.	2 "	Slight improvement
23. M.H., (Female, advanced case.)	10 lbs.	11 "	No improvement
24. S.C., (Female, moderately advanced case.)	5 lbs.	11 "	No improvement
25. E.G., (Female, moderately advanced case.)	15 lbs.	14 "	Improving.
26. A.C., (Female, early case.)	4 $\frac{1}{2}$ lbs.	3 "	Improving.

IN ALL - 26 CASES TREATED.

Complete arrest,	5 = 19.2%)	
Much improved,	6 = 23%)	Improved = 77% about
Improved,	9 = 34.5%)	
No improvement,	4 = 15.4%)	No improve- ment, or = 23% about
Died,	2 = 7.7%)	

On the whole, I think the results are decidedly encouraging, though it is impossible to say anything yet about their permanence.

These statistics, I venture to think, clearly show that the uncertain and inclement climate of the British Isles is no bar whatever to the successful treatment of Pulmonary Tuberculosis. They show indeed, as I have emphasized before, that, given the judicious use of other means as well, not any special kind of air is necessary, but only ordinary pure fresh air.

If that, then, is the case, what is our duty to our patients in general and in particular to the different classes of our patients, and especially, what is our duty to the poorer classes?

First of all, I should place as of paramount importance to our patients of every class, our absolute duty as practitioners, so to cultivate our powers/

powers of observation and skill in diagnosis as to be capable of recognising the earliest signs of Pulmonary Tuberculosis.

As is shown in Dr Burton Fanning's statistics from British Sanatoria, in selected early cases quiescence was obtained in 88.4%, whereas, in cases of all degrees of severity, quiescence was only obtained in 37.4%, a difference of 51%. (Tub. Trans. Vol. III.)

The difference between these two results is enormous and our responsibility equally great.

In the second place, as soon as we have made our Diagnosis of Pulmonary Tuberculosis, it is our duty to at once put our patients on the most thorough and drastic open-air treatment that their circumstances will permit. Let there be no half-hearted measures. Let there be no windows a little open in the day and just a crack open behind the blinds and curtains at night, no meals sent half eaten away, no going away for change of air, which merely means a change from one stuffy room to another and from one set of injudicious friends to another set, still more injudicious.

If the patient is moderately well off, then I think the best plan to adopt is certainly to select a Sanatorium in our own Islands, because, as I have already/

already stated, I believe the best chance of his permanent recovery is to go through the treatment in the climate in which he or she will have permanently to live in.

The rich patient has more option as to where to go, but it must be a properly conducted Sanatorium, wherever it is.

If the patient is poor, what is to be done, or rather, what can be done?

If we were to follow our natural inclination, we should say, "go to an open-air Sanatorium at once and stay there as long as the doctors in charge think necessary." But it is useless to give such advice because the Sanatoria are either not there, or if they are, then they are probably full and the patient has to wait perhaps months, going from bad to worse before he can be admitted.

This consideration opens up the difficult question of how to deal with the consumptive poor, a problem which would suffice of itself for a Thesis, but one which I do not propose to enter into a full discussion of, but merely to offer a few remarks on.

No doubt, the best hope of getting rid of consumption and other forms of Tuberculosis from our midst lies not in Sanatoria or other forms of Medical treatment, but in Preventive measures, Sanitation/

Sanation and Hygiene. Osler, in his System of Medicine, says, "The mortality from Phthisis according to statistics, is less in country than in towns; and in towns increases with population. Town mortality is largely connected with overcrowding in badly lighted and badly ventilated rooms." Even before the Tubercle bacillus was discovered, the death rate from consumption in England was enormously reduced by such measures.

In 1838 death rate from consumption = 32 per 10,000
Living

In 1899 " " " " = 13 per 10,000

(Sanatoria for Consumptives, Prof. Walters, p. 393, 2nd Edition.)

If such has been the reduction in the death rate already, in a period, during most of which we know not the source of the disease, surely it is not unreasonable to hope, that with proper education in the management of sputum and the inculcation of fresh air doctrines and the better housing and feeding of the poor, Tuberculosis by the end of the present Century, might be as rare as Typhus Fever, the prevalent disease of the past, is now.

And further, I think that this desirable result would be greatly aided by compulsory notification, which has already been adopted in New York, the/

the State of Michigan and elsewhere (The notification of Tuberculosis in New York City and its results, Hermann M. Biggs, Tub. Transactions, Vol.II.) The question of notification meets with much disapproval, but if we notify our infectious diseases, why not notify another less acute certainly, but equally fatal disease.

But in the meantime, what are we to do for the consumptive poor who cannot afford to pay for Sanatorium treatment?

Are we to let them die off and die out, in the process, probably scattering Tubercle Bacilli in every direction, or are we to make a great effort to provide them with special treatment.

Our duty to do our best for each individual human life, however apparently valueless, has been eloquently advocated by Sir John Burdon-Sanderson (Our Duty to the Consumptive Bread-earner, Brit. Med. Jour., July 5th, 1901.)

If we spend enormous sums in keeping alive, the absolutely useless insane and idiotic, in comfort, for years, they being entirely negative assets in the social community, it is surely absurd that we should not do our best too for the tuberculous poor, many of whom might be restored to sound or partially sound health and lead useful lives.

If/

If we spend large sums on Hospitals for infectious fevers, it is surely absurd that we should spend none on Hospitals for Consumption, one of the most deadly Infectious diseases.

Surely then, consideration points to the fact that as the State has intervened in these matters, so should it interfere in this.

The State, I think, should intervene, for its own interest is at stake. Private and philanthropic individuals can, of course, do a great deal, but unfortunately, they are not to be found in all parts of the kingdom, but alas, Consumption is.

Supposing that the State does take up this important question, What are the lines to be adopted so as to give the best results?

Germany has set us an example in its experiment by means of the Workmen's Insurance Institutions. I do not propose to go into this scheme, because I do not think it is applicable to England, but an excellent account is given in the Transactions of the British Congress on Tuberculosis in the Papers by Biebfeldt, Rieche and Pannwitz. This experiment is undergoing its trial, but whether the results justify it, is by no means certain. The German Insurance Companies have started their Sanatoria,
not/

not from philanthropic, but from purely business motives, so if they find it pays them best to spend these vast sums, the treatment must have its value.

In this country, I think we should proceed cautiously and not run up in a moment of enthusiasm a vast number of Sanatoria, which I trust, in another 50 or 100 years will not be required. If suitable preventive measures be adopted and at the same time a few Sanatoria erected somewhat after the manner I shall presently describe as my "ideal".

That "Prevention is better than cure", is an old maxim, but none the less true in consequence, and it is to consider the question of prevention that I direct my attention before I conclude.

To extirminate Consumption, "Prevention" and "Cure" must go on simultaneously and of the two, perhaps the more important is Prevention. How is this best attained? The state, I think, should be very strict about the construction of houses on strict hygienic principles, better lighting and ventilation in workmen's houses, factoriss, etc., narrow streets being made broader, etc. We, as practitioners, should do all in our power to instruct the public how to lead more healthy lives, and also to instruct the governing bodies in towns, the absolute necessity of improving and making as nearly/
nearly/

nearly perfect as possible the general subjects of Hygiene. When the authorities and the general public realize the significance of this and unite to stamp out Consumption, then, will the number of Sanatoria necessary decrease in direct ratio to the thoroughness with which the crusade is undertaken. The general public, I think, have yet to learn, or at any rate, take credence of the fact that Consumption is a communicable disease, but when they do realize it, I feel certain they will give their hearty co-operation to exterminate it.

I think we should use existing institutions for the sick poor, as far as possible, where they are at all favourably situated. Hospital and poor-law infirmaries should set aside special open-air wards for consumption and these should be supplemented by special sanatoria and special isolation hospitals or wards for advanced cases.

Already, certain institutions are acting on this principle, (as is shown by the recent articles published in the British Medical Journal for Nov. 15th and 22nd 1902.). Liverpool, Dundee, Northampton, Nottingham, Sheffield, Dublin and Greenwich, have taken this step and in all cases the results have been gratifying. As regards the sanatoria, the way in which Westmoreland Sanatorium is carried on/

on might serve as a model. Started as it was by private charity, out of 22 beds, 20 are now maintained by various councils, boards or districts in Westmoreland at a subscription of not less than £60 a year for each bed. Each district that subscribes for a bed has, of course, a right to keep it filled with suitable cases. This seems to me a good plan. The system approaches the letter system without having its worst features.

Everybody must sympathise with Sir John Burdon Saunderson's desire to do away with the letter system altogether, but I am afraid it is an unrealisable council of perfection to hope to do away entirely with something approaching it.

Indeed, in a sanatorium for a town and county such as that of Northampton, for instance, I think it likely that outlying districts would not get their fair share of beds unless some such arrangements as in Westmoreland were adopted.

Dr Gaskell Higginson, in an able address recently delivered on the subject at Swansea, advocated that Town or County Councils should make themselves responsible for the up-keep of such establishments and should sub-let the beds to districts. To have a perfect scheme, I think the following would be ideal.

Big/

Big towns or big districts should acquire a considerable plot of land, not too far from the big town and there support three establishments:-

A Sanatorium for early cases; a Small special Hospital for advanced cases and between them, a farm or consumptive colony.

The Sanatorium would be for the cure of early and hopeful cases. The Special Hospital for the isolation of advanced cases, to alleviate their suffering and prevent them from being a source of infection to others, and the colony or farm would serve to supply the two establishments and also teach recovered consumptives what work they had best do in future, and how they ought to live when they have left the Sanatorium. (cf. C. C. Chidell Tuberculosis, Vol. II., No. 4, and Rapport sur La Colonie Agricole du Cannet by Vaudremer; Tuberculosis Trans. Vol. III.)

I do not think that these institutions should be built in too splendid or permanent a manner, because I do not think they would have to be permanently maintained. With a resolute effort, I feel sure that Tuberculosis in all its forms may be practically abolished.

So much for the open-air treatment of consumption/

sumption, its results, and the consequences which ought to flow from such results.

It is possible, and we all hope that some day some drug or anti-toxin may be found, which will act directly upon the Tubercle Bacillus or its products, but nevertheless, I believe the "Open-air Treatment" would always find its place in the treatment of the disease. It is a simple treatment, it is a rational treatment and it has the inestimable advantage that it can be carried out with admirable success in the climate of our own islands. It does not perform miracles and in some even early cases, utterly fails but no treatment has yet been devised which produces such excellent results.

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