An Address

ENTITLED

ALPINE OR HOME CLIMATES FOR EARLY TUBERCULOSIS?

DELIVERED AT THE MEDICAL GRADUATES' COLLEGE
AND POLYCLINIC.

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THIS question has a practical bearing which is soon to become obvious in a novel aspect—that of the sanatorium patient. The best means for arresting tuberculosis in the individual and the community have always had the attention of the large body of practitioners to which you belong. But it will happen to many of them in the near future to be responsibly concerned with the task of selecting and certifying suitable cases for the great opportunities which will soon be offered by the Queen Alexandra Sanatorium at Davos.

THE QUEEN ALEXANDRA SANATORIUM, DAVOS.

The Sanatorium, which was mentioned by His Majesty the King at the opening of the King Edward VII Sanatorium on June 13th, 1905, as having Her Majesty the Queen for its Patron, and the privilege to be permitted to be called by her name, is now within measurable distance of entering upon its career of usefulness as our only National Sanatorium in the most perfect of all known climatic resorts for pulmonary consumption. It is not yet completed, though its stately mass already overlooks Davos from a commanding site. The delay is still due to the lack of that powerful philanthropy which would not long be withheld from it were we as a body to lend our united forces to a support of its claims.

This is not, however, an appeal for funds, although there is no other profession with wider opportunities to guide private munificence into the most deserving channels. Our study to-day is not that of subsidies, but how we shall turn to the best account the provision, second to none as regards comfort and efficiency, which is being made for our patients at the Queen's great Alpine Sanatorium.

Concerning the national importance of that object, and in extenuation of the reproach of our lateness in carrying it out as compared with some other nationalities, it is gratifying to think that its first tentative embodiment in Davos arose within the British community with the devoted personal labours of the late Mrs. Lord in the service of our poor consumptives, whose welfare is now under the efficient care of the Local Board of Management. The national aim pursued for years by the "Davos Invalids' Home" to provide a sanatorium worthy of the two great English-speaking nationalities, on an excellent site, purchased mainly through the exertions and the generosity of my lamented friend and co-secretary, the late Mr. Arthur Herbert, had received Royal recognition before the end of the century, and upon her accession in 1901 Her Gracious Majesty was pleased to confirm the patronage which she had granted to the "Home" as Princess of Wales.

But the great Queen Alexandra Sanatorium, which now crowns the southern extremity of Davos at an altitude higher than that occupied by any other national sanatorium in Europe, would not have become an accomplished fact but for the quite unparalleled energy and success of our President, the Lord Balfour of Burleigh, in preaching the good cause, not only in Davos, where the British colony has evinced much public spirit, but far and wide throughout the United Kingdom. The indefatigable services of my co-secretary, Mr. D. A. F. Vesey, and of Mr. H. C. Winch, our local secretary at Davos, and the work of the Local Board of Management, under the chairmanship of His Majesty's British Consul, Dr. W. Huggard, have all been essential also to the achievement.

THE SELECTION OF CLIMATE AND OF CASES.

Owing to those early beginnings, experience has been accumulating, both from our own work and from that of other institutions in Davos, which will prove of advantage. Without undue presumption we may therefore hope that the future working of the Queen's Sanatorium shall be unsurpassed in the results of treatment. One condition is, however, absolutely indispensable, and that is that we shall have throughout the country your constant co-operation in sending us the most suitable cases. That consideration now prompts me to place before you to-day as

briefly and as clearly as I can the leading notions which may guide your action. I shall, in the first place, endeavour to satisfy you as to the practical soundness of *two propositions* and as to the detrimental influence of *three popular fallacies* in connexion with the full exploitation of the altitude for the cure of tuberculosis.

THE POLICY OF COMBINATION AND SOME PREVAILING MISCONCEPTIONS.

The Policy of Combination.—The two propositions I wish to establish make for one practical conclusion—namely, that our true policy is one of a *systematic combination for individual cases of the Alpine and of the Home Sanatorium treatment*.

Proposition I. The best possible value will be got from the Home sanatorium treatment for early tuberculosis when the patients shall have had the advantage of a preliminary course at the Alps.

Proposition II. The best results are obtained at Davos when patients resort to it at their earliest stage, before any time has been spent over any other form of treatment, whether at their homes or at any of our Home sanatoriums.

The Three Prevailing Misconceptions.—First Fallacy:—"All climates are sufficiently good. Everywhere it is the open-air that cures, and this can be had at home." To those of you who have travelled for recuperation after hard work the suitable reply does not need to be suggested. The extent of your gain in health has been conspicuously varied in different localities, according to the kind of open air you have enjoyed.

Second Fallacy:—"The winter is the time for Davos. Let us wait till December, and spend this summer and autumn at home." Our brief answer to this too often fatal misconception is the object lesson afforded by the Davos list of visitors. The most precarious of patients, those *chronic miracles* showing arrest and survival in the advanced stages, are those who find it good to remain in permanent residence at Davos through summer and winter alike. The worst sample of Davos climate, if good for them, should be good enough for our early cases. There need be, then, no closed time for the blessings of the Queen's Sanatorium.

Third Fallacy:—"Try England first and our Home Sanatoriums. It will be time later to fall back upon Davos in second resort." Our safeguard against this fallacy is not merely historical evidence. In the course of annual winter visits to Davos and the Alps during the last twenty-five years I have known patients who had been attracted to the Alps from the Rocky Mountains, and others from high valleys south of the Himalayas. We must bear in mind that the same degrees of altitude are available in many parts of the world, but the climates of these identical altitudes differ in all of them. The same holds good within quite small districts. One of the earliest climatic lessons which I learned was the considerable differences in the individual merits of climates such as those of St. Moritz, the Maloja, Davos-Platz, Wiesen, Arosa, and others, all of them within the same Alpine group. Of course, much greater differences must occur between the mountain climates of different latitudes. In face of these practical differences between valley and valley, need we labour the point that there is an objective importance, and not mere fancy, in the larger question as to the treatment of a patient in the altitude or in the plain.

THE COMPARATIVE VALUE OF HOME AND ALPINE SANATORIUM TREATMENT.

The two great national institutions referred to may be said fairly to represent two rather diverging lines, between which a choice has to be made in the class of cases we have under consideration: the Midhurst Sanatorium, as the type of the many excellent Home sanatoriums—still too few for our needs—the efficient work of which is indispensable as our chief weapon in the fight against tuberculosis, and as the type of the best that circumstances can at the present time offer in this country for the greater number; the Davos Sanatorium, a special effort to carry out for a smaller number the special advantages not to be found in this country, and which it is unhappily impossible to procure for the masses—as the type of the best climatic cure which the world can provide.

In our recent climatic therapeutics there has been a tendency to ignore, and another tendency to exaggerate, the therapeutic importance of differences between climates. The practical effect of both is to deprive our patients of some valuable climatic opportunities. Usually the home climates have been favoured; but the opposite has also been known to occur. The welfare of individuals and of the community may probably be better served by the view I have submitted that there is in most cases an excellent alternative in their happy combination. I had previously expressed an opinion that a majority of cases of pulmonary tuberculosis are at an early stage suitable for the Alps. I should like to add the further opinion that a majority of them are curable at home if only treated early enough. These two statements taken together amount to saying that for most of our cases there is a cure both at home and abroad.

The point which arises is whether patients would be any the less curable at our Home Sanatoriums if they had previously taken an early and short instalment of the Alpine cure. *Experto crede*, the best answer is to be got only from those who have tried that plan. A further point is whether, just as there are cases which are not suited for the Alps, there may not be some, too, not perfectly suited by our home climates, and which the Alps might suit in a special degree. If we admit the existence of these two minorities outside the majority for which our home sanatoriums are available and for which Alpine treatment would also be suitable, the importance of an "early" selection of the best climate is apparent.

The Alternative of the Alps as an Alternative of Choice or as an Alternative of Necessity.—For the masses, under existing conditions, the alternative does not arise. We are dealing only with those for whom travel and residence abroad are practicable. For many of the latter the alternative of the Alps is, like the better of two good things, a luxury. They can be got well without it in "the long run." And if their choice should have been made for the "longer run" there is safety in the end; or, at any rate, there need be no disaster. But when it happens that a patient has not made sufficient progress in the Home sanatorium, in spite of a fairly long trial, the alternative of the Alps is no longer to be regarded as one of choice but of necessity. Would that he had originally chosen rather than eventually suffered that alternative. Although at the later date he may yet succeed in securing his life, this cannot now be done without a considerable expenditure of time and of money. These are the uncertain cases which the climatic adviser should have constantly in mind in his chest examinations of early applicants. These are also the best cases to illustrate the other aspect of the same question—the wisdom not of an exclusive selection of one or the other form of sanatorium treatment, but rather of their systematic combination; for in that combination, if only it could be adopted in time and in the proper order, lies not only the safety of many a sufferer, but the best saving of expenditure and of earning capacity.

The Alpine Cure largely Climatic, the Home Cure mainly by Open Air.—The history of the Alpine treatment is instructive. Dr. Spengler began his climatic cure in Davos in 1853, because that valley had been known as far back as the Middle Ages to be free from endemic consumption. In those days, however, perpetual open air, which had already been preached by Bodington in this country, was still farther than it is even now from prevailing among the local population. During the long winter months house hygiene, particularly as regards ventilation, was worse than it is in our great cities. Nevertheless, though the women, for whom there was little outdoor occupation, suffered from anaemia, yet in spite of the long period spent in bad air, they did not develop consumption. This brings very clearly into light the existence of three distinct aërotherapeutic values in the air-treatment of consumption: (1) Facilities for a perpetual open-air life; (2) freedom from germs; (3) specific climatic quality. In the past the secular immunity of the Alpine altitude from tuberculosis was not due to the first of these values, but existed in spite of its utter neglect. There must have been a singular redeeming virtue in the other two.

In these islands a strictly perpetual open-air life is a preservative and also a cure. But, failing that open-air life, the climate does not possess the qualities which will prevent or check the spread of tuberculosis. In short,

whilst the fullness of the open-air treatment is indispensable in the Home cure, the Alpine cure is not entirely defeated by its incomplete application. Or to state the same thing rather differently: When we take with us the open-air cure to the Alps we are adding excellence to that which is essentially, on its own merits, very good.

The Nature of the Alpine Climatic Advantage.

"Increased vitality" expresses better than any other term the benefit which is conferred. It is felt even by confirmed consumptives and brightens, if it cannot always lengthen, their remaining days. The long survival at Davos of some much advanced cases is a striking proof in point. But we had better look for a demonstration of this remarkable vitalizing power at the other end of the scale—in the man or child who might become a consumptive but is now only depressed by previous illness, overwork, or any lowering circumstances. Why do we send to the Alps the jaded city clerk, the neurasthenic overworked curate, the anaemic exhausted nurse or school mistress? Because there is no change of air which will effect in them with greater certainty a greater change in an equally short time.

The mechanism of these resurrections in vital energy is too well known to you to need more than bare enumeration. Rarefaction of air, dryness of air, and stillness of air, actinic equivalent, and light and warmth equivalent of the sun's rays, physical and mental inspiration from the surroundings, all these factors combine with the influence of the elevation itself and with others perhaps still unknown, such as radio-activity, etc., to render this the strongest of all stimulations: (1) For the nervous system; (2) for the alimentary and metabolic functions; (3) for the richness of the blood; (4) for the nutrition and working power of the heart and of the circulation; (5) for the expansion of the chest, and (6) for the strengthening of the lungs and of respiration.

The immediate rebound is merely the setting free of a hidden store of energy. Where that store is nearly exhausted, this great rapidity of rebound is no longer possible. In the end, too, pilgrims to the Alps will carry away from the mountain just as much proportionate increase in their vitality as they brought to it of vital reserve. Passing to those suffering from tuberculosis, it is clear that a *phenomenally rapid result* of the kind described is attainable only in a patient who has not yet allowed much of his available store of vitality to be wasted by delay under less active measures. His one great opportunity for a rapid cure by the Alpine treatment comes never again; it exists only at the earliest beginning of his degeneracy.

The Mechanism of the Cure of Tuberculosis.—This estimate of the patient's best chances is supported by the latest views as to Nature's method of cure. This is not through the direct operation of our remedies—food, tonic medicines, bracing air, sunlight, rest, graduated exercise, etc.—upon the bacilli or their venom, but through the much more direct operation upon them of our own scavenger and other cells. The *hygiene of disease*, if I may venture to use that expression, consists in raising to the highest pitch the efficiency of our physiological scavenging department and of the protective powers of our juices, at the approach and under the stress of infection. If the energy of our phagocytes should fail to be raised in time to the point of clearing the field whilst the invaders are still few, every passing day will lower it whilst adding to the strength of the invading host. Recovery can no longer be rapid, and it soon becomes precarious.

The Sliding Scale of Profit Derivable from the Alpine Treatment.—If a man were to be offered an assured and profitable investment, he would not continue spending his capital till little of it remained to invest, but would invest at once, and endeavour henceforth to live upon the interest. It is equally true in the matter of health values, that the profit varies with the capital invested.

1. Take the strong man or child whose health is only depressed. He can make the best use of the mountain, and obtain all the good it can give almost without any delay.

2. A less robust subject already threatened with tubercle, though not yet infected, will be able to use the mountain less freely. His profit will be more gradual, yet great in

the end, as it will amount to a practical guarantee of future health, and of freedom from infection.

3. But for the tubercle-infected patient there will be much less activity and much less gain. Even at an early onset of the trouble, it will take *weeks instead of days for the mountain* to make him well.

4. Comes the stage of early bronchial and pulmonary lesion. Our patient is now *an invalid*. Happy if at that time his lot should be cast in the heights where lungs are less slow to heal. But there is at first no active use in the mountain for him; for a while he must simply lie and breathe its atmosphere. He has missed the quick cure. Instead of only weeks, the mountain must now claim *months of his life* to make him safe for the remainder; and with rare exceptions it will never succeed in making a good mountaineer of him.

5. Least of all is this an ambition to be indulged in by those far advanced and badly damaged. Henceforth *mountain-dwellers for life*, or for long periods of time, they can only slowly pace the valley, content to secure from the mountain just their breath and their being.

THE UNSUITABLE AND THE SUITABLE CASES FOR ALPINE TREATMENT OR FOR ADMISSION INTO THE SANATORIUM.

Particulars will in due course be published of the decisions of the Council as to the conditions for the admission, residence, and discharge of patients. As an unlimited stay would not be practicable, and as, in fairness to other candidates on the waiting list, a comparatively short period, possibly renewable, would have to be enforced as is the custom elsewhere, the question of admissibility will have to be most carefully considered by the honorary examining physicians. Unsuitability for admission need not, therefore, imply unsuitability for altitude treatment *per se*. For instance, great advantage might be ultimately derived in Davos by a patient whose condition at the time of application might have been judged to be too precarious to guarantee adequate benefit even from a fairly prolonged stay in the Sanatorium.

The general question as to *suitability for Davos* is quite separate. It is a much more difficult one than that which is before us to-day, as it includes a consideration of many confirmed cases, which the sanatorium has to decline, and which we need therefore only mention very briefly.

The Unsuitable Cases for Altitude Treatment.

As a general statement, it may be said that a *majority of all cases* of pulmonary tubercle are suitable for altitude treatment. The minority is that of the unsuitables, and is made up as follows:

1. *The Advanced Cases:*
 - (a) In their terminal stages; or
 - (b) With severe visceral complications—cardiac, vascular, renal, gastro-intestinal, hepatic, nervous, alcoholic, etc.; or
 - (c) With specially adverse respiratory affections, such as catarrhal bronchitis, asthma, bronchiectasis, emphysema, late laryngeal tuberculosis, and others.
2. *The Relatively Early Cases:*
 - (a) With much catarrhal pneumonia; or
 - (b) With active tuberculation, as evidenced by persistent pyrexia, wasting, rapidity of pulse and of respiration; or
 - (c) With considerable tendency to hæmoptysis; or
 - (d) With any of the pulmonary or of the visceral complications mentioned above; but the cases of quite early laryngeal tuberculosis have to be considered on their individual merits.

The Suitable Cases.

The suitable cases (for the altitude, but not necessarily for the sanatorium) form the majority. They may be taken in the following groups:

GROUP I. *The Chronic Cases* differ much as to their amenability to the curative influence. Although many of them do very well in *permanent residence* in the altitude, they are not, strictly speaking, curable, even at Davos. Much less are they "short-treatment cases." They are not, therefore, suitable in that sense for the Sanatorium.

GROUP II. *The Stages of Confirmed and Active Tuberculosis.*—Many, although not all, cases at these stages are

better suited by the altitude climate than by any other. But as, even in the altitude, they are all slow to heal, their alpine cure has to be reckoned *in months or even in years* during which to send them home would amount to interrupting, and often to ending, progress towards recovery. A few patients of this sort, if they had to be "seen through" their trouble, would monopolize beds to the exclusion of large numbers of "short-treatment cases." Although they may be thoroughly suitable for Davos, the Sanatorium could not undertake the responsibility of such prolonged cures without serious detriment to the interests of the community.

GROUP III. *Early Cases of Mild Type, with Localized Physical Signs of Early Lesion, and with good Antecedents.*—These are eminently suitable for the altitude, and in a large proportion are quickly curable there. They are, of course, admirably suited for a stay in the Sanatorium, followed by a course of treatment at a Home Sanatorium. This is at present and is likely to remain a large group, as many who belong to it are originally of good stamina, and are apt to defer submitting to a medical examination until early physical signs have developed. If sent immediately to the Queen Alexandra Sanatorium, these patients would contribute to a large turn-over of successful "short treatment cases."

GROUP IV. *Early and Mild Latent Cases, without Physical Signs, but Identified as "Tubercle."*—These are the ideal cases for the altitude and for the Sanatorium, because their tuberculosis can be arrested and their chest considerably strengthened by a few weeks' stay in the Alps, with a practical certainty such as is probably not to be equalled in any other climate. After that stay they should immediately proceed to a Home sanatorium to confirm their gain.

GROUP V. *Early Latent Tuberculosis Diagnosed but not Identified.*—This, too, is an ideal field for the best work of the altitude and of the Sanatorium. All the members of this group, whether rightly or wrongly suspected of pulmonary tuberculosis, are sure to derive in a few weeks' stay at the Sanatorium, followed by Home sanatorium treatment, an amount of general and cardio-pulmonary invigoration which will permanently raise them above the danger-line of that "tubercle-catching level" at which they have been living.

It is inevitable that in that number some should be included in whom tuberculosis is really not present, but is only simulated by that *misère physiologique* which is its usual forerunner. Call them "pretubercular" if you will; the name matters little so long as they are not deprived on sentimental grounds of the immense and unmitigated benefit provided by the Sanatorium.

GROUP VI. *The Preventorium Cases.*—This is the group of the most suitable of all cases for the altitude, as they are capable of yielding with the least delay the most brilliant results. But, as tubercle has not been diagnosed in them as present, but only as threatening, they may not claim admission into the Sanatorium. A large, and the most important, proportion of this group is composed of delicate children. Special provision for them in the Alps combined with a Home of Rest for Nurses is one of the most beneficent future developments of the work of the Queen Alexandra Sanatorium to which any large benefaction could possibly be applied.

CONCLUSIONS AS TO THE BEST PRACTICAL ADVICE FOR "SANATORIUM CASES."

1. It would be worth everything to a merely threatened subject to be sent to the Alps before tuberculosis had actually set in. In the future, perhaps, this may be possible in connexion with some *Alpine Preventorium*, such as was suggested in my article in the *Practitioner* for July, 1908.

2. For the Sanatorium-cure, as it now exists, the patient's best chance occurs *immediately* when the existence of tuberculosis is diagnosed or strongly suspected. At this earliest stage proper treatment will do more good than at any other stage, and more good will be secured at an Alpine than at any other sanatorium.

3. As in many of these earliest cases the improvement obtainable in the altitude is very rapid, four to six weeks' stay at Davos may place the further progress of the case beyond any risk of relapse, provided the open-air treatment be continued for a further period at any suitable

Home Sanatorium to consolidate the cure. Arrangements should therefore be made accordingly in good time.

The "short and early" Alpine cure is the best of all courses for safety and also for real economy. Too often patients are sent to the altitude as a last resource. If, as this implies, there is a curative power in it greater than that of home climates and to which an ultimate appeal has to be made, the patient would have been better off for its earlier help. In fatal cases life itself might perhaps have been saved. In the others there might have been much saving of time and of earning power to outweigh the additional expense of travel. For, although both forms of sanatorium treatment yield their best results at the earliest stage, the advantage arising from earliness, particularly as regards rapid results, is immeasurably greater in the Alps than in our own climate. Safety and economy strongly urge that the *Alpine Sanatorium should be visited not second, but first.*

4. The rationale for this order of march rests upon:

(a) The greater "altitude invigoration" which can be derived by constitutions as yet less debilitated by disease, and upon the greater "altitude expansion" of lungs as yet less extensively damaged; and also

(b) Upon the greatly enhanced subsequent efficiency of the Home sanatorium treatment when the early cases have just had the benefit of that initial invigoration and of that thoracic expansion which no Home climate can confer.

5. The Selection of Cases is simplified by the fact that, at that earliest stage, practically speaking all ordinary apyrexial cases are suitable for a temporary stay in the altitude.

6. The Selection of Seasons is simplified by the fact that for these earliest cases all seasons are suitable for treatment under sanatorium rule. As a fact, the individual merits of the several seasons are a minor consideration as compared with the inherent virtues of the "mountain breathing-cure," and these are always equally at our service at all times of the year.

7. As no other treatment is superior to this, no points can possibly be lost through its immediate adoption. But many points might be quickly lost through its delay. For safety, our first climatic prescription should be in all "possible" cases, "Sanatorium treatment in the Alps at once, and Home Sanatorium treatment to follow."

8. For those threatened only—and particularly for Children—this is the treatment *par excellence*; and for them Alpine preventoria must eventually be provided. The risk of bacillary infection, which has sometimes been alleged as a deterrent, is probably smaller at Davos than anywhere else; and as a merely sentimental objection it should not be allowed to stand in the way of an untold boon.

9. The later cases, including those which have not been cured by prolonged treatment at our Home Sanatoriums, are not to-day under our consideration. For them the best opportunity has clearly been missed. Nevertheless they may still find in the altitude a measure of improvement greater than they could obtain elsewhere, provided they can invest considerable time in their treatment. These are not the cases in which admission to the Queen Alexandra Sanatorium could lead to the best and to the most rapid results, nor to the greatest advantage for the greatest number. They are not therefore specially the cases which you will be invited to recommend when the Sanatorium, at no distant period as it is hoped, shall at last open its gates.

THE German Society of Tropical Hygiene will hold its second meeting in Berlin at Eastertide this year.

ACCORDING to the *Medizinalkalender für Oesterreich*, the number of medical practitioners in Austria, including Bosnia and Herzegovina, at the end of 1908 was 12,278, as against 12,041 in the previous year. Of these, 2,946 reside in Vienna, 269 at Graz, 112 at Innsbruck, 499 at Prague, and 334 at Lemberg.

THE eighth International Congress of Hydrology, Climatology, Geology, and Physiotherapy will be held this year at Algiers, April 4th to 10th, under the patronage of M. Journaux, Governor-General of Algeria. There will be an exhibition in connexion with the Congress, and a number of interesting excursions have been arranged. Communications relative to the Congress should be addressed to the General Secretary, Dr. L. Raynaud, 7, Place de la République, Algiers.

THE SELECTION OF SANATORIUM CASES FOR TREATMENT WITH TUBERCULIN.

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THE scientific and comprehensive basis upon which the sanatorium treatment of tuberculosis has now been placed is chiefly due to the exhaustive work of Wright on the problem of the infections and their treatment by opsonotherapy. The recognition of autoinoculation as a specific factor in the treatment of disease took origin in the observations of Freeman. The possibilities of autoinoculation in the treatment of pulmonary tuberculosis were first recognized by Meakin and Wheeler,¹ who in 1905 were led to the conclusion that the beneficial effect of graduated walking exercise in the sanatorium treatment of consumption was due to autoinoculation with small doses of tuberculin, which raises the level of the opsonic index. In one patient, who had a small, almost healed focus, walking exercise failed to elicit any rise in the opsonic index, and the indications in this case pointed to a total absence of autoinoculation.

Recently Paterson and Inman,² from an investigation of the effect of carefully systematized manual labour on the physical condition of consumptive patients and their progress towards recovery, as gauged by the range of temperature and the level of the opsonic index, concluded that graduated manual labour is directly beneficial to the able-bodied consumptive by reason of the repeated autoinoculations it induces, which find expression in a higher opsonic range. In 95 per cent. of the patients doing heavy manual work, Inman found the opsonic index to be above normal. A rise of temperature to 99° F. as a result of work is regarded as indicating a condition of hyperinoculation, calling for absolute rest. Obviously, manual labour will lead to autoinoculation when walking exercise fails to do so by reason of the more active respiratory and muscular movements to which it gives rise.

Walking exercise and graduated labour, therefore, are important and essential elements of the sanatorium régime, inasmuch as they represent an autoinoculation with tuberculin, the doses of which depends in susceptible cases on the amount of exercise and degree of labour. But autoinoculation as a specific measure has distinct limitations. It is not possible to exercise complete control over the dosage in all cases; moreover, patients treated in this way are inoculated, after a certain phase has been reached, with gradually decreasing doses of tuberculin, and indeed in quiescent cases autoinoculation may cease altogether. The clinical history of many of these cases indicates that this fails to elicit an efficient and lasting immunizing response, and if a high level is to be maintained it becomes necessary to supplement the failing autoinoculation by the introduction of tuberculin from without. The occurrence of relapse in patients who have derived material benefit from autoinoculation may frequently be traced to the failure of the organism to protect itself against a sudden hyperinoculation induced by physical strain, exhaustion, etc. Further, it is the experience of most sanatorium physicians that, other things being equal, patients treated with Koch's tuberculin are less liable to relapse than those in whom no such specific treatment has been employed. In a word, the employment of tuberculin in suitable cases in known and gradually increasing doses produces a marked and efficient tolerance which ensures a greater freedom from relapse. It is therefore suggested that in all cases in which the clinical evidence points to the absence of hyperinoculation and the possibility of a diminishing or absent beneficial autoinoculation, gradually increasing doses of Koch's tuberculin should be administered.

PHASES OF AUTOINOCULATION IN RELATION TO TREATMENT.

The degree of autoinoculation in pulmonary tuberculosis varies within wide limits. In quiescent and almost cured cases it may be entirely absent. In benign cases it is slight, and when the dosage is proportionate to the physiological needs of the organism it is directly beneficial by increasing the agglutinins and opsonins of the blood serum. Apart from the clinical phenomena due to acute disease or a coexisting septic infection we have two distinct types of