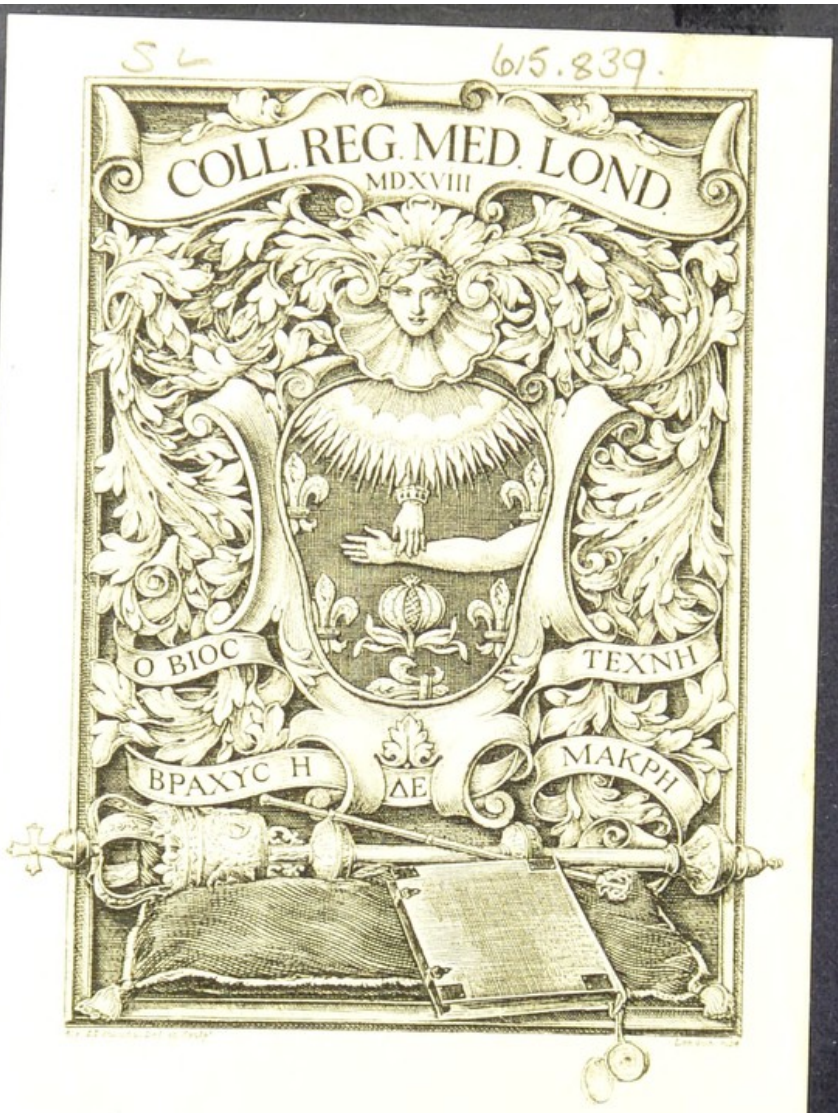
Marine climates in the treatment of tuberculosis : the opening address delivered at the Hastings Meeting of the British Balneological and Climatological Society, on March 16th, 1907.

MARINE
CLIMATES
IN
TUBERCULOSIS

BAILLIÈRE TINDALL & COX

EWART



MARINE CLIMATES.

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ITS MANAGEMENT IN CHILDHOOD AND AGE, AND AT THE CHANGE OF LIFE.

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MARINE CLIMATES

IN THE TREATMENT OF

TUBERCULOSIS.

The Opening Address delivered at the Hastings Meeting of the British Balneological and Climatological Society, on March 16th, 1907.

By WILLIAM EWART,

M.D. Cantab. & Dunelm, F.R.C.P. Lond., M.R.C.S. Eng.,

Senior Physician to St. George's Hospital, and to the Belgrave Hospital for Children.

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MARINE CLIMATES IN THE TREATMENT OF TUBERCULOSIS.

INTRODUCTION.

THE honour of the invitation to open this debate will be best acknowledged by an endeavour to be of use in clearing up the situation, if, as it almost appears from the selection of this subject, any doubts should prevail as to where we stand. To that end I may venture to dwell upon principles rather than details, and also to refer briefly to the nature and requirements of the affections to be treated. Novelty in meteorological facts or in therapeutic methods is hardly to be expected of this address, neither can it provide a complete panorama of the subject. But its freedom from any seaside bias is assured, as it has been entrusted to a critic rather than an expert, almost more familiar, after upwards of a score of winter visits to the Alps, with the climate of the altitude than with that of the coast. On that score alone his conclusions would be debatable ; and as the practical conclusions are the

only essential part, they may be at once briefly enumerated as a basis for the discussion of the Marine Climatic Treatment.

GENERAL INDICATIONS AS TO SUITABILITY.

(1) All cases of "surgical tuberculosis" and scrofula are suitable. (2) All "latent," or "threatened" cases of tuberculosis pulmonalis are suitable. (3) Early cases of "declared tuberculosis," or of "declared phthisis pulmonalis," are debatable, and the responsibility of advice is great, as climatic treatment may turn the scales. They are all fit to try the mountain cure. But, failing this, not all of them will benefit most at the seaside; and more equable climates may be indicated. (4) The suitability of cases of "advanced phthisis" can only be decided in relation to the existing prognosis and to personal toleration and preference in regard to climate. Well-sheltered marine stations are available, provided the patient's inclination favours them. But in the less hopeless, other climatic chances should not be allowed to slip, if on fair trial seaside influences should have proved unsatisfactory. (5) The excellent progress maintained at chosen spots along the coast by some cases of

"chronic quiescent phthisis," reveals the fact that there are temperaments for which seaside air is specially favourable and may be of positive advantage, even at the later stages.

THE PERSONAL FACTOR.

The meteorological conditions are a relatively easy study; but their influences upon individuals are as various as the nervous systems which react to them; and these differences are greatly intensified in disease. The sensitiveness of the rheumatic is proverbial. For the majority, the approach of rain or of snow is a discomfort and the fall a relief, but there are exceptions. Again, the exhilarating effect of dry frost is not shared by all, but there are those of intense electric susceptibility to whom frost is pain because of its dryness and who are exhilarated by the change to a damp atmosphere. But in addition to this nervous response to weather, a distinct effect is exerted locally upon the tissues themselves in health and in disease. These are some of the physiological details which complicate the apparent simplicity of our present enquiry.

The mental factor must not be forgotten. For children the sea has boundless charms and for older minds instruction. We are all as children when gazing upon our terrestrial limits with the great unknown beyond; but some invalids might resent the solemn monotony of the scene.

The effect upon the nervous system oscillates with the weather and the sky. There may be individual intolerance for the glare, or for the rhythm of the wave. These obvious instances serve to illustrate those more subtle nerve responses which are apt to influence the results of climatic treatment.

REACTION — there is a volume in that significant word which symbolises much of the purpose and mode of action of our climatic treatment. The nervous system, and particularly the vaso-motor system, appears to furnish the working mechanism of reaction, and its sphere extends widely in two directions, that of a stimulation of the general metabolism, and that of the local effects upon skin and mucous membrane, and of the reflected effects upon functions, viscera and tissues.

THALASSOTHERAPY, OR "SEA TREATMENT," BY SEA WATER AND SEA-AIR.

SEA-WATER.

THE immense ocean which forms our earth's greater surface, is still, for many purposes, a blank, its wondrous powers and its inexhaustible treasure hidden, except from the vision of the poet. It is true that it has yielded us iodide of potassium and cod liver oil, but other great remedies for our terrestrial ills may yet arise from the deep. For, although "sea treatment" by sea air and sea bathing is as old as the race, the latest branch of "thalassotherapy," the practical pharmacology of the sea, is still in its infancy.

If there is any special virtue in sea air it must have been derived from sea water. Quinton, of Arcachon, has written a large book on the constitution of the latter and of its diffused organic contents, which, together with its high saline charge, raise it to the value of a serum, and to a strength which has to

be diluted before it is isotonic with our own. In that dilution it has been extensively used, after simple filtration, in moderate-sized subcutaneous injections, of which he describes the remarkable results.

THE VARIOUS USES OF SEA WATER.

As to its other uses, the ancient recipe of sea water as an *internal medicine* has never been much patronised. The chief mode of employment is external. *Sea bathing* is not appropriate for consumptives; but the modified sea bath or *sea-water rubbing* belongs to the daily routine of a marine treatment. It is singular that whilst inland mineral springs impregnated with the buried residue of former oceans are used for inhalation with considerable success, nothing is attempted at marine stations by way of pulverising the living briny serum for throat-sprays or *vapourised inhalations*. The method may prove inapplicable in phthisis, but it might be tried in other affections.

SEA AIR.

The breathing of sea air at the coast is apt to get the credit for results not entirely its own. If we bring it to rest, dry it and warm it, is there any specific virtue left in it distinctive of the sea? This question cannot be answered off-hand. *Ocean air* is free from microbes and from the coarse particles of which dust is made up; and this purity is reinforced, as it were, by ozone and possibly radio-activity. Are there not, however, some finer and more characteristic constituents analogous to those emanations from soil and vegetation which occupied so large a place in the old etiology of endemics, and still claim consideration in connection with asthma? Asthmatics are acutely conscious of a "closure of the chest" by given atmospheres, and sometimes by that of the sea. We, too, are familiar with the delightful sense of a freer and deeper breath on approaching the coast. Both forms of respiratory reaction suggest an atmospheric cause. And as to their mechanism, this might be a mere intensification of those normal activities with which Watson Williams credits

the bronchial muscles in healthy respiration. We *do* know that organic matter is contained in the spray swept up from the wave, and that for every falling crystal which contributes to the saline incrustation of the vegetation and of every exposed surface on shore, there remains in suspension until oxidised away a minute quantity of organic matter made up of the lower forms of animal life and of the nutrient basis diffused through the ocean, which must be so fine as to resemble an exhalation, although not comparable to the full-flavoured effluvia arising from the beach. But the main question for discussion is whether sea air is in itself, and apart from added influences, a respiratory stimulant.

The other atmospheric peculiarities are physical rather than chemical and biological. They possess nothing specific, though there is something characteristic in their grouping. Ocean air is always more or less *moist*. But relatively dry air may be blown across narrow seas, as exemplified in our own east winds, so discomforting to the soft hydrated nerve-endings of a fog-bred race.

THE MARINE CLIMATES OF THE OCEAN AND OF THE COAST.

We must not imagine that the curative values of climates are to be judged according to a mere scale of comfort. The open-air hardships of prehistoric cave-dwellers may have surpassed in real value some of our climatic refinements. Our ideals must vary with the objects of treatment; and these furnish us with two great climatic types : *the protective* and *the active or stimulating.*

There are distant southern shores which offer us close approximations to perfect protection, varied with each turn of the French and Italian Riviera, and of the African coast; Mediterranean and Atlantic Islands, Corsica, Capri and Sicily, Madeira, Teneriffe and the Canaries; besides, too, the more remote West Indian and Californian resorts. In their number are to be found instances of the more bracing type, though sometimes marred by a liability to treacherous winds from mountain or valley. But in general they are unsuitable in summer; and this explains the absence of any systematic national sanatorial enterprise in the Riviera.

Our climates, though not so exquisite as those of cærulean type, are no less varied, and they are available in summer as well as in winter. Moreover, we owe to our favoured geographical position a graduated series of bracing stations. In short, we are practically independent as regards the supply of marine climates, and this is some compensation for our complete lack of any available altitude.

THE OCEAN CLIMATE.

An open-air life on a small mid-ocean island in any temperate zone would give us the unadulterated advantages of this climate, which may also be obtained in a modified form and with some drawbacks on any "liner" or in a "floating sanatorium." Sea air from every point of the compass, sea air always, and sea air only, laden with salt and with gluey sea-stuff, always moist and never freezing, with steady breezes and long dead calms, or passing storms, not varying immoderately in temperature from day to night, or even from season to season, clouded at times, but more often glittering with a thousand mirrored suns, radiant, temperate, equable and moist. This is the marine climate in the fulness of the term. Its characteristic is "equability."

THE CLIMATE OF THE COAST.

How different the climate which is apt to prevail at the coast, with its ever-renewed atmospheric conflicts and its regular daily balancing of the temperature account by breezes from the land and breezes from the sea. Thanks to the latter, sea air is never long absent from shore. But strong winds and long winds may blow from the land, and we then realise that this is not a "climate" but a "mixture" of two climates, a *tertium quid, varium et mutabile semper.* In our latitude it may get frost from the land, but seldom from the sea, which keeps the atmosphere warmer and moister than that inland; it is relatively temperate, equable and moist, but not in any of these respects equal to the ocean climate, and in none of them constant. Ever astir, the searching damp air keeps things moving, and when it comes from the sea it is "strong"; often it is only land air possessed of very different qualities; but whether from the sea or from the other quarter, it is apt to rush into fitful disturbing winds—truly a climate of vicissitudes, a school for ever-ready reaction. Its name is "variability."

LOCAL VARIETIES OF SEASIDE CLIMATE, AND THEIR CAUSES.

In reality each station has a climate of its own, which partakes more or less of the marine type according to the extent of its shelter from inland influences and of its direct exposure to the sea. In this way the sea element of the climate may happen to be considerably mitigated. There are, indeed, those less frankly marine climates in which, far from being eliminated, the land features of configuration, vegetation and soil are, perhaps, the more essential parts. The variability common to all local climates becomes a drawback or a boon according to the therapeutic requirements. In short, sea-coast climates can seldom boast of being ideal, but they have a wider range of selection and of adaptability to individual cases if only these opportunities were to be utilised.

TUBERCULOSIS.

GENERAL REMARKS ON THE ETIOLOGY OF PULMONARY TUBERCULOSIS IN CONNECTION WITH CATARRH AND THE INFLUENCE OF WIND.

THIS is the topic of the day; but it is really only a new phase of the old question as to the bracing or relaxing quality of winds. The chilling influence which they all exercise varies with their strength and temperature. But their varying moisture also governs the rates at which heat and electricity are conducted away from the surface, and it accounts for the diverging effects of the south-westerly and of the north-easterly winds, which, of all others, provide us with the most instructive contrast. Dr. William Gordon's laborious investigations have led him to the conclusion that whatever the effect may be upon the clinical course of the affection, a south-westerly exposure distinctly favours a higher prevalence of pulmonary

tuberculosis. The demonstrable fact that moisture is one of the conditions of existence and of activity of the bacillus tends to support the results of his statistics. An experimental study of the behaviour of the mucous membrane would be a much more difficult matter. But, clinically, there is no doubt that any sudden transition from cold and dry to mild and muggy weather heralds the onset or the recrudescence of catarrhs. A similar conclusion was pointed out in my article on "Bronchitis," in Clifford Allbutt's "System of Medicine," on the basis of the Registrar-General's statistics, which showed a lower rate of mortality from bronchial affections in the eastern than in the south-western counties. If these conjunctions are not to be regarded as fortuitous they should be capable of some rational explanation in the future. The facts before us read thus: That whilst moisture of air definitely favours bacterial life, it also appears to foster a liability to catarrh, and to lessen the resistance of the organism to the causal factors of the atter. It would thus seem as though wet winds might be conducive not only, as urged by Gordon, to an increased

frequency of consumption, but also to an aggravation of its catarrhal tendencies, a point of primary importance for our present enquiry in these Islands, swept on the one side by the moist Atlantic gales, and on the other by the winds which have yielded their moisture to the intense refrigeration of the polar ice-fields and of the Siberian steppes. Great Britain has lost its evil name as the home of phthisis mainly thanks to the drainage of its damp soil. But a complete statement calls for brief remarks upon some of the other factors of catarrh.

THE ETIOLOGY OF CATARRH, AND THE THEORY OF MICROBIC INFECTION.

The natural history of catarrhs would be a simpler one to trace if we possessed evidence that their causation was exclusively microbic. But whilst recognising the probability of an active infective factor, particularly in the more acute febrile colds, which has recently been ably urged by Dr. Prosser White, we must still assume that the physical stress of violent oscillations of pressure, of temperature, of moisture, and of electricity, plays no mean part in their etiology. The wonder is that in the integrity of the physiological state we should rise superior to the strain. Between the fulness of health on the one hand and its pathological disablement on the other, there is no common measure. The mysterious gulf between them cannot be explained, but it is graphically represented by the expression "collapse of the mechanisms of adaptation," which implies some nervous failure.

A stoker will think nothing of facing, immediately after the fierce heat of the furnace, the coldest wind on deck; but when prostrated by catarrh a slight draught may chill him to the bone, and the radiation from an ordinary fire may lead to a profuse coryza. Undue sensitiveness of the surface is with some an innate delicacy; or it may be acquired from injudicious coddling. Little or much of it is invariably induced by the depressing influences of phthisis. Where it exists this individual predisposition to catarrh adds serious responsibility to our climatic selection, as even in those free from tubercle it impedes recovery and favours relapse. Such subjects, too, are specially difficult to train up to a toleration for damp or cold air. The contingent which they contribute to the ranks of phthisis is accountable for a large proportion of failures or long-delayed recoveries in the "open air" of this country or of the Alps. They need an ideal climate of their own—in brief, *the most perfect climate, with a personal correction.* Short of this they are apt to run through the triple series (*a*) of common and influenzal catarrhs, (*b*) of bacillary bronchial

catarrhs, and (*c*) of irritative *vomical catarrh* with suppuration, generally incurable and disastrous unless the atmospheric asperities be tempered to the irritable membrane.

The intense sensitiveness of the cutaneous surface of many consumptives to the slightest impressions conducted by damp air, and the excessive response of the mucous mechanisms, are but too genuine ; but there is also *the chill "on the mind"* which intensifies the evil. These are poor subjects for our average marine climates in winter ; but the initial catarrh, if slight and quite early, may benefit in some warm, bracing shelter.

In the absence of tubercle, catarrh often finds its natural remedy at the sea ; and I believe that the degree of suitability of the particular local climate is reflected in the varying time required. Careful selection will be specially needed in cases where the catarrh is inveterate and its perpetuation fraught with organic consequences, as in bronchiectasis.

HUMAN AND BOVINE TUBERCULOSIS.

THE QUESTION AS TO THE DERIVATION OF THE VARIOUS FORMS OF INFECTION.

This is not the place for any pathological discussion, but we may refer to Dr. Nathan Raw's recently published views, as they suggest an entirely novel basis for our classification. He believes that the human subject is liable to be attacked by two types of bacilli, the *human* and the *bovine*; and that these two types of infection are not only strictly distinct, but in a sense mutually antagonistic, so that one infection may be successfully combated by the tuberculin from the other variety. The bacilli of bovine type are supposed to be conveyed by milk through the intestine, and those of human type to the lung by the aerial route. The human type of infection would thus be almost exclusively responsible

for our pulmonary tuberculosis, whilst practically all other forms of tuberculosis would be due to infection of the bovine type.

Whatever eventually may prove to be the fate of this theory, it emphasises a previously manifest distinction. From our own special standpoint pulmonary tuberculosis differs much from all other forms in its behaviour under the influence of climate. It is, indeed, mainly in connection with the pulmonary cases that the value of the marine climate becomes a difficult question. They constitute a separate category; whilst for our present purpose all other forms may be grouped together.

TUBERCULOSIS OTHER THAN PULMONARY.

This makes up a large and varied collection, which includes the "surgical" tuberculosis of skin, of bones, of joints, and of glands; genito-urinary tuberculosis; abdominal tuberculosis; and the tuberculosis of serous membranes. Happily it may be said of nearly all these that they stand the marine climate well and tend to benefit from it. The other group cannot be so briefly dismissed.

PULMONARY TUBERCULOSIS AND ITS VARIETIES.

THE PARAMOUNT INFLUENCE OF PREDISPOSITION.

The anatomical and the clinical varieties of lung disease really defy classification, as they are the outcome of endlessly various individual proclivities as regards tissue-reaction and function. For our practical therapeutics we shall look only to the broadest features as our guides, but we cannot ignore pre-

disposition in its three aspects of constitutional *liability to infection*, of localised individual *vulnerability of organs*, and of *functional inadequacies* or instabilities. The individual evolution of tuberculosis pulmonalis is largely determined by the inherent weakness of the lung with tendency to catarrh, combined in the worst cases with a feeble heart. In the large group of lymphatic tuberculosis the defect is not in the lungs; the liability resides in specially vulnerable serous membranes, or in intensely irritable glands. And similar lines of predisposition run through the other varieties.

Fortunately in many cases of accidental infection the subjects are free from any strong predisposition, and the tendency of the early lesions to a spontaneous cure is evidenced by the frequency with which their vestiges are recognised in the lungs of those who have met with a sudden or violent death in the midst of perfect health, the proportion being 20 per cent. according to the statistics of the Morgue, quoted in W. Huggard's excellent "Handbook of Climatic Treatment."

THE TWO TYPES OF PULMONARY CONSUMPTION—PULMONARY TUBERCULOSIS AND PHTHISIS.

It would be straining the common uses of language to describe as "consumptives" the healthy bearers of "latent" tubercles, which may never give occasion either for suspicion or treatment. "Tuberculosis," on the other hand, is an inadequate statement of the multiple miseries which make up the pathological and clinical record of the dying consumptive. As a fact, his tubercle was complicated by catarrh, by pneumonia, by necrosis, and by sepsis, and in our ministrations none of these could we afford to ignore. There may be, then, something to be said for the old-fashioned distinction between phthisis and tuberculosis, only we are now aware that tubercle is the primary event, and we have to reverse Niemeyer's famous dictum, and to say, "The worst that can befall the patient infected with tubercle is that he should develop phthisis." The onset of phthisis is the disaster which all our efforts are bent upon warding off, and one of our chief weapons is climate.

PRACTICAL CLINICAL CLASSIFICATION OF CASES OF PULMONARY TUBERCULOSIS.

The necessity for an adequate definition of cases and stages for purposes of consultation and of treatment is my excuse for the much abbreviated and incomplete classification, reduced to the ultimate factors of our clinical requirement, which I now submit.

THE VARIETIES OF PULMONARY TUBERCULOSIS.

MAINLY TUBERCLE: (Dry, Grey.)	I.	Early, "Local;" Latent, and often Healing.
	III.	Late and Declared; "Spreading."
	IV.	Terminal, "General" (Acute or Subacute Infective Tuberculosis).
TUBERCLE WITH CATARRHAL PNEUMONIA	IIA.	Acute Caseous Phthisis (mainly Pneumonic).
	IIB.	Common Subacute Phthisis (mainly Catarrhal).
	IIC.	Chronic Excavating Phthisis, with Persistent Catarrh.
	IID.	The same without Catarrh.

THE PROGNOSIS OF THE SEVERAL TYPES.

(1) The first heading identifies the latent stage common to all cases of invasion by the ubiquitous bacillus. This may go no farther. But if it should degenerate into phthisis, the affection will tend to develop along one of the two directions indicated under II. and III., viz., either into Chronic Tuberculising Phthisis (III.), or into the more rapid Acute Caseous Disease (II.). The event will be determined largely by predisposition and by the virulence of the infection.

But if any influence can be claimed for treatment this will tell in the measure it may be capable of controlling the catarrhal factor. Unfortunately, this is a forlorn hope in the group IIA., the worst type of consumption, and too often also in group IIB., and invariably in group III., chiefly composed of adults once fairly resistant in their youth, but broken down by privations, disease, or alcohol.

As regards prognosis, I. is the only promising group. As to the common forms of consumption, IIB. and IIC., the out-

look is precarious. True recovery is hardly to be expected except in unilateral cases ; but of all of them it may be said that prolongation of life can only be secured with the help of the most favourable conditions.

THE CLIMATIC TREATMENT.

GENERAL REMARKS

In estimating the results obtained at the seaside and elsewhere, the precision of the mathematical method is illusive. It is wasted upon a clinical material ill suited for statistics owing to its feature of latency at the beginning, of prolonged uncertainty as to the type and severity of disease, and of precariousness at the late stages. Greater reliance can be placed upon experienced clinical observations, and upon some of those great simple facts which, like the face of the sun, are rarely looked at.

The first group, that of threatened, or of the earliest demonstrable tuberculosis, furnishes the best results of marine treatment.

The second, that of pulmonary *tuberculosis in progress,* is difficult, anxious, and uncertain. The pyrexia may stop ; who knows that this was not automatic, given the individual and his lesions? Or it may last interminably, and who will say that the given lung and the given strain of bacillus could have behaved any better inland, or on the heights ? The truth may be revealed to the acute perceptions of the clinician, but there can be no strict proof. Inference, however, does suggest that any conditions which are demonstrably favourable in the stage of confirmed phthisis are likely to be those best suited to its stage of progress. This brings us to the consideration of the advanced cases.

THE CASES OF LONG SURVIVAL AFTER DESTRUCTIVE PULMONARY LESIONS.

This third group provides us with much more definite tests for climates. Any climate which could effectively protect life and preserve the survivors for indefinite periods, would become a sort of clinical museum of these rare specimens. Is

that clinical display one of the features of our seaside resorts? If not, is this due to the cures effected being so substantial as to render unnecessary a permanent residence at the sea? At Davos, the acknowledged prolongation of life in phthisis is attested by a unique and ever-growing popularity. It is traceable to two circumstances, the utmost protection against secondary infections, and the absence or brief duration of any ordinary catarrhs owing to the purity and the glacial dryness of the air in winter, and to its stillness. Healing lungs are safe so long as bright weather or dry frosts prevail. At the same time it is remarkable how well the change of season is borne even by much excavated lungs, provided they are not exposed to influenzal infection.

THE INFLUENCE OF A CATARRHAL TENDENCY AND ITS INDICATIONS.

A favourable predisposition doubtless helps to explain the immunity of those well-seasoned survivors. But there are less fortunate subjects whom an excessive liability to catarrh unfits

for the benefits of the Alpine winter. The cold is too intense an irritant for their sensitive mucous membrane. These are precisely the subjects whose catarrh does not heal at the coast, and whose only chance of a temporary lull in its encroachments lies in the protection afforded by warmer winter stations. These patients appear to form a smaller minority at Davos than at our marine resorts.

These facts point a lesson in the management of those less advanced cases whose tendencies are not fully declared. It is of supreme importance that they should be allowed, if possible, the highest rather than any lower degree of safeguard against the risks of catarrh ; and for them the altitude *cæteris paribus* seems to offer the best chance and the quickest method of recovery. However, as the masses, who are chiefly concerned, cannot avail themselves of the altitude, our attention must be confined to our own valuable marine climates.

THE AEROTHERAPEUTIC FACTORS OF SEA AIR IN PULMONARY TUBERCULOSIS AND CATARRH.

In our treatment of tuberculosis it is not the open air that kills the bacillus, safely sheltered in the depth of air-tight tissues. The "airing" is for the man, not for his microbe. But sea air can reach the respiratory surface and influence its condition, and it is credited with the following activities :—

(1) *The Tonic action* is both local and general. It strengthens the membrane by direct contact, and every tissue and function by raising the cardio-vascular tone.

(2) *The Cutaneous action* is exercised upon the epithelial, the glandular, the vascular, the muscular and the nervous elements of the skin, and in virtue of the close nervous and vaso-motor sympathy of the skin with the respiratory mucous membrane, it is capable of strong reflex effects upon the latter.

(3) *The Respiratory or Inhalation action* is dependent upon any undescribed volatile properties of the atmosphere, but mainly upon its salt, its moisture and its temperature.

At Mont Dore ordinary catarrhs are cured by inhalations

of steam mixed with pulverised saline water. Any stray cases of "latent" tubercle, if improved thereby, must be regarded as having benefited in spite, rather than because, of that combination; for heat and moisture must favour the growth of bacilli and their dissemination in the tubes by hydrating the mucus.[1]

From these risks the inhalation of sea air is free. It is true that the air is never dry nor glacial, but it is sufficiently cool in winter, and the salt may act as a corrective for the moisture. The "salting" of the mucous membrane is effected partly by suspended crystalline particles, and partly by concentrated droplets in which the saline solution approaches to saturation, and is therefore dehydrating. This high degree of concentration is a dehydrating factor to set against the

[1] Since these lines were printed Dr. G. Schlemmer, of Mont Dore, has informed me that the impression they convey is not borne out by his long experience. Largely owing to the altitude, suitable early cases of pulmonary tuberculosis derive great benefit; the catarrhal foci making way for re-expansion, after an initial increase in the expectoration and in the local moist sounds under the inhalation treatment.

effect of damp air. As a paradox I might speak of this as "dehydration in the wet way." We are familiar with the effect of "brine" upon animal tissues; the healing effect of sea air upon common catarrh and upon bronchial delicacy probably belongs to the same kind of action. This dredging with dry salt and this spraying with brine are of an infinitesimal order, but they are continuous, whereas the much more powerful artificial treatment in the inhalation room is of brief duration.

SEA FOGS AND THEIR INFLUENCE.

Some interest and attention may be claimed for this subject in the debate. The common sea fog is analogous to the Mont Dore inhalation, with the difference that the vapour is a cold one; it cannot be regarded as an essential, nor perhaps as a desirable, phase of the sea air treatment of pulmonary tuberculosis. It may, however, be of less serious detriment than is commonly thought. I have known recovery take place from extensive caseation and catarrh in spite of continued exposure to its prevalence.

THE MARINE EXHALATIONS FROM THE SEA AND FROM THE SHORE, AND THE INFLUENCE OF VICINITY TO THE BEACH.

Among the *exhalations* a distinction may be made between those of the sea itself and those from the shore, where animal and vegetable matter is always undergoing decomposition. It is here that iodine is likely to be liberated, together with other odoriferous and perhaps stimulating effluvia, in addition to any other volatile organic contents in the pure air blown from the sea. A practical question arises in connection with these sea-shore exhalations. An opinion is said to have been expressed by Walshe, and has been endorsed by Dr. A. Ransome,[1] to the effect that the actual seashore is bad for phthisis. Dr. Wm. Gordon informs me that "he has known of cases of obstinate hæmoptysis in *sea-front* lodgings close to the water lose their hæmoptysis when sent a short distance (about ¼ mile or less) further from the sea." This is a serious indictment against the reputation of the beach well deserving of elucidation.

[1] "Treatment of Phthisis," p. 133.

THE METEOROLOGICAL FACTORS IN THE AEROTHERAPEUTICS AT THE SEA-SIDE COMPARED WITH THOSE AT THE ALTITUDE.

The winter climate of Davos is famed for its stillness, clearness, powerful sunshine, and pure, cold, dry, rarefied air, which affords little conduction for heat or electricity and is highly ozonised and, according to Jessen's recent estimations, also highly radioactive. With the exception of our sunshine, which is tempered by a thicker atmosphere, and of our ozone and marine breezes, it might be said that the contrast presented by our seaside climate was almost absolute. At the coast atmospheric pressure is at its maximum, as well as the density of air, its moisture, and its conductivity for heat and electricity. We might have expected even greater divergences than are observed in the results. As a fact, the chief difference in the latter is one of degree. Nature, ever adaptive, has supplied some elements of compensation which tend to restore the balance.

At the sea, general metabolism is stimulated by cutaneous

stimuli through loss of heat and of electricity instead of through their conservation, and catarrhs are benefited by sea air because of its salt and in spite of its moisture. A stimulation of the respiration forms part of this all-round stimulation, and is more specially connected with the increased muscular activity called forth by loss of heat. But there is nothing analogous to the considerable gain in thoracic diameter induced by the automatically increased respiratory labour in rarefied air.

THE LUNG REST-CURE.

The alpine "liege-kur" whilst resting the lung and the heart from all strain of bodily exertion and of cough, involves in reality a good deal of unconscious respiratory exercise. This perpetual cardio-respiratory work and blood aëration without any general muscular wear and tear, are the exclusive speciality of rarefied air. At the seaside increase in respiratory function grows in the service of muscular work, and in response to the more chilling cutaneous stimuli. Bodily

exercise being directly called for, the conditions for the pulmonary rest-cure are less favourable, and the complications of biliousness and hepatic congestion, which are quite exceptional at the altitude as a result from immobilisation, are much more likely to occur.

GUIDING PRINCIPLES AS TO THE SUITABILITY AND SELECTION OF MARINE CLIMATES.

The safety, comfort, and cheerfulness of our best protected seaside resorts might spare many enfeebled sufferers the fatigue of distant travel, which others so keenly desire. The task of selection is, however, much more responsible for purposes of cure than for mere *Euthanasia.*

There are two criteria of a patient's personal fitness for a moderately bracing seaside climate: A good power of "reaction," which is primarily a nervous and vaso-motor question; and a good cardio-pulmonary adequacy, which is primarily a question of the extent of lung surface available

and of the amount of use which may be allowed to it and to the heart in the particular case. The heart, it goes without saying, must be able to back the effort at pulmonary repair. Any doubt as to this double endowment must point to the need for a protecting rather than a stimulating station.

The importance of the cardio-pulmonary factor in treatment is well displayed in the cases of "surgical tuberculosis." The integrity of the respiratory function is the most essential weapon which enables them to wear out the infection. But where the lung itself is the seat of the disease its safety becomes the first consideration, and this implies the sacrifice of the stronger climatic treatment and a systematic limitation of the respiratory risks. When, however, the lung lesion is strictly limited and without associated catarrhal tendency, as in the "latent" cases, it may be possible with the help of the same test to conciliate these opposing ends. The less relaxing stations may prove the best for them, as moderate exercise may be allowed; and the same may apply to some cases of healed or arrested phthisis.

PRACTICAL INFERENCES.

Some definite statements may now be put forward in connection with the selection of cases :—

(1) In regard to *Tuberculosis other than pulmonary* the present tendency of the marine treatment is quite sound, but its advantages are still imperfectly utilised.

(2) *Pulmonary tuberculosis* is the difficulty. Sea air alone will not cure bad cases that inland air cannot cure. But sea air is specially fitted to cure the liability to tuberculosis. Its powers in prevention have hardly been fully turned to account.

(3) In connection with the modern ideas of treatment in pulmonary phthisis the seaside has been at a disadvantage in two directions : (*a*) It possesses *no germicidal* virtues comparable to those aimed at by bacteriological methods. (*b*) *The rest cure*, which is the unchallenged doctrine of the day, is not its special strong point; on the contrary, the soul of marine climatic treatment is muscular exercise.

(4) Both these objections are believed to be temporary,

and when they have lapsed a great future will be opened up to the sea-coast for the efficient treatment of phthisis.

(5) Meanwhile our policy must be opportunist; and as we have not any altitudes to choose from, we should make the most of our sea-side advantages—by selection, by protection, and by local improvement. Climatic sea-side treatment is of great value, not only in large categories of surgical tuberculosis and of scrofula, but also in the ill-defined but important group of *"latent" or early "local" tuberculosis* of the lung, in which the necessity for the lung rest cure cannot be so strongly urged. Those subjects who are merely threatened, being still in possession of their pulmonary adequacy, may be sent to the more bracing stations, such as those suited for the scrofulous and for surgical tuberculosis. But where the presence of a bacillary lesion can be made out the choice must be adapted to the condition, with every safeguard against catarrh or over exertion.

(6) *In declared early phthisis* the same applies yet more stringently. But here climate, even of the best, does not

suffice. Treatment is required which shall be planned on the Hospital idea combined with the Sanatorium idea. For the present, until the bacillus is no longer invincible, and until the rest cure ceases to be a moral obligation, much might be gained by improved methods of protection against undue asperities of climate, so that, for instance, bracing air might be available without the complicating evil of wind.

(7) *Lastly, advanced phthisis* is an unprofitable field. As there is little promise in treatment, the highest degree of climatic protection is the main indication; and that is also the requirement for the select few who survive the long ordeal of phthisis. For them, and for those still fighting a hard but not yet hopeless struggle, our marine climates are imperfectly adapted and may not ever be capable of competing with the altitude.

GENERAL CONCLUSIONS AS TO THE "PRESENT POSITION."

The present stage is to be viewed as one of evolution. Our great resources are still undeveloped because some great facts

which are before us have not yet been pressed upon us with compelling force. Nature has supplied decimating diseases for purposes of her own; and although she may offer some simple remedies, still these are not adequate for the cure of the most virulent of our infections—small-pox, anthrax, sleeping sickness and others. Tuberculosis is a much less formidable affair; and most often it is curable spontaneously, or with the additional help of "airing" and "salting." In the lung a vicious circle of complications is superadded by the complexity of structure and of function. A cure is beyond the competence of mere hygiene and climate, and needs to be engineered by the joint efforts of general and anti-bacterial therapeutics. In the recent past these had been discredited in favour of "open air" pure and simple, but there are signs of an approaching period when the Hospital treatment will be regarded as the essential and the Sanatorium as the adjuvant, unless the more perfect scheme can be realised of combining with "climate" the joint advantages of Hospital and of Sanatorium treatment after the example set by Davos.

THE SEA-SIDE FOR PREVENTION AND FOR CURE.

The other fact is that our only hope of stamping out tuberculosis lies in prevention. The only practical policy is that of not only checking the dissemination of the infection, but of stopping its reproduction by rendering the entire growing generation as tubercle-proof as possible. Short of an efficient vaccine the best means would be to utilise our marine climates on a larger scale, for the benefit of all children not sufficiently protected by their native robustness or by their surroundings. The outlay would be great even with modern facilities for supplying the simple accommodation required, but it would be a permanently profitable outlay for the purposes of health instead of serving a temporary purpose, as in the case of the small-pox hospitals and similar makeshifts.

A greatly extended use of our sea-side climates is also indicated for young adults threatened with tuberculosis, and for a considerable section of the large group of surgical and glandular tuberculosis. For all these catagories, in which the *prevention* of pulmonary tuberculosis is to be aimed at rather

than its cure, our best marine climates are suitable just as they are.

For the purposes of *cure* they are suitable for another large group—that of the non-catarrhal localised pulmonary affections in their earliest stages. But it is clear that neither for these nor less still for any cases of declared catarrhal phthisis can even the best of marine climates be an ideal one, since being variable it is often not at its best. Special provisions require to be made, particularly in the direction of shelter from wind, to secure the greatest possible good with the least disadvantage, and a great deal more could yet be achieved.

THE PREVENTION-SANATORIUM, OR PREVENTORIUM.

These, then, are the main propositions submitted for full criticism. We possess in proportion to our population an unparalleled wealth and variety of marine climatic stations. Their powers for prevention are vastly in advance of their powers for cure. Prevention is *par excellence* the use to which they should be put, and this is also the steadily growing tendency of the Sanatorium movement in this country. The

place for the "Prevention-Sanatorium" or "Preventorium" is the sea-coast. The inmates should be recruited from among the most threatened ages and the most precarious surroundings.

For the management of the disease when declared we must jealously preserve our alternative of specially sheltered inland climates. But if our prosperous marine stations are to justify their reputation and to rise to full efficiency, the fact must be recognised that climate is after all secondary, and that the essential is *active treatment*—treatment along the great lines of bacteriological progress, and treatment with the elaboration of every clinical detail.

There is another tempting theme upon which we might have dwelt, but time forbids—that of the improvement of local climatic advantages by the skill of modern engineering. Let each of our best resorts study and improve its own local opportunities. Some of them rejoice in sandy soil where the pine might thrive, others in a mild and sunny hinterland, and some again in the proud possession of cliffs which offer both shelter and bracing altitude. Among them the city of our welcome is not the least favoured. *Floreat!*