LETTSONIAN LECTURES

ON

THE INFLUENCE OF CLIMATE IN THE
TREATMENT OF PULMONARY
CONSUMPTION.*Delivered before the Medical Society of London.*By C. THEODORE WILLIAMS, M.A., M.D.Oxon., F.R.C.P.,
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LECTURE III.

IN the last lecture, we discussed at considerable length the climatic results of the British Channel sanatoria on consumptive patients; and I should greatly like to treat the chief foreign health-stations in the same manner, but this is impossible, as it would necessitate not one but many lectures, and as we have only one at our disposal it will, I think, be more interesting to the Society if we take a practical survey of the foreign climates most in vogue, and examine briefly their respective merits. The limited time will forbid my entering into detailed particulars, and I must crave pardon if I seem too dogmatic; but I am prepared to substantiate every statement from a broad basis of facts. There are many climates of which I have no results, and it will be more in accordance with the plan laid down if I do not at present dwell on these, but rather discuss those of which I have results.

one consumptive patients spent one or more winters at one of these sanatoria; 190 were males and 61 females. Family predisposition was present in 52 per cent., and hereditary predisposition in 28 per cent. Eleven were cases of scrofulous phthisis, 55 originated in pneumonia and pleuropneumonia, 41 originated in bronchitis, 2 originated in syphilis, and 6 were instances of hæmorrhagic phthisis. Hæmoptysis was present in 62½ per cent. As regards the state of the lungs, 61 per cent. were in the first stage; 21½ per cent. were in the second; 17½ per cent. in the third. Sixty-seven per cent. had one lung attacked, and in 33 per cent. both were involved.

These facts will give us a rough outline of the cases on which the results of foreign climates are based. The table is arranged, not as in my last lecture under two headings, local and general, but a careful examination was made of these conclusions, and a balance struck as accurately as possible in the form of a single report. I confess this is not so satisfactory a procedure as the separate classes, but it is more intelligible, and will bring me sooner to the end of my story. Now let us examine the individual groups.

Calm Inland Climates with a certain amount of moisture have an excellent example in Pau, a health-resort with some remarkable meteorological features. It stands on elevated ground facing south, towards the magnificent range of the Pyrenees, with the uplands of Les Landes of Pont-Long in the rear. The town is situated on gravelly soil, well drained; it has a lower mean winter temperature than Torquay or Penzance, a considerable rainfall, and a large number of rainy days. The chief characteristic of the climate is stillness; the leaves often do not move for long periods together, while the rain, and there is plenty of it, falls perpendicularly. Of old times, it was stated to be specially suited for erethic phthisis, whatever that may mean; but, as most of the so-called cases of erethic phthisis are acute forms of the disease,

TABLE I.—Showing Influence of Foreign Climates in Consumption in 251 Cases.

		RESULT.							PERCENTAGES.		
		Winters.	Patients.	Much Improved.	Improved.	Stationary.	Worse.	Average No. of Winters per Patient.	Much Improved & Improved.	Stationary.	Worse.
Calm Inland Temperate Climates (Moist)	Arcachon	1	1		1						
	{ Pau	74	43	5	16	2	20	1.70	50.00	4.55	45.45
	{ Bagnères de Bigorre	2	1	1							
	{ Rome	22	18	4	6	2	6	1.23	53.56	11.11	33.33
	{ Hyères	35	23	4	9	6	4				
Dry Climates of the Mediterranean Basin (Marine).	{ Cannes	39	19	6	6	3	4				
	{ Nice and Cimiez	20	18	6	8	3	5				
	{ Mentone	24	12	2	3	2	1	1.64	58.23	20.73	20.73
	{ San Remo	8	3		2	2	1				
	{ Riviera generally	9	7	1	3	1	2				
	{ Malaga	10	8	2	4	2		1.56	58.00	21.00	21.00
	{ Ajaccio	1	1		1	1					
	{ Palermo	1	1			1	1	1.51			
	{ Malta	2	2	1							
	{ Corfu	1	1		1						
Very Dry Climates.	{ Cyprus	2	1				1				
	{ Algiers	4	4		2		2				
	{ South of Europe generally, including winters spent partly at one and partly at another of the above stations, or else in travelling in Italy, Spain, etc. . .	73	52	16	21	5	10				
	{ Egypt and Syria	26	20	6	7	5	2	1.30	65.60	25.00	10.00
	{ Cape and Natal	13	9	1	3	2	3	1.34	58.62	24.13	17.24
	{ Tangiers	11	3	2	1						
	{ Madeira	102	63	14	20	9	20	1.61	53.81	14.28	31.91
	{ Canaries (Teneriffe)	1	1				1	1.71			
	{ St. Helena	1	1		1						
	{ West Indies	16	5	1		1	3				
Moist and Warm Atlantic Climates (Marine).	{ India (generally)	30	10	7	2		1	3.00			
	{ New Zealand	19	4		3	1					
	{ South America (Andes)	1	1	1							
	{ Sea-voyages to Australia, America, India, China, Cape, and West Indies	45	18	7	9	1	1	2.50	89.00	5.50	5.50
		593	350	87	126	49	83				

To classify all foreign sanatoria is a very difficult task; and beyond an outline sufficient to give some of the leading features of the meteorology, such as dry and moist climates and a few others, I shall not attempt to elaborate.

In the accompanying table, I have placed a list, taken from my paper in the fifty-fifth volume of the *Medico-Chirurgical Transactions*, which will serve as a text for my sermon, and supply us with facts enabling us to judge of the various sanatoria. Two hundred and fifty-

such are generally unfit to send away from home, and this must, indeed, be a wonderful climate if it will arrest cases of acute phthisis.

Whatever may be its climatic peculiarities, the results on forty-four patients during seventy-six winters are seen under the headings of *improved*, *stationary*, and *worse*. Fifty per cent. improved; 5 per cent. remained stationary; and 45.45 per cent. became worse. Now these are simple figures, but their publication in France, where my paper on foreign climates was circulated in a translation by Dr. Nicolas

Duranty of Marseilles, has caused a great deal of excitement, especially at Pau, and has brought some abuse on my head. But I will not trouble the Society with the details of this outcry, my opponents being, for the most part, interested persons, and unable to bring any new facts to bear on the subject. I am inclined to say with the old Roman, *Fiat justitia, ruat cælum*.

Another inland climate which had formerly a great repute is Rome, though for many years its unfitness as a shelter for invalids has been recognised, and it is now mainly resorted to for pleasure and not for health; it is exposed to all winds, has a mean winter temperature of 48.9 degs. Fahr., a large rainfall, and is situated in the midst of a malarious plain, the evil effects of which show themselves most in summer, but to a certain extent in winter and spring, as is too often experienced by enthusiastic but unwary sight-seers, who linger after sunset among the tombs of the Appian Way, and suffer accordingly.

When, however, the grand system of drainage of the Campagna, as inaugurated by Garibaldi, has been effected, some amelioration may be looked for; but, considering the size of the plain and how small a portion of it is inhabited, few here present can expect to see the day when Roman malaria will be a dream of the past. And there are other perils for the invalid in the form of cold and draughty palaces to be explored, icy museums and picture galleries, sunless and well-like streets, all combining to render Rome a dangerous place of residence, except for those in robust health. Eighteen patients passed twenty-two winters there and yielded the following results; 55½ per cent. improved, 11.11 per cent. remained stationary, and 33.33 became worse; which results, contrasted with some others, which will be referred to later, are far from favourable.

Madeira was formerly the *beau-idéal* of a residence for phthical invalids, who in this balmy sedative climate seemed to forget their sufferings and breathe afresh. It has a winter mean temperature of 60.6 degs. Fahr., twelve or nineteen degrees higher than any of the Riviera resorts, a rainfall of twenty inches in eighty-eight days, and a warm moist atmosphere singularly soothing to coughs. Dr. Walshe states that so damp is the air, that boots become covered with mould, lucifer-matches cease to be inflammable, and iron rusts easily. A good many results have been published about Madeira, the majority of them being unfavourable. Dr. Lund alone gave favourable ones, for his hundred patients showed forty-nine cases of arrest; whereas, of Dr. Renton's forty-seven cases of undoubted phthisis, thirty-two died in six months after arrival, and the rest shortly afterwards. Of the twenty Brompton patients who were sent to Madeira, only three derived benefit, one died, and the rest returned home worse than they went.

Our table shows that of sixty-three patients who spent one hundred and two winters, 53.81 per cent. improved, 14.28 remained stationary, and 34.29 became worse. This is the second worst sets of results on the page, and makes us cease to wonder at the desertion of Madeira by the medical profession. Other moist warm climates seem to furnish unfavourable results, as the Canaries and St. Helena; and the five patients who spent various winters in the West India Islands, the climate of which is hotter than that of Madeira, yield even more unfortunate ones. Madeira appears to me to fail entirely in the stimulating qualities of sea-air which render Hastings and Brighton so bracing, but its soft air serves as a species of linctus to the cough, and supplies an atmosphere easily breathed by those with irritable bronchial membranes. The symptoms of which the patients who became worse most complained were diarrhoea, languor, and loss of appetite; and, in many cases, the oil was not taken regularly. Some of the patients who did improve, did so to a remarkable extent, cavities closing and the general health recovering in a very rapid manner; and these patients were generally those who were able to live in the higher part of the island and took horse-exercise. Still we must bear in mind in the case of Madeira, as in all the other groups, that in all climates cases of phthisis have recovered; only it is a matter of study—aye, and of very careful study—to determine what kind of climates have yielded the best results, and to gauge the evidence in favour of each. For one form of the disease, viz., the catarrhal, to which allusion will presently be made, Madeira seems admirably suited, although less so for the ordinary type of consumption.

The West Indies have been classed with Madeira in spite of their winter temperature being far higher, and their presenting many climatic peculiarities, such as the large rainfall and the terrible tornadoes, which are not participated in by Madeira. Five patients spent sixteen winters in Jamaica, Barbadoes, and Cuba, and, with the exception of one cavity case, were all first staggers, and the disease generally was of catarrhal origin. They fared rather worse than the Madeira ones, though they all had the advantage of a longer to-and-fro voyage. The invalids who did best, here also lived

in the hill country of Jamaica, which has a high reputation among Americans as a sanatorium.

In connection with the causation of phthisis by climate, it may not be irrelevant to mention two remarkable instances in natives of the West Indies which have lately come under my notice. The first was a young lady born in Jamaica of white parents who were healthy, but she had a sister who was a leper. She first came over to England at the age of nearly 14 for education, and a few weeks afterwards was attacked with obscure lung-symptoms, for which I saw her with Mr. George Gaskoin, and which developed into tubercular consolidation of the greater part of one lung, with excavation. The second case was also a young lady, aged 13, born in Jamaica, whom I saw last week in consultation with Mr. Bezly Thorne. Her family were free from suspicion of consumption, and she had enjoyed excellent health till shortly after landing in England, when she was attacked with cold, cough, expectoration, and wasting; and, when I saw her a month after the manifestation of the first symptoms, she had profuse sweats and signs of active phthisical disease in the right lung. Both these patients were nearly perfectly developed young women, although under fourteen years of age, and had the appearance of having grown too rapidly, but both had been quite healthy before landing on our shores, and had previously complained of no loss of appetite or of strength; so we must conclude that their growth and development were of too rapid and exotic a character to stand transplantation to our more treacherous climate. The advice given in both instances was to return to their native island.

Let us now turn to the dry Mediterranean group, and consider its climatic features. This inland sea, with its narrow entrances to the Atlantic and the Black Sea, and now through the Suez Canal into the Red Sea, presents many peculiarities which distinguish it from the neighbouring Atlantic Ocean, and which powerfully affect the climate of its shores. 1. It has scarcely any tide; 2. It is much saltier than the Atlantic; 3. Its waters contain less free oxygen and more carbonic acid (Carpenter); 4. It is much warmer than the portions of the Atlantic lying between the same latitudes; and, moreover, its warmth is less influenced by the seasons. The temperature, at a depth of twenty to thirty feet, throughout the winter, has been found to be from 54 deg. Fahr. to 60 deg. Fahr., and bathing is indulged in all the year round.

The principal cause of all this is the existence of a submarine barrier of rock, extending from Cape Spartel to Cape Trafalgar, in the Gibraltar Straits, and reducing the depth in this portion of the sea to 167 fathoms. By this, according to Dr. Carpenter, the cold polar current, which descends along the Atlantic coast of Spain and Portugal, is shut off, and does not penetrate to lower the temperature of the Mediterranean depths.

The saltiness of the sea is usually attributed to the comparatively small number of large rivers which empty themselves into it, and which cannot supply the immense volume of water which is lost by evaporation, due to the sun's powerful influence in these latitudes. Thus is necessitated a supply of water through the Straits of Gibraltar, which takes the form of a superficial current, the depths of these two seas being separated, as I before noticed, by the rocky barrier.

What we have to do with, as climatologists, is the warmth of this inland sea and its equalising influence, by which the temperatures of its northern and southern coasts are, to a certain extent, assimilated, and its shores clothed with palms, oranges, lemons, Japanese medlars, and other subtropical vegetation, which seem to flourish in proportion to their proximity to its warm levels.

The sea lies between 30.15 deg. and 40.50 deg. north latitude, and, of course, considerable thermometric differences are to be found between the two shores, though this is very much reduced by the large body of warm water separating them.

The first characteristic of the Mediterranean climate is dryness; the second, its stimulating qualities; and the third, its moderate warmth; the combination of which characteristics appears to act favourably on consumptives from the north.

No fewer than 152 of our patients passed 229 winters on the shores of this sea, either halting at one spot or travelling about; 82 wintered in the Riviera; 8 spent 10 winters in Malaga; 2 spent 2 at Malta; 4, 4 winters in Algiers. A single winter was spent by a patient at Ajaccio, Palermo, and Corfu, while one patient wintered at Cyprus. Fifty-two were, during 73 winters, travelling about in Spain, Italy, and the South of Europe generally.

The results of this climatic treatment of the whole 152 cases is very satisfactory: 62.50 per cent. were improved, 20.39 per cent. remained the same as when they set out, and only 17.10 per cent. became worse: one of our best results.

This large group admits, however, of certain subdivisions; and as

one of these may be mentioned the climate of the tract of country extending from Toulon to Spezzia, and sheltered more or less completely from the north by the various ranges of the maritime Alps. The parts lying between Nice and Spezzia are called the Eastern and Western Riviera, though the term is sometimes applied to the whole district. Within it are the well known sanitarium, Hyères, Cannes, Nice, Mentone, Bordighera, San Remo, Nervi.

Its southern exposure and the protection from northerly winds give it a warmer mean temperature in winter than many parts of the adjacent Italian peninsula. The winter mean varies from 47 deg. Fahr. to 49 deg. Fahr.; the rainfall is about 25 inches, and the number of rainy days from 45 to 80. The climate of the whole region is dry, as hygrometrical observations show, and there is abundant sunshine throughout the winter, enabling patients to live much in the open air. But, in spite of the northern screen, this region is subject to occasional visitations of cold weather, of which we often read complaints in the newspapers; and every winter brings round its series of grumbling letters from invalids who have left their homes in search of summer, and who find, after all, but a modified winter, bright and cheerful, it is true, but still necessitating winter clothing and warm wraps. And herein lies their mistake; for if our invalids could indeed find a lotus-aeter's land,

"In which it seemed always afternoon,
All round the coast the languid air did swoon;"

I would predict that the results on their health would be rather pernicious than otherwise, and loss of appetite and diarrhoea would probably be induced.

The real advantage of the Riviera climate is the combination of the bracing element with dryness, sunshine, and moderate warmth; and this first quality can hardly be supplied without a certain number of days of mistral, or a certain percentage of cold weather. This is as necessary to the maintenance of the appetite as the warm air is beneficial to the cough and other local symptoms.

Many opinions have been expressed as to the relative advantages of the Mediterranean health-stations, and it is amusing to hear the patrons of each vaunt it and decry the others; but the fact is, that there is not such a very great difference between any of them. Mentone and San Remo are probably the most sheltered from north winds; but they are consequently the least bracing, while Cannes and parts of Nice are the most so. The real distinction which should be taken into consideration is, first, whether a place be situated on the sea, or lie at a distance from it; and, again, whether the protecting ranges are close to or at a distance from the town; for, while the sea-shore ensures greater equability of temperature, it also ensures a large amount of stimulating influence, sufficient at times to preclude sleep, and to excite unduly the nervous system; on the other hand, a few miles inland means greater extremes of temperature, although generally sounder sleep and more repose of the nervous system may be reckoned on. Hyères, Cannel, and Cimiez belong to the less stimulating class, and Mentone, Cannes and Nice to the more stimulating. Our 82 patients who tried the Riviera climate give as results 58½ per cent. of improved, 20¼ per cent. stationary, and 20¼ per cent. worse: a good result, but not so good as that of the whole 152 wintering in the South of Europe. Still, it must be remembered that the difference is made up by the favourable results given by those patients who were able to travel from place to place, and, therefore, were probably not so advanced in disease as those limited by their doctors' orders or their own wishes to one health-station.

Besides the Riviera patients, 8 spent 10 winters at Malaga, and, though a small number, returned excellent results, the whole of them becoming better or remaining *in statu quo*, and testifying to the benefits of that beautiful climate, which, if it were not for the unsanitary state of the town, would probably eclipse the Riviera in the estimation of invalids, from its greater dryness. The winter mean temperature is 56 deg. Fahr.; the rainfall is only 16½; the number of rainy days is 40.

A few of the patients spent winters in some of the Mediterranean islands—Sicily, Cyprus, Malta, Corsica, and Corfu—which all appear to have a much warmer climate than the Riviera, but are open to winds and storms. Algiers is placed on the Mediterranean, but local reasons give it a somewhat different climate from the other sanitarium. It is moister and warmer, and this comes about from the Atlas Mountains attracting a large annual rainfall. Looking at the dryness of the south-eastern corner of Spain, it always appears as if Algeria, in the battle of the elements, had secured to itself the rainfall lost by Spain, as the contrast between the almost arid eastern coast of Spain and the well watered provinces of Constantine and Algiers is very striking. The mean winter temperature, according to Dr. de Pietra Santa, is 56 deg. Fahr., the amount of rainfall 32 inches, and the number of

rainy days 87. The prevailing winds are the west, north-west, and east (from the Mediterranean quarter); of these the westerly bring moisture from the Atlantic. The chief drawback to the climate is the fact that the rainfall takes place principally in the winter, the summer and autumn being the dry seasons.

Since making out these statistics, I have come across my notes of a young lady of strong consumptive predisposition, who went to Algiers three years ago for the winter, with a considerable sized cavity and great emaciation. She has passed three winters there, taking cod-liver oil, and living in a villa in Mustapha Supérieur, with the greatest possible benefit. I have examined her each year on her return home, and have watched a gradual improvement in general and local signs; and last spring, to her and my great satisfaction, after examination of the lungs, I failed to detect any trace of the cavity. She has become very stout, lost her cough, and is wintering this year in England fairly well. Before we quit this part of Africa, I may allude to Tangiers, where three of the patients spent eleven winters with great benefit. There some of the Atlantic influence is felt in the form of cool westerly breezes; but, at the same time, this does not appear to increase the rainfall or the number of rainy days, neither of which is large. Recently, a well known Fellow of this Society has called attention to Mogador, on the Atlantic coast of Morocco, as a fitting resort for consumptives, and has published some good tables illustrative of the climate; but, as this lecture does not aspire to give accounts of all good climates for consumption, but merely analyses those of which I have practical results, I cannot now dwell more fully on this and other climates, which I hope may each in turn have a trial, and be found in certain cases to be of especial benefit.

[To be continued.]

REPLY TO DR. CHARLTON BASTIAN'S REMARKS ON THE DEVELOPMENT OF GERMS IN INFUSIONS.

BY JOHN TYNDALL, F.R.S.,

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I HAVE been favoured with a copy of the BRITISH MEDICAL JOURNAL for February 5th, and have read therein, with interest, the article of Dr. Bastian, in which, to his own obvious satisfaction, he convicts me of insufficiency of knowledge, insobriety of reasoning, and inattention to facts. He urges, in the first place, against me, a striking departure from the conditions laid down by him as necessary to the success of his experiments. I have sought, he says, to obtain, with a temperature of 60 or 70 deg., results which could only reveal themselves at a temperature of 90, 100, or 115 deg. If, then, failure attended my efforts, my own carelessness is to blame. Having erred so seriously where my instructions were so plain, what confidence, asks Dr. Bastian, is to be placed in my mode of preparing those infusions that refuse to verify the statements which he has so ardently enunciated, and which others have so trustingly believed?

In briefer terms, Dr. Bastian produced the same criticism in the *Times* of January 29th; and I cannot, perhaps, do better than publish here the reply which I thought it expedient for the time being to make. It runs thus:

"To the Editor of the *Times*."

"Sir,—Unwilling to cumber your space with a discussion which, for the present, at least, can be carried on more fully and decisively elsewhere, I refrained from answering Dr. Bastian's letter published in the *Times* of the 28th of January.

"A considerable portion of your readers, however, feel an interest in the question of warmth there raised, and I therefore hope you will grant me room to say that Dr. Bastian's temperature hypothesis will not answer. Many of my infusions, prepared with the most scrupulous adherence to his own prescription, have been exposed for weeks to temperatures varying from 80 deg. to 90 deg. Fahrenheit, and have remained perfectly sterile throughout. A temperature 20 deg. lower than these rapidly develops putrefaction in the common air.

"This subject was taken up by me with a full consciousness of its gravity. Upon its right solution depends the practice of the physician, and, therefore, the lives of men. Knowing this, I have spared neither care nor toil in examining the facts and doctrines which Dr. Bastian has of late years so successfully spread abroad. The question of temperature is a case in point. To obtain sufficient mastery over it, I had a special supply of gas brought in from the main, and entirely cut off from the interference of servants. I was thus enabled to keep four