ON THE EFFECTS
OF
WARM CLIMATES
IN THE TREATMENT OF
PULMONARY CONSUMPTION,
AS EXEMPLIFIED BY
AN ANALYSIS OF TWO HUNDRED AND FIFTY-ONE CASES.

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THE selection of a suitable winter climate is a most difficult question in the treatment of consumption, and one which affects, more than any other, the plans of the patient and of his friends, often entailing an exile from home and its comforts, a separation from those most dear, and the sacrifice of ordinary occupations or pursuits. When we consider, therefore, the important interests involved in the answer to this question, we are bound to spare no pains to arrive at a decision, in carrying out which the invalid may secure a fair prospect, if not a certainty, of improvement in health.

Now, what are the grounds on which a physician bases his opinion in this weighty matter? They may be briefly summed up as follows:—

1st. The alleged immunity of some localities from the disease the patient is suffering from. This is certainly an

a priori ground for recommendation, but when we come to examine the climates of the localities known to be exempt from phthisis, we are met with such a contrast of atmospheric conditions, that it is evident the immunity cannot be assigned to the influence of climate alone, but to peculiarities in the out-door life, food, and habits of the natives. What specific qualities of climate can be common to Iceland with its ever-varying meteorology, to the cold steppes of Tartary, lying a 100 feet below the level of the sea, to the lofty plateaux of the Andes, 8000 to 10,000 feet above it, and the hot presidency of Madras? And yet all these places are free, or nearly so, from phthisis! We do not, therefore, gain much assistance in the selection of a climate from this source, though by close imitation of the conditions under which the inhabitants of these fortunate countries live, individuals pre-disposed to phthisis might possibly avert its onset. On the other hand, we should not dismiss from consideration certain climates only on the ground that they are not free from phthisis, as experience has shown that this is the case even in those health resorts which have proved most beneficial to British invalids.

2ndly. The existence in certain localities of atmospheric conditions the reverse of those under which the disease was contracted, as a dry warm climate, when the disease has been contracted in a damp cold one; or, again, a cold atmosphere of great purity, when the malady has arisen under the influences of heat and bad ventilation. This is a very reasonable ground for selection, and in the absence of better data, and with certain restrictions, a very practical one, though difference of food, variability of seasons and individual idiosyncrasies will sometimes upset our calculations, and turn what appeared a probable success into an undoubted failure.

In selecting our climate on this principle, it were well to bear in mind that the causation of phthisis is probably two-fold—*inflammatory* and *septic*.

By inflammatory, I mean those influences which excite or keep up inflammatory affections of the lungs, the products of which are apt to be of a lowly organized kind, tending to

contraction or caseation ; such influences are, the prevalence of cold and damp, and frequent changes of temperature. Consumption arising in this way is generally a limited disease of one or both lungs, running a chronic course, and is known chiefly in cold and temperate climates.

By septic influences I mean those which tend to blight and corrupt the bioplasm of the blood or lymphatics generally, and thus sow the seeds of decay. Such are the combination of warmth and humidity, foul air, bad or insufficient nourishment, certain weakening diseases, and other general debilitating causes. Consumption having this origin exhibits very marked constitutional symptoms, is often tubercular, and runs a more or less rapid course, and often attacking other organs besides the lungs. This is the type which, as Dr. Guilbert has pointed out, prevails in hot countries, as along the littoral of Peru, in the West Indies, and on parts of the Coast of Africa ; but it is also to be found in northern countries, then arising principally from the above-mentioned septic causes or from the neglect of certain rules of hygiene. What the exact nature of this septic influence is, and whether the power of thus depraving the nutrition of the blood and lymph, and causing the formation of phthinoplasms, resides in germs often present, but requiring certain conditions for their development, it is at present uncertain, but judging from the direction modern researches are taking, such an origin seems by no means improbable.

Now, viewing the causation of phthisis in this light, its treatment by climate would naturally depend upon whether the case had a septic or an inflammatory origin. For the former a dry cold¹ air of great purity is desirable, as Archibald Smith² has well shown ; while for the latter, in order to avoid

¹ We must not omit to add that the atmosphere should be still, otherwise the cold is not well borne by consumptive patients. During a recent visit to Davos-Platz, the principal high altitude winter station of Switzerland, I ascertained from several phthisical patients that they did not feel the cold in winter, and could sit with the windows open for hours at a time, provided there was no wind ; but that wind, even with a moderate temperature, tried them severely.

² 'Edinburgh Medical and Surgical Journal,' 1840.

fresh inflammatory attacks a combination of dryness and warmth seems indicated.

The 3rd, and far most important ground for selecting a winter station, lies in the ascertained results of certain climates on similar cases; this, after all, being entitled to our gravest consideration, as it furnishes the strong argument of *fact*, while the other two are more or less *a priori* grounds, and though valuable in the absence of the third, are not to be compared with it for validity.

Unfortunately, though considerable experience must have been stored up by practitioners at home and abroad of the results of climate on the various forms of phthisis, few records have been offered to the profession, though those made available are of the highest interest. It is, however, undoubtedly to the medical men living at the various health resorts that we ought to look for careful clinical observations on the influence of climate. Dr. Walshe justly remarks—"It cannot be too deeply regretted that local practitioners employ their leisure hours in adding to the already too ponderous mass of meteorological and picturesque data concerning their various spots of residence, rather than in conscientiously jotting down in writing the exact conditions of their patients on arrival and on departure, and in due season submitting a series of such observations to collation and analysis."¹ This advice is the more reasonable as the "meteorological and picturesque data" could be equally well collected by other and non-medical residents, as has been done in some localities, who could not, of course, contribute the medical facts required.

The cases which have hitherto been published to exemplify the effects of climate in phthisis have rarely been sufficient in number to admit of the framing of statistics, but many striking examples of the effects of climate have been recorded, among which few can compare with the admirably described ones of Dr. Hermann Weber in the fifty-second volume of this Society's 'Transactions.'²

¹ 'Diseases of the Lungs,' 4th edition, p. 584.

² The selection of the high altitude stations for consumptive patients is

The present contribution is intended as an attempt to furnish statistical information on this point, and is a sequel of a paper read before the Society last year, and published in vol. liv of the 'Transactions.' In that paper an account was given of 1000 cases of consumption, taken from the practice of Dr. Williams and myself, tabulated under certain headings; the average duration was estimated, as well as the influence which *age, sex, family predisposition, and origin* exercised on the same. The consideration of the influence of climate was postponed, and is embodied in the present paper.

Of the 1000 patients who had been one year and upwards under observation, 251 were submitted at some time or other to the influence of warm climates in localities out of the United Kingdom, for periods varying from one to eleven winters. Their general condition and the state of their lungs were noted before quitting England, and in most cases again registered on their return. In addition to this, some account of their progress during their absence was furnished either by the patient or by the medical attendant; and a special note was taken of whether they took oil regularly, as they were ordered to do, or trusted to climate alone, as many are wont to do. A specimen of the mode of tabulation is annexed.

generally based on the 1st or "immunity ground," but the results obtained by Archibald Smith, Guilbert, Brehmer, Weber, and others, warrant us in claiming also for it the 3rd or "experience" ground.

I trust that medical men will be able in time to overcome the prejudice which at present prevails among our countrymen against this form of treatment, and that a fair trial will be made of it by us, as is being done by the Germans, Swiss, Dutch, Belgians, and South Americans.

In addition to the good results obtained at Davos and Görbersdorf, we must bear in mind that in South America it has long been not only the medical but the popular practice to send consumptives to the higher plateaux of the Andes, and that there the mountain cure is looked upon as the "very grammar of plithisical therapeutics;" also that cases of arrest have been by no means confined to South Americans, many Europeans having equally benefited by a stay at Santa Fè di Bogota, Huanaco, Jauja, and Tacna, at all of which places suitable accommodation can be procured.

How these mountain climates act on the lungs, whether, as Dr. Walshe sensibly suggests, by causing increased capacity of the chest through continual inhalation of rarefied air, or whether, according to Brehmer ('Die Chronische Lungenschwindsucht und Tuberculose der Lunge,' 2nd ed., 1869) it is to be assigned to acceleration of the pulse giving rise to enlargement of the heart, I have no space here to discuss. Brehmer's theory that consumption often arises from a small heart with feeble and lax muscular fibres, has been well criticised, and, to my mind, refuted by Dr. C. v. Mayer in his 'Ätiologie und Therapie der Lungenschwindsucht,' 1871.

SPECIMEN TABLE.

No.	Sex.	Age.	Origin and nature.	Stage.	Climate.	Effects.		Duration.	Remarks.
						Local.	General.		
885	M	25	Catarrhal phth.	1st right	West Indies 3 yrs., voyages to & from Nice 1 winter	Advance of disease	Improved	13 5 yrs. mths.	
895	M	38	Chronic phth.	2nd left, 1st right	Nice 1 winter	Advance	Ditto	8 3	Dead.
902	M	26	Ditto	1st left	Rome 1 winter	Extension and advance	Worse	1 2	
906	M	21	Chronic phth.	1st right	Hyères 1 winter, Madeira 1 winter	Decrease and cure	Much improved	5 6	Nova Scotia in summer.
909	M	33	Phth. after pleuropneum.	Ditto (morb. cord.)	Madeira 1 winter	Advance	Worse	8 6	Dead.
912	M	30	Catarrhal phth.	1st both	S. Europe 1 winter, Pau 1 winter	Ditto	Improved	15 1	
905	M	23	Chronic phth.	Ditto	S. Europe 1 winter	Decrease	Much improved	4 8	
941	M	32	Phth. after pleuropneum.	Ditto	Florence 1 winter, Pau 1 winter	Advance	Stationary	5 0	Dead. Oil had much greater effect than climate, for with its continuance or omission the patient would gain or lose as much as [35 lbs.
855	M	47	Catarrhal phth.	1st left	Madeira 2 winters, S. Europe 1 winter	Decrease and slight extens.	Much improved	4 6	
856	M	33	Chronic phth.	1st both	Pau 1 winter, S. Europe 1 winter	Advance	Ditto	12 0	
860	M	22	Catarrhal phth.	2nd right, 1st left	Nice 1 winter	Ditto	Improved	1 7	
865	M	18	Chronic phth.	1st both	Naples 1 winter	Decrease	Much improved	3 4	
869	M	32	Scrofulous phth.	2nd right	Nice 1 winter	Stationary	Ditto	3 4	Previous to wintering at Nice spent 1 year in Canada and greatly improved in flesh and phys. signs.
879	M	16	Phth. after pleuropneum.	1st left	Hyères 1 winter	Ditto	Improved	11 9	
874	M	39	Ditto	2nd right	Rome 1 winter, Nice 1 winter	Decrease	Much improved	10 0	

While laying a brief account of these cases before the Society I propose, as I proceed, to compare their main features with those of the total number, so as to enable those present to judge, 1stly, whether the cases were exceptional or not; and, 2ndly, whether their going abroad was of advantage or disadvantage to them.

Sex.—190 were males and 61 females. The large preponderance of the former might be expected from the ease with which they can travel abroad compared with ladies, who often require relations or friends to accompany them.

Age.—The ages of the patients at the time of their being attacked has been arranged in the following table, as also the percentages of the different decades of life :—

TABLE I.—*Showing age at time of attack of 251 patients who passed one or more winters abroad.*

	Males.		Females.		Total.	
	No.	Percentage.	No.	Percentage.	No.	Percentage.
Under 20 years.....	23	12·10	20	32·78	43	17·13
20 to 30 ".....	89	46·74	30	49·18	119	47·41
30 to 40 ".....	51	26·08	8	13·11	59	23·50
40 to 50 ".....	22	11·57	2	3·27	24	9·56
50 to 60 ".....	3	1·50	...	...	3	1·11
60 and upwards	2	1·05	1	·61	3	1·11
	190		61		251	

The average age of attack of the males was 29·04, and of the females 23·59; nearly half of both sexes being attacked between 20 and 30. Comparing this table with a similar¹ one of the whole number of patients, we find an excess of nearly 6 per cent. in the decade, 20 to 30 for both sexes collectively, and also a preponderance of 7½ per cent. among the males alone in the same period. Among the females the percentages in the decades—under 20, 20 to 30, and 30 to 40—were all slightly higher.

We may conclude, therefore, that the age of attack among these climatic cases did not differ greatly from that of the whole

¹ Vide Vol. LIV, p. 101.

number; but that the females who went abroad were attacked by the disease rather earlier than the other female patients.

Family predisposition was present in 131 cases, or in 52·19 per cent., and hereditary predisposition in 68, or in 27·9 per cent.: both percentages being higher than those of the whole number; which were for family predisposition 48·4 per cent., and for hereditary 25 per cent. This may perhaps account for the earlier onset of the disease among the climate females, as I have demonstrated,¹ that the chief influence of family predisposition lies in precipitating the attack of the disease among females.

Origin and nature of disease.—While the patients one and all presented the familiar group of symptoms characteristic of consumption, they included examples of many of the varieties of that greatly varying, but still definite, disease—11 were instances of scrofulous phthisis: that is, the cases were complicated by the presence of scrofulous disease of the bone, fistula in ano, enlarged suppurating glands, &c. In 55 the symptoms supervened on attacks of pneumonia, pleurisy, and pleuro-pneumonia, the unresolved products of inflammation remaining behind after the attack. In 41 the disease had a catarrhal origin, following attacks of acute or chronic bronchitis; 2 had a syphilitic origin; 6 were cases of chronic asthma, lapsing into phthisis; 6 were instances of the variety of phthisis, which I have described as the “hæmorrhagic.”² The remaining 130 presented the usual characters of chronic progressive consumption.

Hæmoptysis was noted in some degree or other in 157 instances, or in 62·54 per cent. In the 1000 cases the percentage was 57.

State of lungs.—For the purpose of clearly demonstrating the condition of the lungs in these patients before they quitted England, and the effects of the various climates during their stay abroad, a table has been constructed, which, under the headings of “State of Lungs before leaving England,” “State of Lungs on return to England,” gives the most important facts.

¹ Op. cit.

² ‘Pulmonary Consumption,’ p. 155.

TABLE II.—*Showing the influence of warm climates on the condition of the lungs in 251 cases of consumption.*

State of lungs on return to England.											
Stage.	No.	Percentage.	State of lungs before leaving England.	Cure.	Decrease.	Stationary.	Advance.	Advance & Extension.	Extension.	Unknown.	Totals.
1st	153	61·00	69 had the <i>right</i> lung alone affected	5	21	13	11	9	6	4	69
			38 had the <i>left</i> lung alone affected	2	15	4	3	6	6	2	38
			46 had <i>both</i> lungs affected	1	19	3	15	6	2	0	46
			— 153	8	55	20	29	21	14	6	153
2nd	54	21·51	14 had the <i>right</i> lung alone affected	0	7	0	5	1	0	1	14
			5 had the <i>right</i> lung in 2nd stage, and the <i>left</i> in 1st	0	1	0	3	0	0	1	5
			19 had the <i>left</i> lung alone affected	2	11	2	3	1	0	0	19
			8 had the <i>left</i> lung in 2nd stage, and the <i>right</i> in 1st	0	1	3	3	0	0	1	8
			8 had <i>both</i> lungs in 2nd stage	0	3	1	3	1	0	0	8
			— 54	2	23	6	17	3	0	3	54
3rd	44	17·52	15 had the <i>right</i> lung alone affected	1	5	3	1	0	1	4	15
			6 had the <i>right</i> lung in 3rd stage, and the <i>left</i> in 1st	0	2	1	2	1	0	0	6
			12 had the <i>left</i> lung alone affected	0	2	2	3	1	1	3	12
			8 had the <i>left</i> lung in 3rd stage, and the <i>right</i> in 1st	1	2	1	4	0	0	0	8
			3 had <i>both</i> lungs in 3rd stage	0	2	0	1	0	0	0	3
			— 44	2	13	7	11	2	2	7	44
	251			12	91*	33	57	26	16	16	251

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In 84 of the 251, or in 33·06 per cent., both lungs were diseased at the time of departure from England :—Of those in the 1st stage in 46, or 30·06 per cent.; of those in the 2nd stage in 21 or 39·00 per cent.; of those in the 3rd stage in 17 or 38·63 per cent.

Of 167, or 67 per cent., in whom one lung alone was diseased, the right was attacked in 98 instances, or 39·04 per cent.; the left was attacked in 69 instances, or 27·49 per cent.

* In five decrease in one lung was accompanied by slight extension of the disease to the other.

Results.

		No.	Percentage. (Unknown excluded.)
<i>1st Stage:</i>			
Cure.....	} Improved	63	42·56
Decrease			
Stationary		20	13·51
Advance	} Worse	64	43·53
Advance and extension			
Extension			
Unknown		6	—
<i>2nd Stage:</i>			
Cure.....	} Improved	25	49·21
Decrease			
Stationary		6	11·76
Advance	} Worse	20	29·21
Advance and extension			
Extension			
Unknown.....		3	—
<i>3rd Stage:</i>			
Cure.....	} Improved.....	15	40·54
Decrease			
Stationary		7	18·91
Advance	} Worse	15	40·54
Advance and extension			
Extension			
Unknown.....		7	—
<i>Total:</i>			
Cure.....	} Improved.....	103	43·64
Decrease			
Stationary		33	13·98
Advance	} Worse	99	41·94
Advance and extension			
Extension			
Unknown		16	—

From this we see that 61 per cent. were in the 1st stage, $21\frac{1}{2}$ per cent. were in the 2nd, and $17\frac{1}{2}$ per cent. in the 3rd stage, when they quitted England. We also see that 33 per cent. had both lungs affected, and 67 per cent. but one lung attacked; the right alone in 39 per cent., and the left alone in $27\frac{1}{2}$ per cent. On comparing these with the figures of the 1000 cases, we find that the climate cases had 5 per cent. fewer in the 1st stage, but $3\frac{1}{2}$ per cent. more in the 2nd, and 3 per cent. more in the 3rd stage.

On the other hand, the percentage of cases in which both lungs were involved is 12 per cent. less than in the whole number, the ratio of the percentages being 33.06 to 45.40.¹ It appears, therefore, that the disease was slightly more advanced in these cases, but, at the same time, much more local in its character; the opposite lung being attacked in the comparatively small percentage of 33, and it must be admitted this last feature would form a favorable element in the prognosis certainly sufficient to counterbalance the somewhat larger percentage of 2nd and 3rd stage patients.

Before considering the state of the lungs on the return of these patients to England, we must give some account of the climates in which they lived for periods varying from one to eleven winters. In some of the more distant localities, such as New Zealand, the Cape, &c., the summers were also passed.

It must here be noted that in the selection of their wintering place the patients did not always act in accordance with the physician's advice, but often as fancy, convenience, or pleasure prompted, and thus may be explained the appearance, in the subjoined list (Table III) of certain localities, a residence in which could hardly be deliberately recommended by medical men. Though the list is a tolerably long one, I hope the Fellows of this Society will not view it as including all the climates of which Dr. C. J. B. Williams

¹ This is a considerably higher figure than that recorded in my last paper, which was intended to include only cases of undoubted disease of the opposite lung. Here, as also in the climate percentage, cases of slight, and often dubious, disease of the other lung are comprised.

and I have notes, or, again, that the 251 patients represent our total of cases submitted to climate; they are limited to the proportion of the 1000 already selected, as a standard of reference, and to the climates to which these were subjected.

Of such a variety the classification is not easy, but a rough grouping has been attempted, where possible, under the heading of "Inland Temperate and Moist Climates," "Dry Climates of the Mediterranean Basin," "Very dry Climates of Africa," "Moist and Warm Atlantic Climates." Of these groups the first, containing Pau and Bagnères de Bigorres, is characterised by a moderate and tolerably even winter temperature, a large amount of rainfall, a considerable number of rainy days, and an almost total absence of wind. This climate has been acknowledged by the best authorities to be markedly sedative. I have purposely excluded Rome from this group because, although from its inland position it possesses some of the same features, its lack of shelter from winds presents one decided point of difference.

The second group comprises the localities situated on the Mediterranean Basin, and enjoying with the higher winter temperature of a southern latitude the additional warmth and equalising influence which the Mediterranean has been shown by modern researches to possess to a far greater degree than the Atlantic.¹ The winter climate is characterised by a tolerably warm mean temperature, subject, however, to great variations through the prevalence of boisterous and sometimes cold winds, by a small rainfall and a small number of rainy days. The dryness of the atmosphere combines with the exciting marine influence to give the climate a decidedly stimulating character.

The Rivièra sub-group differs from the rest of the Mediterranean climates in that, although more northerly situated, it enjoys better protection from cold winds through the sheltering ranges of the Maritime Alps.

Malaga closely resembles the Rivièra group in character, but is warmer and drier.

¹ "Messrs. Carpenter and Jeffreys' Report," 'Proceedings of Royal Society,' No. 125.

Algiers and the Mediterranean islands enumerated differ in having less dry climates than the rest of the group, but are still all more or less stimulating in their influence.

The third group, of very dry climates, is partly inland and partly marine, but is marked by a higher winter temperature and a greater degree of dryness. It contains Egypt, Syria, the Cape, and Natal. I am aware that the summer seasons at the Cape and at Natal are moist and stormy, but the winters are very dry, and it is on this account that these places have been thus grouped.

The fourth group, of warm Atlantic climates, combines a high degree of winter temperature with abundant moisture, and is generally admitted to be decidedly sedative. Such are Madeira, the Canaries, and the West Indies. Tangiers probably occupies a place intermediate between the warm Atlantic and the Mediterranean groups, but the lack of correct meteorological data has prevented me from ascertaining this point.

The other localities are given too vaguely to enable me to arrange them into classes, but as regards sea voyages, it may be well to state that they were generally arranged so as to ensure warm seasons in the cruising grounds the patients visited. Some went to the Cape, India, and China; others to America, others to the West Indies; and a greater number to Australia and back.

From this, I am afraid, rather tedious description it appears that 251 patients spent 548 winters in various warm localities, some of which had dry stimulating, and others moist sedative, climates: this gives an average of $2\frac{1}{3}$ winters per patient. We see also that 18 patients undertook 45 voyages to various parts of the world, giving an average of $2\frac{1}{2}$ voyages per patient.

We will now inquire what effect was produced on the patients by their stay abroad, and first let us consider the changes in their general condition. This has been described (vide p. 238) under the heads *much improved*, *improved*, *stationary* and *worse*. We find 85 were much improved, 78 were improved, 15 remained stationary, and 73 became worse, or in

other words 65 per cent. were improved to a greater or less extent, 6 per cent. remained stationary, and 29 per cent. became decidedly worse; 13 patients died when abroad. This high percentage of general improvement, amounting to about two thirds, cannot but be considered as satisfactory.

Local effects.—The state of the lungs of these patients on their return to England has been reported as, 1st, *Cure*, where little or no physical signs remain; 2nd, *Decrease*; 3rd, *Stationary*; 4th, *Advance*, signifying progress in the way of softening and excavation; 5th, *Extension*, where a greater amount of lung surface was attacked, either of the same or of the opposite lung; 6th, *Advance and Extension*, when both these processes took place.

Table II (p. 241) shows that of the 251 cases, 12 returned home cured. In 91 the disease decreased, in 33 it remained stationary; in 57 it advanced, in 16 it had extended, in 26 it had advanced and extended, and in 16 the local result was unknown.

If we now bracket the "cure" and "decrease" cases under the head of *Improved*, and the "advanced," the "extended," and the "advanced and extended," under the head of *Worse* and at the same time exclude the "unknown" ones, we arrive at the following percentages:—*Improved*, $43\frac{1}{2}$ per cent.; *Stationary*, 14 per cent.; *Worse*, 42 per cent.; the improved being thus only $1\frac{1}{2}$ per cent. more than the worse.

Examining the changes according to stages, we find that out of the 153 in the 1st stage, the improved amounted to $42\frac{1}{2}$ per cent., the worse to $43\frac{1}{2}$ per cent., and the stationary to $13\frac{1}{2}$ per cent.; out of 54 in the 2nd, $49\frac{1}{4}$ per cent. were improved, $11\frac{3}{4}$ per cent. remained stationary, and $29\frac{1}{4}$ per cent. became worse. Out of 44 in the 3rd stage the percentage was $40\frac{1}{2}$ for both improved and worse, while that of the stationary was nearly 19 per cent. Among the curious features in this result, one is that the largest percentage of "improved" and the smallest of both "stationary" and "worse," occurred in the 2nd stage, although *a priori* reasoning would lead us to a different conclusion. It is quite possible that some cases may have been included where

crepitation indicated congestion or deposit, and not necessarily softening, as we know it is not always easy to be decisive on this point. Another curious feature is, that the percentages of "improved" and "worse" were equal both in the 1st and 3rd stages, which when considered in connexion with the small number of stationary cases, show that the climates had a decided effect one way or another, either towards hastening the progress of the disease, or towards diminishing its amount.

The result of the 3rd stage cases is encouraging as regards the expediency of sending patients with cavities abroad, as excepting the dangers from pneumothorax, and from hæmoptysis having its source in pulmonary aneurisms, cases of limited cavity do not seem to come off worse than other cases. The number of cures was, as might be expected, largest in the 1st stage, amounting to 8, of which 7 were unilateral cases and 1 bilateral. Two cases occurred in the 2nd stage; in both cases the left lung alone being affected, and 2 in the 3rd stage, in each of which both lungs were diseased.

A comparison of these local with the general results before mentioned will show how common it is, as all who have had any extensive experience of consumption are aware of, for a patient to gain colour, strength, flesh, and weight, while little or no improvement takes place in his lungs, and often indeed a decided progress of the disease is attested by the physical signs.

We can now return to the list of climates and see how the various groups affected these patients; and here I must trespass on the indulgence of the Society in order to explain the way in which the results of the climate sheet have been arranged. In tabulating the effect of the *different* localities on each patient, it was thought sufficient, as the general and local results of the whole set of climates had been already given, to record in this table¹ a single report of the patients' condition, founded on both local and general results, by striking a balance between the two, the same terms being used.

¹ Table III.

TABLE III.—*Showing influence of warm*

Calm inland temperature climates (moist)	Arcaçhon. Winter mean temp. 46° F. (Lombard); sedative.....		
	Pau. Winter mean 42·8° F.; rainfall 43 inches; rainy days 119; sedative		
	Bagnères de Bigorre. Climate similar to that of Pau		
	Rome. Winter mean 48·90° F.; rainfall considerable; entirely exposed to winds; more stimulating than Pau		
	Riviera.	Hyères	Enjoying a winter climate warmer than England by at least 3° F., much less moist, and far more stimulating. Winter mean 47° F. to 49·5° F.; rainfall 25 inches; number of rainy days 45 to 80; well sheltered from cold winds; stimulating
Cannes.....			
Nice and Cimiez...			
Mentone			
San Remo			
Riviera generally			
Dry climates of the Mediterranean Basin (marine) ...		Malaga. Winter mean 56 F.; rainfall 16½ inches; rainy days 40; well sheltered, and stimulating.....	
	Ajaccio. Winter mean 53° F.; large number of rainy days; well sheltered; less stimulating than Malaga		
	Palermo. Winter mean 53° F.; open to extremes of temperature; imperfectly sheltered.....		
	Malta. Winter mean 57·46 F.; drier than Palermo; much exposed to wind.....		
	Corfu. Winter mean 54·28 F.; large rainfall; great vicissitudes of climate		
	Cyprus.....		
	Algiers. Winter mean 56° F.; rainfall 32·18 inches; rainy days 87; moister than Riviera; stimulating		
	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, &c.		
	Very dry climates ...	Egypt and Syria. Winter mean 58·52 F.; at Cairo very small rainfall; rainy days not exceeding 15; extreme dryness	
		Cape and Natal. Winter mean 60° F. circa; rainfall small.....	
Tangiers. Climate probably intermediate between Algiers and Madeira			
Madeira. Winter mean 60·60 F.; rainy days 88; rainfall 30 inches; warm and moist; sedative			
Moist and warm Atlantic climates (marine)	Canaries (Teneriffe) }	Resembling Madeira; sedative	
	St. Helena..... }		
	West Indies		
	India (generally)		
	New Zealand		
	South America (Andes).....		
	Sea voyages to Australia, America, India, China, Cape, and West Indies		

climates (foreign) in consumption in 251 cases.

No. of winters.	No. of patients.	Result.				Average No. of winters per patient.		Percentages.				
		Much Improved.	Improved.	Stationary.	Worse.			Much improved and improved.	Stationary.	Worse.		
1	1	...	1	...	...	...						
74	43	5	16	2	20	1.70	} ...	...	50.00	4.55	45.45	
2	1	1	...	...	...	...						
22	18	4	6	2	6	1.23	} ...	...	55.56	11.11	33.33	
35	23	4	9	6	4	...						
39	19	6	6	3	4	...						
20	18	6	8	3	1	...						
24	12	2	3	2	5	1.64						
8	3	...	...	2	1	...						
9	7	1	3	1	2	...						
10	8	2	4	2	...	1.56	} Mediterranean Basin (100 patients)	58.00	21.00	21.00		
1	1	...	...	1	...	...						
1	1	...	...	...	1	1.51	} South of Europe and Mediterranean Basin (152 patients)	62.50	20.39	17.10		
2	2	1	...	1	...	...						
1	1	...	1	...	...	...	} ...	...	...	53.81	14.28	31.91
2	1	...	...	...	1	...						
4	4	...	2	...	2	...						
73	52	16	21	5	10	...						
26	20	6	7	5	2	1.30	Egypt alone	65.00	25.00	10.00		
13	9	1	3	2	3	1.34	Very dry climates	58.62	24.13	17.24		
11	3	2	1	...	...	...	} ...	...	...	51.43	14.28	34.29
102	63	14	20	9	20	1.61						
1	1	...	...	...	1	1.71						
1	1	...	1	...	...	...						
16	5	1	...	1	3	...						
30	10	7	2	...	1	3.00						
19	4	...	3	1	...	...						
1	1	1	...	...	...	...	} Voyages per patient	89.00	5.50	5.50		
45	18	7	9	1	1	2.50						
593	850	87	126	49	88							

Average of winters passed by each patient abroad, 2.36

Let us first consider the moist climates.

The calm inland group of Pau and Bigorre furnishes, out of 44 cases, nearly equal numbers of "improved" and "worse," with only $4\frac{1}{2}$ per cent. "stationary;" that is to say, it gives the largest percentage of "worse," and the smallest of "improved" and "stationary" in the sheet.

Of the 18 patients who wintered at Rome $55\frac{1}{2}$ per cent. improved, 11 per cent. remained stationary, and 33 per cent. or about one third became worse. The group of moist Atlantic climates with its 70 patients gives $51\frac{1}{2}$ per cent. "improved," $14\frac{1}{2}$ per cent. "stationary," and $34\frac{1}{4}$ per cent. "worse," the 2nd largest proportion of "worse."

The Madeira patients, which form the chief quota of this class, furnish the same percentage of stationary, but a somewhat higher one of improved and a rather lower one of worse. It will be seen, then, that the moist climates, both cold and warm, yield a percentage of improved varying from 50 to 55, of stationary from $4\frac{1}{2}$ to $14\frac{1}{4}$, and of worse from 32 to 45.

Let us next examine the effects of the dry climates. The sheltered Genoese Riviera for 82 patients shows $58\frac{1}{2}$ per cent. improved and $20\frac{3}{4}$ as a percentage for both stationary and worse.

The Mediterranean Basin, which includes, in addition to the Riviera, Malaga, Algiers,¹ and the Mediterranean Islands (Ajaccio, Corfu, Palermo, Malta, Cyprus), yield somewhat

¹ Professor Biermer, of Zurich, in a very interesting paper, "Ueber Prophylaxis und Behandlung der Chronische Lungenschwindsucht" ('Correspond. Blatte für Schweiz: Aerzte No. 12, 1872), divides warm climates into "stimulating" and "sedative," and includes Malaga and Algiers in the latter class, associating them with Madeira, Pau, and Meran; in the former are arranged Cairo and the Riviera. Professor Biermer gives no reasons for this classification, and I am quite sure that an examination of the climatology of Malaga and Algiers, as well as the results of the preceding table, will convince him that they do not differ greatly in climate from the other Mediterranean stations, but are separated by vast contrasts in point of temperature, humidity, and other qualities, from both Madeira and Pau. Professor Biermer gives a most favorable report of Davos, and says, "The south heals catarrh, but the Alpine climate improves the constitution," and chiefly by increasing the appetite and powers of digestion.

similar percentages, while if we take in the 52 patients who wandered about in warm parts of the south of Europe, dividing their winter season among various stations, we obtain 62½ per cent. improved, 20 per cent. stationary, and 17 per cent. worse,—a highly satisfactory result.

The very dry climates of Egypt, the Cape, &c., were tried in 29 cases and yielded 58½ per cent. improved, 24 per cent. stationary, and 17½ per cent. worse.

In this group Egypt furnishes 20 out of the 29 patients, and shows itself *facile princeps* among the winter stations of the list. Counting only 10 per cent. worse, it numbers 65 per cent. improved, and 25 per cent. stationary.

The *most favorable* results, however, are obtained from sea voyages, which in 18 cases yield 89 per cent. improved and only 5½ per cent. stationary, and the same percentage worse.

It must be admitted that these figures testify very strongly against the moist climates, whether temperate like Pau and Rome, or warm like Madeira and the West Indies; for while the percentages of their *improved* are in every instance somewhat lower than those of the dry climates of the Mediterranean and Africa, those of the *stationary* are very considerably so, and this difference is unfortunately explained by the moist climates having a large preponderance of worse, for whereas the percentage of worse among the dry climates varies from 10 to 21, that of the moist varies from 32 to 45, at least double and in one instance treble.

It may very naturally be asked, Might there not have been some great difference in the patients sent to the various stations? were not the most advanced cases sent to Pau, and Madeira, and Rome, and the less advanced to the Mediterranean Coast and Egypt, thus explaining the results?

This is by no means easy to determine, as cases of phthisis contain certain elements which hardly admit of exact comparison, such as the amount of irritation to the system, the degree of pyrexia, the rate of progress of the disease, &c.

If, however, it be sufficient to judge by the number of cases in each stage, and also by the number which had both lungs involved, the following table which I have constructed may give some idea on the subject.

TABLE IV.—*Showing the relative conditions of lung in patients wintering in various climates (dry and moist), expressed in percentages.*

	First stage.	Second stage.	Third stage.	Both lungs affected.
	Per cent.	Per cent.	Per cent.	Per cent.
Pau	52·20	34·00	13·60	38·63
Madeira.....	62·85	20·00	17·14	40·00
Rome	72·22	16·67	11·11	38·89
South of Europe	58·55	20·38	21·05	35·53
Egypt, Cape, &c.	62·05	27·58	10·34	20·68
Sea voyages	72·22	11·11	16·67	27·78

From this it appears that in point of bilateral affection the patients who went to the moist climates were the worst. In this particular, however, the south of Europe cases differed only by 5 per cent. from the Madeira ones, the highest percentage, but the sea voyage patients were more favorable, and the Egypt cases most so, of all, diverging from the Madeira ones by 20 per cent. On the other hand, in point of stage, the cases sent to Pau were slightly the most unfavorable; then come those of the south of Europe, Madeira and Egypt following at a considerable interval, and, lastly, as the most favorable were the Roman and sea voyage cases. Viewing the patients from both aspects (stage and double affection), we must conclude that those wintering at Pau were slightly more unfavorable cases than the rest, and that the sea voyage patients were rather more favorable; but as regards the others there was no great difference; the south of Europe cases not being more favorable than the Madeira ones, and if anything less favorable than the Roman ones.

Such being the case the natural inference is that it was something inherent in the climates, and not in the patients, which caused so great a difference in the results of the winters passed in the various localities; for here it must be remembered that several of the patients tried different health-resorts in succeeding winters, thus affording us opportunities of comparison between them.

What, however, is there in the climates of Pau, Rome, and Madeira to render them less beneficial to consumptive patients than those of the Mediterranean and of Egypt?

Pau, the worst offender in the list, has a winter mean temperature lower than that of Torquay or Penzance, and considerably below that of Nice, and is subject to great thermometrical variations, probably on account of its nearness to the Pyrenees, which in winter are covered with snow, and like all high mountains attract clouds. It has a considerable rainfall, a large number of rainy days, and occasional snow-falls; but the climate is wonderfully free from cold winds, or indeed from any winds at all. It is stated that there is marked absence of communicable humidity in the air, and that this is due to the dry gravelly soil on which Pau stands; but though I possess careful hygrometric returns of this place, they by no means prove this, and Dr. More Madden¹ states that in some comparisons which he made on the results obtained at Kew and Pau during the winter 1862 the hygrometric difference between these two localities was almost nil. Pau has been perhaps more highly eulogised than any climate in Europe, and I have failed to discover fair grounds for such praise, but, as Dr. More Madden says, "no amount of eulogy affects the temperature of a locality, or adds a degree to the heat marked on the scale of the thermometer." It has a cold and, compared with the dry climates of our list, a damp climate, and the stillness of the atmosphere does not at all make up for the large number of rainy days, which necessitate confinement to the house, or for the vicissitudes of temperature, which induce inflammatory attacks. I lay special stress on these last two evils because, as far as I can judge from the records of the cases, they were the principal reasons of the patients not doing so well as in other localities. The real virtue of Pau is as a spring climate, when some of the more southerly climates prove either too windy or too hot.

Rome, with a winter mean about the same as Nice, is admitted to have a very changeable climate, attributable to its unsheltered position in the midst of a large and swampy

¹ Change of Climate, p. 253.

plain ; this imparts to its atmosphere a considerable amount of moisture, which is not to be wondered at when we remember the size of the Campagna and the sponge-like pozzuolana soil on which the city is built. This absorbs moisture with marvellous rapidity, and under the influence of the sun as quickly exhales it. A piece of it brought into a room will be found to gain weight in a few minutes, thus showing its power of absorption. Rome has a considerable rainfall and a large number of rainy days, and may fairly be considered a colder and moister climate than that of the Riviera. I need not dwell further on the merits or demerits of Rome, as I have elsewhere¹ given reasons for its utter unfitness as an invalid resort, the cogency of which its recent transformation into the capital of Italy does not alter, but I may remark in passing, that if the Campagna is to be rendered healthy it will be necessary not only to drain it and to build upon it, but following Padre Secchi's² advice, to thickly replant with trees the surrounding hills, and thus localise the rainfall and retain in their neighbourhood the moisture which, now coursing down the hill-sides, collects in the vast plain and renders it marshy.

Madeira and the other Eastern Atlantic islands enjoy a mean winter and spring temperature, 12 to 19 degrees higher than that of Nice, of extraordinary equability, and are free from cold winds, though by no means from hot ones, as those who have had experience of the Leste well know ; the number of rainy days is small. At first sight this island climate, subject to the strong marine influences of the Atlantic, and remarkable for steadiness of temperature, does not seem to have much in common with the variable climates of Pau and Rome, but there is one feature which characterises all the three, and is possessed to a very large extent by *Madeira* ; that is, *humidity* giving rise, probably, to its markedly sedative influence. The atmosphere is charged to saturation, and according to Dr. Walshe³ the damp is so extreme that boots laid aside for a day are covered with mould, lucifer matches

¹ 'Climate of South of France,' 2nd edition, p. 100.

² Sul Clima di Roma, Lettura Seconda.

³ Op. cit.

cease to be inflammable, and iron rapidly oxidizes. The combination of the high temperature with this excess of moisture is stated to be the cause of the diarrhœa and the great languor which many patients experience, and also of their relief from the symptoms of pulmonary irritation.

Among our cases the patients who improved were those who took the oil regularly and were strong enough to ride on horseback about the island and thus to dispense with the truly passive exercise of being carried in a hammock. The "worse" class consisted of patients who could only take passive exercise, and losing strength and appetite became intolerant of the oil. In these softening and excavation proceeded very rapidly. These results differ considerably from Dr. Lund's¹, who, in 100 cases wintering at Madeira, found that in 49 the disease was arrested and in 53 it went on. Dr. Lund's proportion of 1st stage cases was smaller than our own, which would have led us to expect less favorable results. Dr. Renton,² however, states that of 47 cases of confirmed phthisis arriving at Madeira 32 died in 6 months and the rest slowly followed, but that of 35 cases of incipient, or (as the diagnosis was made in 1827) doubtful phthisis, 26 returned to England improved. Of the 20 Brompton Hospital patients who were selected as cases likely to profit by the climate, only 3 returned improved, 1 dying at Madeira and the rest losing flesh and showing signs of progress of the disease. These took no oil, and somewhat confirm the result of our statistics. I may mention that one of these Madeira patients is now an inmate of the Brompton Hospital under the care of Dr. Quain; fifteen years have elapsed since the commencement of his symptoms, and he has had signs of cavities for the last eleven years. This patient derived no benefit from Madeira, but by regularly taking the oil and getting sheltered in the Brompton Hospital during the winter, he manages to pass a very tolerable existence.

Although the statistics of Madeira are so unfavorable, I find that many of the "improved" class exhibited rapid and

¹ 'Association Medical Journal,' 1853.

² 'Edinburgh Medical and Surgical Journal,' vol. xxvii.

remarkable recovery, cavities closing, and the patients' health becoming stronger in a few months.

The West Indies has been classified with Madeira as a moist warm climate, though the mean temperature is higher. The results of a few patients who wintered there are even more unfavorable than those which Madeira has furnished.

The general conclusion as to the climates of Pau, Rome, Madeira, &c., is, that the amount of moisture present in the atmosphere as well as the absence of a proper degree of stimulating element renders them less suitable for consumption generally than drier and more bracing climates.

It may be urged in answer to this conclusion that, though these climates are unsuited to the ordinary type of chronic consumption, they may through the very absence of exciting qualities be useful in cases of phthisis marked by great irritation of the intestinal tract or of the vascular system, and attended by a good deal of pyrexia. Too few examples of this kind are included in our numbers to determine this point statistically, but from all that I know of this class of patients I should greatly doubt the advisability of sending them abroad at all. Some few cases that I have seen returning from Madeira have done very badly there; as a rule their strength is hardly sufficient to justify their being banished from relatives and home comforts.

The rest of our list need not detain us long; the percentages of the dry climates speak for themselves. It may be well to note that the percentages of the South of Europe taken generally are slightly more favorable than those of the Rivièra considered alone, and from this we may deduce that it is the dry sunny climate of Eastern Europe combined with the warming influence of the Mediterranean that acts beneficially on consumptive patients, and that it is by no means necessary for them to remain cooped up the whole winter in one well-sheltered nook. Those patients seem to have benefited most who spend part of their time in travelling about from place to place, dividing their time among the different winter stations.

The results of Egypt among the very dry winter climates are most striking, and show what a warm, dry, and exhilarating atmosphere like that of Upper and Middle Egypt can effect, in spite of the disadvantages of bad food and a great deal of discomfort. It is much to be regretted that the great cost of a winter in Egypt and a voyage up the Nile, places it out of the reach of the greater number of phthisical invalids.

Among the miscellaneous climates it may be noted that India gives good results, but it should be mentioned that of the 9 patients who resided in different parts of that hot country, 6 were in the first stage, and only 2 in the third. One of these who had a very large excavation in one lung and some consolidation of the other, lived for upwards of ten years, and during the greater part of this time did active duty as a colonel of a regiment in India, also engaging in various field sports, including tiger-hunting. The only patient who made trial of the elevated plateaux of the Andes was one in the first stage of consumption, who resided at a height of 6000 feet above the sea level in the mountains of Peru. Here he was quite free from cough, but he had some hæmoptysis. I do not, however, attribute this latter symptom directly to the mountain climate.

The great success of the sea voyages deserves a passing notice, and is somewhat opposed to the theories of Rochard,¹ who, because he found from statistics that, among the sailors of the French navy, which at that time cruised almost entirely in the torrid zone, phthisis was more common than among soldiers, concluded that sea voyages were of no use in the treatment of phthisis, but rather the reverse. If our patients had cruised only in hot climates, as the French sailors did, the voyages would probably have not been so beneficial, but this was not the case; the larger number made the trip to Australia and back, others travelled round the Cape to India and China, others to the West Indies, and some few went by steamer backwards and forwards between this country and the American Continent.

¹ 'Mémoires de l'Académie de Médecine,' t. xx, p. 103.

The nearly uniform good results cannot be assigned to equability of temperature, as the variety of climates and the boisterous weather encountered in many of them precludes such explanation. It may rather be assigned to the abundant supply of the constant change of fresh pure air, obtained with little or no fatigue, and to its well-marked effect on the appetite, both as to the kind of food and the amount digested, which, as Dr. Maclaren¹ truly remarks, is the first decided sign of amendment. The moral influence, too, of what is to many an entire change of life, acts often beneficially on the spirits of the patient, and assists, if proper care be paid to diet and cabin ventilation, in his recovery.

It may be remarked that our statistics, though they testify strongly in favour of dry climates, yet in the satisfactory results they yield from sea voyages, give evidence in favour of, at any rate, one very moist form of climate. Why great benefit should be derived both from sea voyages and also from residence in dry localities as took place in some of our cases when both were tried I do not pretend to explain, but would suggest that in both cases great purity of air was present.

Influence of climate on different forms of Consumption.

Do certain forms of consumption derive special benefit from any particular climate? The present cases are insufficient in number to decide this question in all its bearings, but only as regards consumption of *inflammatory* or *catarrhal* origin.

Of 55 patients, in whom the disease had a pneumonic, pleuro-pneumonic or pleuritic origin, 4 wintered once or oftener at Pau, 18 at Madeira, and 35 in the south of Europe.

Of the Pau patients all became decidedly worse, except one in whom the local condition remained stationary, while the general health became worse.

¹ 'British and Foreign Medical Review,' p. 193, January, 1871.

Of the Madeira patients in 13 or in 72 per cent. the general condition improved, and in 5 or 28 per cent. it deteriorated ; the local results being more unfavorable, 11 improving and 7 getting worse.

Among the south of Europe cases the general health improved in 21 or in 60 per cent., remained stationary in 9 or in 26 per cent, and deteriorated in 5 or in 20 per cent. The local disease progressed in 17 (or about half), was stationary in 11, and advanced and extended in 7.

Thus putting aside Pau cases, which all did badly, the Madeira ones showed a percentage of " worse," both locally and generally, double that of the south of Europe patients.

Therefore, as far as the statistics go, and judging chiefly by the number of " worse," at Pau and Madeira, it would appear that *a warm and dry climate is more successful in the treatment of phthisis of inflammatory origin than a warm or cold moist one.*

Of 41 cases of phthisis of catarrhal origin 10 wintered at Pau, 9 at Madeira, and 21 in the south of Europe. Among the Pau patients the general condition improved in 5, and deteriorated in 5 ; the local condition improved in 4, remained stationary in 3, and became worse in 3. Among the Madeira patients the general condition improved in 8, and deteriorated in 1, while the local condition improved in 5, remained stationary in 3, and became worse in 1. Of the south of Europe cases there was general improvement in 16 instances, deterioration in 5 ; local improvement in 11, a stationary condition in 2, and advance and extension in 7 ; in one the local condition being unknown. According to these figures, the climate of Madeira seems to have answered by far the best, and that of Pau the worst, while the south of Europe occupied an intermediate position in fitness for this variety of the disease. The natural inference is, therefore, that *warmth and equability of climate are more important than dryness, for patients suffering from phthisis of catarrhal origin.*

Duration of life.

How long did the climate patients live, and was their span of life prolonged by their residence in foreign climes?

Of the 251 patients who passed on an average $2\frac{1}{3}$ winters abroad, 40 have died, and 202 were alive when last heard of. Among the deaths the average was 8 years exactly; among the living 8 years 11·21 months (nearly nine years).

Compare these averages with the results of 749 patients who never wintered abroad. Of these 149 have died, having lived on an average seven years seven and a half months, and 600 were living at last report, having lived on an average nearly eight years (7 years 11·15 months). Comparing the deaths of each class we find that there was an extension of $4\frac{1}{2}$ months in favour of the climate cases.

Far more striking was the result of observations on the effects of cod-liver oil in the duration of life; 40 patients took oil irregularly or not at all, and of these 17 have died; the average duration among these deaths being only four years eight and a half months, which contrasts strongly with the average of the total climate cases, viz. eight years. Yet at the commencement these 40 patients were not more unfavorable cases than the rest. At first sight the results of the duration of life in the home and foreign cases are not very encouraging for the latter, and make us question whether it was worth while to send patients abroad; but we must not forget that the unfavorable climates are included, and that a large preponderance of the winters were spent in them.

Even in the less favorable climates, the invalids enjoyed a great deal more out-door life than it would have been possible for them to do in England, and it is the knowledge of this that induces invalids to pass winter after winter abroad, often without hope of deriving permanent benefit from their exile.

In conclusion I may remark that the superiority of the dry bracing climates over the moist relaxing ones has long been recognised and acted upon by many physicians, but that the desertion of the latter has been attributed to the

caprice of fashion. It has been my endeavour to show that this is not so, and that the treatment of phthisis by dry climates is founded on well-ascertained results.

The length of this communication has prevented the introduction of suitable cases, which, however, has been rendered less necessary by the statistical details furnished. I venture to hope that the above results may assist, with those of Dr. Hermann Weber and others, in forming a foundation on which a scientific and practical system of climatic treatment for consumption may eventually be built.