THE LUMLEIAN LECTURES ON AËRO-THERAPEUTICS IN LUNG DISEASE.

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LECTURE II.—TEMPERATURE AND MOISTURE.

THE next warm climate, of which I propose to discuss the results, is that of the Riviera, which has been fully described by Drs. Henry Bennet, Edwin Lee, Marcet, Sparkes, Burney Yeo, and myself; and its health and pleasure resorts, being familiar to most of us, will not require a long notice.

The region extends along the north Mediterranean coast from Hyères to La Spezzia, and owes its warm winter and spring climate to (1) its southern latitude, lying between 43° and 44.5° N. lat.; (2) its protection from cold winds by the mountain ranges of the Maritime Alps, and their spurs the Basses Alpes, the Maures, and Esterels; (3) the warming and equalising influence of the Mediterranean Sea, which from its tidelessness, its salinity, and its high winter temperature (for it has a warmth of 5.8° to 8.6° F. higher than the air in winter) exercises a most powerful effect on the Riviera climate, and nearness to, or distance from, this sea determines the amount of nocturnal radiation. The winter mean temperature varies from 50.8° to 51.5° F. The minimum, from 42° to 46°, being lowest in December. Occasionally it sinks to the freezing point, and snow sometimes falls. A feature of the climate is the rapid fall after sunset, especially at any distance from the sea.

The relative humidity percentage varies at the different stations from 61 to 74 per cent., and the rainfall is 31 inches, distributed chiefly over September, October, and November, the rain coming down in heavy showers, as much as 4½ inches being known to fall in nine hours and a-half. The rainfall increases eastwards on the Riviera, and diminishes westwards.

The principal winds are the north-west, or mistral, a dry wind, prevailing chiefly in March, and bringing fine weather, and the north-east, or bise, a cold wind, and the south-east, or scirocco, a warm, enervating one. The westerly winds are dry, and the easterly moist, the opposite of what obtains in Great Britain and Ireland.

The winter climate of the Riviera is clear and bright, with a good deal of wind, but devoid of fog or mist; with a mean of 8° to 10° higher than that of England, with half the number of rainy days, and four or five times the number of bright ones.

RESULTS OF THE RIVIERA CLIMATE IN PHTHISIS.

Before giving the results of 210 phthisical patients who passed one or more winters in this district, I will say a few words on my statistics generally. They are composed partly of cases hitherto unpublished, and partly of those already communicated to the *Medico-Chirurgical Transactions*, the latter being brought, as far as possible, up to date.

The duration of life is not calculated, because the object of the figures is solely to determine the exact influence of the climate on the patients during their sojourn at the health resort. Many of these patients went to various climates in succeeding winters. The results are divided into *general* and *local*. The general, referring to the functions of digestion and assimilation, circulation and respiration, to gain or loss of strength and weight, and to the main symptoms, including cough and expectoration. The categories of *improved*, *stationary*, and *worse* speak for themselves, and by *cure* is meant the disappearance of all symptoms of disease, and the restoration of the patient to apparent health. The local results are classified under the headings of "Arrest of Disease," where, in the case of first stage, or tuberculosis patients, all physical signs have disappeared, and in softening and excavation cases it signifies signs of contraction and entire disappearance of cavernous sounds. "Decrease of disease" means simply a diminution of the physical signs

either in area or intensity. "Advance of Disease" means the process of softening and excavation. "Extension" and "Advance and Extension" and "Stationary" all speak for themselves.

The examination of sputum for tubercle bacilli has been carried out in most of the cases since 1882, the year of Koch's discovery of the bacillus. The examinations have been made generally for the sake of diagnosis, no great importance being attached to its bearing on prognosis. A large number of the patients were treated before the era of bacillus discovery. Examination for lung tissue has frequently been carried out. The number of deaths it has been found impossible to ascertain, because many of the old patients have been lost sight of. In the more recent cases it has been ascertained, but to furnish this alone, without that of earlier cases, would only be misleading.

TABLE I.—Showing the Condition of Lungs of 210 Cases of Consumption who Wintered on the Riviera and in the South of Europe.

Stage	Number.	Percentage.	State of Lungs of those Wintering on the Riviera, etc.	Result.									
				Arrest of Disease.	Decrease of Disease.	Stationary.	Advance of Disease.	Advance and Extension.	Extension.	Unknown.	Improved.	Stationary.	Worse.
Tuberculisati- on, 1st stage	123	59	55 had right lung alone affected	5	22	9	9	6	1	3			
			28 had left lung alone affected	1	10	2	4	5	6				
			40 had both lungs affected...	2	9	8	11	5	5				
Softening and excavation. (2nd and 3rd stages) + tuberculisa- tion.	87	41	23 had right lung in 2nd or 3rd stage	3	8	5		1	5	1			
			8 had right lung in 2nd or 3rd stage, and left in 1st stage	1	2	1	3		1				
			29 had left lung in 2nd or 3rd stage	8	5	4	3	7	2				
			20 had left lung in 2nd or 3rd stage, and right in 1st stage	1	3	5	3	2	5	1			
			7 had both lungs in 2nd or 3rd stage	1		3	2	1					
				4	21	17	11	11	18	5	30	21	49
				12	62	38	35	27	30	8	37	18	45
										%	%		
										%	%		
										%	%		

Per Cent. Both lungs affected in 75 = 35.7
One lung affected in 135 = 64.3
Per Cent. Right lung alone affected 78 = 57.0
Left lung alone affected 57 = 43.0

One hundred and forty-nine patients were males and 61 females, the average age of the males being 29.53, and of the females 26.31. Family predisposition was present in 117, or 55.6 per cent., and hæmoptysis in 124, or 59 per cent.

The average history of tuberculous disease before wintering on the Riviera was—for males 26.46 months, and for females 26.11 months. The cases were those of chronic phthisis, some intermingled with inflammatory conditions, some of the hæmorrhagic type, and more of the scrofulous form.

The condition of the lungs of the patients has been given in summary in Table I, which shows that 123, or 59 per cent., were cases of tuberculosis without excavation, and that in 87, or 41 per cent., softening and excavation had taken place. Of the first stage cases, 55 had the right lung affected, 28 the left lung, and in 40 both lungs were attacked. Of the excavation cases there were right lung cavities in 23, right lung cavities with left lung infiltration in 8, left lung cavities in 29, and left lung cavities with right lung infiltration in 20.

Seven patients had both lungs undergoing softening or excavation. Summing up, we may say that the disease was unilateral in 135, or 64 per cent., and bilateral in 75, or 36 per cent.; and that 59 per cent had different amounts of consolidation, and 41 per cent. had cavities.

The 210 patients were scattered about the Riviera stations, 76 went to Hyères, 43 to Cannes, 25 to Nice and Cimiez, 36 to Mentone, and 23 to San Remo. Twelve visited various stations on that coast, 27 wintered in the south of Europe, being part of each winter on the Riviera, and many passed one winter at one health resort and the next at another, while some remained faithful to one station and passed five or even ten winters in the same place. According to our returns, more time was spent at Hyères than any other place. The average length of residence was nine months.

The general results of these cases showed 6 cures, 131 improved, making, with the cures, 65.23 per cent. of improved, 21, or 10 per cent., stationary, and 52, or 25 per cent., worse.

The local results (Table I), excluding unknowns, were as follows: Twelve instances of arrest (nearly 6 per cent.); 62 of decrease, making 74 improved, or 37 per cent.; 36 stationary, or 18 per cent.; 35 cases of advance, 27 of advance and extension, and 30 of extension, making in all 92 to be classed as worse, or 45 per cent.

This total cannot be considered very satisfactory for either category. The percentage of 45 of worse is high, but we must bear in mind the large proportion of excavation cases and of bilateral affections. If we examine the results of each class we see the first stages improved more than the cavity cases in the proportion of 41 to 30 per cent., and deteriorated less in proportion of 43 to 49. We also note that in the first stages the unilateral improved more than the bilateral as 45 to 27, or 5 to 3, and the right-sided cases progressed better than the left-sided; and the same held good with regard to the cavity cases, the right cavities showing greater progress than the left. When we investigate the individual cases of the above statistics, where the disease improved and even underwent arrest, we cannot explain why some patients prospered so much more than others.

The following cases are examples of the beneficial effect of this climate:

CASE I.—In October, 1875, a clergyman, aged 39, consulted me with a three months' history of phthisis following overwork. He had slight pyrexia, had wasted considerably, and I detected a cavity in his right upper lobe. He passed one winter at Bournemouth, taking tonics and cod-liver oil, but with no local or general improvement; and spent the following winter on the Riviera with great advantage, returning without cough or expectoration, and having regained his strength and weight. The signs of cavity were no longer present, and no physical signs beyond dulness and flattening remained. That was in 1876, and since that date he has been a hardworking clergyman in the Midland Counties, out in all weathers; and though occasionally under my care for the results of overwork, he has had no recurrence of lung disease, though sixteen years have elapsed since his return from the Riviera.

CASE II.—A young man, aged 20, with a decidedly phthisical family history, who broke down after overworking for a competitive appointment, and after four months of tuberculous symptoms, presented a cavity with extensive infiltration of the right lung. He spent the winter of 1873-4 at Hyères, lost his cough and expectoration, gained 2 stone in weight, and when he returned to England I could detect no signs of a cavity, but only dulness and slight flattening of the side. This gentleman held an appointment in the Army Transport Corps during the Zulu war, and distinguished himself, but afterwards contracted typhoid fever in the Transvaal and died at the end of 1879.

These patients may be considered fair instances of the arrest of tuberculosis in the excavation stage, and there are many of the same type to be found among the Riviera patients, some of whom are members and ornaments of the medical profession, who have not only recovered but struck root on the Riviera, and practised their profession for many years with advantage to their fellow countrymen and credit to themselves. Such cases as those of the late Dr. Henry Bennet of Mentone and Dr. Griffith of Hyères are excellent examples of what energy in a fine climate may do in arresting tuberculous disease. Where this climate does not arrest disease, it may prolong life for many years, as in the subjoined case.

CASE III.—A young lady, born in Brazil, though of Scotch parents, was seen by me September 6th, 1876, with a history of consumption of six months' standing, and tuberculosis of both upper lobes and of the left lower lobe. She had wasted considerably, and only weighed 6 stone. Her breath was short on exertion, her cough very troublesome, but there was no pyrexia. I had considerable hesitation in recommending her to winter on the Riviera, doubting her fitness to travel, but fearing the English winter for so frail a patient brought up in the South, I determined to make the venture, which turned out a successful one, and

advised Hyères. The case was unfavourable from the first, but she returned from Hyères greatly improved, with a cavity in one lung and a gain of 1 stone 6 lbs., and the cough and expectoration much reduced. She returned to Hyères, and passed altogether nine winters there. For three or four years the disease remained quiescent, but about 1880 there was a distinct increase in lung disease, and intestinal ulceration came on. She rallied, however, and continued to spend her winters at Hyères, and her summers at Leamington till she died there in the summer of 1885, nine years after I saw her first. This patient undoubtedly owed much to the climate of Hyères, especially to the sunshine, in which she revelled, as was not unnatural for a daughter of the South. The changes in her weights were remarkable. She was of medium height, but of a slender figure, and her weight would at times fall to 5 stone 10 lbs., and then increase up to 7 stone again, this undoubtedly depending on the amount of food consumed and the regularity of taking cod-liver oil.

The winter climate of the Riviera is not only clear and bright, but it is intensely stimulating, especially to the nervous system, and consequently is contraindicated in all neuroses, where the sedative element is required. Want of sleep is a very common complaint on the coast, and the general remedy is to go a few miles inland—to Cimiez or Grasse, for instance—where the Mediterranean influence is not so strong.

The cases which appear to do best on the Riviera are: (1) chronic bronchitis and emphysema; (2) chronic pneumonia with or without bronchiectasis; (3) bronchial asthma; (4) phthisis, in which inflammatory attacks have been the predisposing causes of the disease; (5) scrofulous phthisis; (6) unilateral first stage, which improves far more than bilateral phthisis, tuberculation cases generally improve more than cavity cases; (7) anæmia.

I have seen many cases of chronic pneumonia of some standing clear up with marvellous rapidity. Asthma does fairly well on the Riviera, and best of all at Hyères, partly on account of this climate being less stimulating than that of other resorts, and partly because the valley is a more open one than some others. For all cases, either phthisical or non-phthisical, where any degree of fever is present the Riviera is contraindicated, and experience points to its stimulating character increasing, instead of decreasing, the fever. It is also contraindicated in insomnia and in most nervous affections, specially hysteria, on account of the exciting qualities of the climate.

SOUTHERN CALIFORNIA.

Another dry, warm climate which must not be overlooked is that of Southern California, which somewhat resembles that of the Riviera, but is warmer and more equable. Its meteorology has already been alluded to in the first lecture, and in my tour through the United States last autumn I visited this region and carefully examined many of its towns and health resorts.

The Tehachapi mountains, running east and west across California, join the coast range and the Sierra Nevada, and what is called Southern California is the part of the State lying south of the Tehachapi, between the Sierra Nevada mountains and the Pacific. It is an irregular rhombus of country, situated between latitude 32.30' and 35.40', with a coast line of 330 miles. The western portion is traversed by the coast range of mountains, and encloses numerous beautiful and fertile valleys, and then widens out into a large plain, limited to the east by the Sierra Madre and San Bernardino ranges. The soil of this plain is composed partly of adobe or red clay—of which the picturesque old Spanish convents and mission houses are built—and partly of granite detritus. It lies at some height above the sea level, is protected from all cold blasts, and watered partly by streams and partly by irrigation canals, which the Californians have constructed with great skill and energy, and it is now one of the most fertile spots in the world. The fruits of both tropical and temperate regions are produced here, and while you see gigantic oranges and lemons, grapes, figs, and olives of the south of Europe, persimmons of Japan, guavas, locusts, custard apples, and pineapples of the tropics, you also recognise apples, pears, peaches, apricots, nectarines, mulberries, quinces, blackberries, raspberries, currants, and nuts of our own climate, so that a South Californian dessert is very cosmopolitan. Strawberries are to be had all the year round. Vegetables are in the same variety and profusion.

This plain, with the different valleys opening on it, and the western slopes of the Sierra Madre and San Bernardino Mountains constitutes a vast garden of hundreds of miles in extent, and supplies vegetables and fruit to the United States

all the winter through, and also exports tinned fruits largely to all ports of the world. Here is situate Riverside, with its famous magnolia avenue and orange groves.

The eastern portion of Southern California, north and east of the San Gabriel and San Bernardino ranges, consisting of the Mojave and Colorado deserts, lies at an altitude of from 1,000 to 3,000ft. The soil, being chiefly the detritus of granite, is good, but the barrenness is caused by want of water. The rainfall is very small indeed, being diverted by the mountains to the west, which condense all the moisture coming from the Pacific, and nearly all the streams of the San Bernardino range flow to the Pacific, and not eastwards. At present only cactuses and gigantic yuccas, or what are called yucca palms grow here; but parts of the Mojave desert have yielded good crops under irrigation, which is carried out by tunnelling the mountains, and it is likely that the whole will in time be brought under cultivation.

This tract has some remarkable depressions in it, which are supposed to have at one time formed part of the Gulf of California, and one of these, called the Arroyo del Muerte or Death Valley, is, in fact, below the sea level. The name was given after a party of emigrants perished there from thirst in 1850. It lies at the northern margin of the Mojave desert, about 200 miles from the coast, between the Funeral and Amargosa and Paríamint Mountains, is about 75 miles in length and 12 to 25 in width. This valley was formerly an old bitterwaterlake, and is now covered with a crust of salt and borax deposits, and devoid of all vegetation. The interesting point about the valley is its meteorology, it being one of the hottest and driest places in the world. Professor Mark Harrington, the Chief of the Weather Bureau, in an able report on this climate in summer, states that the temperature occasionally rises to 122° F., and has been known to reach 137°. It rarely falls in the five hot months below 70°, the average

summer mean temperature being 94° F. It is not only hot, but, being surrounded by high and bare mountains, persistently hot, during the five summer months, and the heat is increased by the warm blasts from the desert to the south. The air is in active motion, and there are often sand storms. The rainfall is 0.13 inch, the relative humidity is 29, the mean daily range 29°. In winter it is cold at times, and the radiation excessive. As a rule, all travelling through the valley must be done at night in summer; and there is a story of men becoming insane who have been exposed to noonday heat, that one driver taking a load of borax, in which a brisk trade is carried on, died with the water canteen in his hand. The cause of this great heat and aridity is the position of the valley, the sandy soil and wind adding to the dryness. There is nearly as much heat at Fort Yuma, further south.

However, it is not this portion of South California which is fitted for health stations, but the western part fringing the coast; and here, in the plain of San Gabriel and on the slopes of the beautifully wooded ranges, we find plenty of charming sites for invalid residence. Los Angeles, with pleasant villas and gardens; Pasadena, with its orange and lemon groves and its fine hotel; Sierra Madre, with its comfortable hotel *pension*, its vineyards, and extensive views from the hillside;

and, on the coast, Santa Monica, where there is an ostrich farm; Santa Barbara, a well-protected site; and San Diego, with the beautiful Coronado beach close to the Mexican frontier. At the last place I saw greater profusion of tropical vegetation than ever before. Also in North California, south of San Francisco, is Monterey, on the Pacific, a well-equipped station, with an excellent hotel, and good drives in the splendid pine woods. All these places have hotels, often good ones, and it invalids insisted on certain requirements they might be much improved; but at the present moment the Southern Californians do not understand that in their cities the unceasing noise of cable and electric cars detract from the conditions of repose needful for recovery; and more elasticity of rules and more attention to comfort are desirable even in the palatial hotels of which they are proudest.

The climate of Southern California depends for its warmth and equability on three factors:

1. Its southern latitude.
2. Its protection by the various mountain ranges from cold northerly or easterly winds.
3. The influence of the Pacific, and especially of the warm Kuro Siwo, or Black Japan Current, which washes the shores of the Western states.

All these are potent influences, but to the last is mostly due the warmth in winter and coolness in summer.

The Pacific Ocean off this shore, according to Dr. Orme, of Los Angeles, to whom I am indebted for much information, varies in winter temperature from 60° to 70°, and the degree of equability enjoyed by each of the health resorts depends on nearness to or distance from the sea.

The annual mean temperature of Los Angeles is 63° F. for the winter months (December, January, and February), 50° F. for the summer (June, July, and August) 65°—the maximum 103°, the minimum 32°. On the coast these figures give less extremes.

The rainfall occurs in the winter months, and ranges from 10.82 inches to 16.92, and the number of rainy days from 20 to 30 in the year. The relative humidity is from 60 to 75 on the coast, and diminishes on nearing the inland desert.

The winds are during the summer from the north and north-west, in the winter from the south and south-west, the Pacific Ocean being the principal source. There is one westerly wind called the chinook or Santa Ana, which is hot and disagreeable, and during its prevalence the air becomes highly electrified. Horses' tails stand out, and the hair crackles when stroked. The great drawback of South California are the mists which roll in from the Pacific, sometimes quite suddenly in the middle or afterpart of the day, and give a very raw feeling to the air. They are worst on the coast line, but extend many miles up the valleys, though they are said never to reach an altitude of 1,000 feet.

The strong point of the climate is equability, which gives it an advantage over most other warm regions like Egypt and the Riviera, for in South California a patient can live with comfort all the year round, the difference between the seasons not being accentuated. It is moister than its neighbours, Arizona, Utah, and Colorado, but still by no means a damp climate, and it allows of an open-air life, and of camping out

to any extent. The country is well suited for an invalid with a little capital to settle in and find profitable and healthful occupation in fruit or vegetable growing, for which there seems an unlimited demand, and, though the climate is by no means bracing, its equability, combined with dryness, prevents catarrhs and their consequences.

CASE IV.—I met a medical man in consultation in Bromley, in Kent, in July, 1884, and, on my remarking that he was apparently in a worse condition than his patient, he informed me that he had had hæmoptysis (3½ to 3½) sixteen days previously, and cough and expectoration for some months, with wasting. He had lost his mother, brothers, and a sister from consumption, and had been seriously thinking of leaving England for his health. He asked me to examine him, and, on doing so, I found at the right upper chest crepitation in the first interspace, with some dulness to the third rib. I advised his emigrating to South California. A few months later I received a letter from him in South California announcing his arrival, and I heard nothing more till in November, 1892, Dr. Orme brought him to my hotel in Los Angeles, looking very well. He then told me that he had brought his wife and family out, and had gradually improved in health, and, losing his cough, he had settled in practice some ten miles away, on the slopes of the Sierra Madre, and had been able to lead an active life and support his family ever since. He had some slight hæmoptysis last year, but, with that exception, had been well. The only physical signs were some tubular sounds in the first interspace on the right side. He spoke in high praise of the climate, specially of the lower ranges of mountains, which are always cool and pleasant and free from fogs.

The effect of cold climates in the treatment of phthisis and certain lung affections was at one time extensively tried in the State of Minnesota, and many Americans wintered at St. Paul's, Brainherd, and other places with some benefit, though cited results of this climate are not very striking. It is generally advisable to combine some other element, such as altitude, with dry cold.

MOISTURE.

Hygrometry, or the measurement of moisture in the atmosphere, is of as great importance as the measurement of heat, and the distribution of rainfall and the amount of relative humidity are of the deepest interest to medical men and their patients. We all know the refreshing effect, on our sensations, of rain falling after a long period of dry heat, when we seem to breathe more freely. On the other hand, it would appear that excessive atmospheric humidity prevents free evaporation, though it often promotes expectoration, and is therefore useful in bronchial affections. I have not many instances of the effects of an increase of humidity on the circulation, but the following is a striking one which occurred to a patient of mine.

A gentleman, aged 32, who had a well-marked cavity in his right lung and some tubercularisation of his left, was trekking in the Kala Hari Desert of South Africa. The climate was exceedingly dry, and a difference of 25° F. had been noted between the wet and dry bulbs. A thunderstorm came on, and heavy rain fell, and the patient immediately had an attack of hæmoptysis, having been free from that symptom for years previously.

We have already considered the effect of dryness as an element of climate, and have taken Egypt and the Riviera as examples of dry climates.

SEA VOYAGES.

The best example of a moist climate is that of the ocean, as it combines moisture with a saline atmosphere, and in the case of many sea voyages, with a well graduated rise or fall of diurnal temperature. The use of sea voyages in the treatment of lung diseases has long been advocated by Gilchrist, Maclaren, and others, and Dr. Walshe¹ gave it as his opinion "that a sea voyage, especially in the case of young adult males, will occasionally work more effectual change in the phthisical organism than any other single influence, or any combination of influences with which he was acquainted." On the other hand, Rochard showed, from the records of the French Navy, that phthisis was more common in the navy than in the army, and that, with rare exceptions, the course of phthisis was more rapid on board ship than on land. This last may be accounted for by the fact that at the time of Rochard's statistics the French navy cruised almost exclusively in the torrid zone. Rattray's² important observations on the crews of the Royal Navy during voyages in different climates, tend in the same direction, and show that the tropics should be avoided by natives

of colder and temperate climates, especially by the young, the weakly, and those suffering from chronic disease. Also that healthy adults should not remain too long in the tropics, and should quit them at once if strength and flesh begin to fail. The most striking result of Rattray's observations was the loss of weight under the combination of the tropics and salt diet in able-bodied seamen. This occurred in 81.55 per cent., the average loss being 4 lbs. When muscular exertion was added, the percentage of loss exceeded 91. These sailors in 104 days lost on an average 7 lbs., the shipboys not losing so much as the men. A wonderful improvement took place on reaching temperate climes. Rattray found that in the tropics the urine of the crews decreased 59½ to 42 per cent., and the perspiration increased from 8½ to 30 per cent. There was a diminution of 4½ per cent. of the fluid exhaled by the lungs, and a slight increase in that secreted by the bowels. The kidneys appeared to be the principal eliminators of surplus water, both in the tropics and in temperate regions; but the skin was most worked in the tropics, and the lungs in temperate climates.

Though the above results are taken from a number of healthy men and boys, for the most part hard worked in the tropics, and therefore somewhat differently circumstanced from our invalids, the evidence is in favour of avoiding the tropics as far as is possible in sea voyages. Before the use of high altitudes in the treatment of consumption, a sea voyage was held to be the most effective climatic agent; but of late years the number of invalids who have recourse to them has greatly diminished, and this for several reasons. The Australian or New Zealand voyage is the best climatologically, because it affords the longest spell of marine influence, and especially if a clipper be chosen in preference to a steamer. The best route is round the Cape of Good Hope.

The number of clippers has been greatly reduced of late years, and accordingly the choice is more limited. In this age of hurry and scurry many people object to being shut up in a vessel out of sight of land for three months at a time, passing a life which must be to a certain extent monotonous, and occasionally liable to being put on short commons or salt provisions if the voyage be prolonged by adverse conditions. About sea voyages in general it may be said that if the weather be fine, and the patient able to remain on deck, the circumstances are very favourable, as under no other conditions could he procure so much fresh air; but, in stormy weather, confined to his cabin, which is always small, often unventilated, with portholes closed and hatches battened down, a different state of things prevails, and even in moderate weather he cannot be always on deck, and seldom gets sufficient exercise: for the deck walking, except to the regular seaman, is apt to become very monotonous. He may, like too many, spend the greater part of the day in the smoking room, drinking spirits and betting on the speed of the vessel, and at the end of the voyage his state may be rather worse than at the beginning. Even sea sickness, though in most cases a passing ailment, does not improve matters. One reason for the decline in the use of clippers is the introduction of steamers, and particularly the increase in the traffic through the Suez Canal and the Red Sea, which of course makes the transit to Melbourne or Sydney a matter of five weeks, very different to the old three months of sailing vessels. Even of the clippers which are left, but few go and return by the Cape of Good Hope, as, for navigation reasons, the return by Cape Horn is preferred; but not so for the patient's sake, as I showed in my Lettsomian Lectures before the Medical Society, for passing Cape Horn necessitates nearing the Antarctic Circle, and a very chilly atmosphere prevails for nearly a month. The meteorology of an outward-bound voyage round the Cape from England to Australia in a clipper starting in October is briefly the following, as is shown by a diagram constructed by Mr. John Curtis of the Meteorological Office from the log of a clipper courteously placed at my disposal by Lieutenant Baillie, marine superintendent.

The temperature ranged from 53° to 58° F. for the first five days. Off the Azores it rises to 60°, and on passing Madeira to 69°. In crossing the line the maximum, 82°, is attained, but breezes are present and temper the heat; afterwards it gradually falls; in 30 S. latitude 70° is the average, and this sinks to 58° on reaching the Cape. After rounding the Cape the temperature, owing to the mixture of the warm Agulhas

¹ *Diseases of the Lung*. 4th Edition, p. 655.

² *Proceedings of the Royal Society*, 1869-72.

current with the Antarctic current, is uncertain, varying from 47.5° to 56°, the currents overlapping each other, and causing great varieties of atmospheric temperature. The vessel reaches 43 S. latitude and steers eastward, and, on account of the influence of the Antarctic circle, the temperature ranges from 47° to 55°, and rises to 67° on approaching the continent of Australia. The actual range of temperature is from 47° to 82°, the number of rainy days about 20. The relative humidity varies from 74 to 91 per cent., the average percentage being 82. When the Australian voyage is made in summer, and the patient starts in May or June, the temperatures do not greatly differ from the winter voyage, but the record in passing the equator is 85°, and, of course, Australia is reached in mid-winter. The return voyage from Australia or New Zealand to England *via* Cape Horn is not so favourable, as the ship starts at 52° or 53°, and often goes southward towards the Antarctic circle, and near Cape Horn the temperature falls to 41°, and for several days is often little over 43°, a rather wretched state of things. In 40 S. latitude a rise to 50° occurs, in 35 S. latitude to 60°, and off Rio de Janeiro 78° is attained. The line is crossed at about 82°, the Azores at 63°, and England is reached in the early part of June.

The chief consideration in making this voyage is not the season of the year at which it is commenced, but the time of arrival in England or Australia, it being advisable to land in either country in warm weather.

The effect of the first division of the voyage as far as the Cape is sedative, reducing the cough and quieting to the nervous system; the last, between the Cape and Australia, is a tonic one, when appetite is improved and weight gained.

The voyage to the Cape is a portion of the Australian one, but not so beneficial in its effect, occupying only at present from two to three weeks in a steamer. With two weeks' halt at Cape Town or its environs on the return voyage it ensures an escape of two months of an English winter.

The other winter voyages made by invalids are those to the West Indies in the Royal Mail steamers, lasting six to eight weeks, though the climate is too mild for bracing purposes, and the Brazilian voyage. This latter is the best, as a vessel touches at various ports—Lisbon, Teneriffe, Pernambuco, Bahia, Rio de Janeiro, Monte Video, and Buenos Ayres—and occupies two or three months; and here experience of temperate climates is intermingled with that of tropical.

Very different in its effects on consumptive invalids is the voyage to India and Australia through the Mediterranean, the Suez Canal, and Red Sea, for here we get great heat, and, accordingly, great depression. During a voyage, leaving England for India the end of October, the temperature in the Suez Canal rose to 81°, and in the Red Sea to 86.5° F. At Aden it was 83° to 84°, but after the vessel had left the Straits of Babel Mandeb it fell to 79°, but throughout the voyage to Bombay the thermometer records varied from 79° to 81° F., and after this the course soon became identical with that round the Cape. The great objection to this route is the usually intense heat in the Red Sea and Suez Canal, where the thermometer occasionally reaches 98°, which has a most disastrous effect on patients weakened by chronic disease, and in many cases induces diarrhoea and great languor and sweating. I have known more than one phthisical patient returning from Australia die in the Red Sea, overpowered by the results of the great heat, and many are deteriorated thereby. The danger on the homeward trip by this route is the transition, too, from the heat of the Red Sea and the Suez Canal to the comparatively cool atmosphere of the Mediterranean, especially if a tramontana be blowing at the time, a transition which checks perspiration, and, in some cases, induces temporary albuminuria, as has been shown by an intelligent surgeon of the P. and O. Service, who, on testing the urine of the healthy passengers after entering the Mediterranean from the Canal, found albumen present in all.

STATISTICS OF EFFECTS OF SEA VOYAGES.

I will now furnish some account of 65 phthisical patients who used sea voyages as a form of climatic treatment, and see what conclusions may be drawn from them.

Fifty-seven were males and 8 were females. This small number of the latter was probably due to the difficulty and expense of providing escorts or chaperons. The ages of the males averaged 25.77, and of the females, 26.5. The length of illness before starting was on an average 22 months. Family predisposition was present in 22 cases, or in 33.84 per cent.; hæmoptysis in 25, or in 38.46 per cent.

TABLE II.—Showing the Influence of Sea Voyages on the Condition of the Lungs in 65 Cases of Consumption.

Stage.	Number. Percentage.	State of Lungs before Sea Voyage.	Result.					
			Arrest of Disease.	Decrease of Disease.	Stationary.	Advance of Disease.	Extension.	Improved.
								Stationary.
								Worse.
								%
								%
								%
Tubercularisation, 1st stage	41 63	17 had right lung alone affected ...	3	6	2	2	4	
		12 had left lung alone affected ...	2	6	1	1		
		12 had both lungs affected ...	7	1	1			
			5	19	4	4	9	58 10 32
Softening and Excavation (2nd and 3rd stages) + Tubercularisation.	24 37	5 had right lung in 2nd or 3rd stage ...	3	1			1	
		5 had right lung in 3rd stage, and left in 1st stage ...	4		1			
		7 had left lung in 2nd or 3rd stage ...	3		2	2		
		7 had left lung in 2nd or 3rd stage, and right in 1st stage ...	2	2	2	1		
			12	3	5	3	1	50 12 38
			5	31	7	9	3	10 55 11 34
			Per Cent.		Per Cent.			
Both lungs affected in			24 = 37		Right alone affected in		22 = 34	
One lung affected in			41 = 63		Left alone affected in		19 = 29	

Table II gives at a glance the condition of the lungs in these patients; 41, or 63 per cent., were in the first stage, or that of tubercularisation, 17 having the right lung affected, 12 the left, and 12 both lungs; 24 patients, or 37 per cent., were in the softening and excavation stages; of these, 5 had a right lung cavity; in 5 right lung cavity with tubercularisation of left lung; 7 with left lung cavity, and 7 with left lung cavity and tubercularisations of upper right lung. Of the whole number there was single affection in 63 per cent., and double in 37 per cent.; 34 per cent had the right lung alone affected, and 29 per cent. had the left lung alone affected. Summing up, 63 per cent. were in the first stage; 37 per cent. in the second, and third, and 63 per cent had unilateral disease; 37 per cent. bilateral.

Forty-four made single voyages to their destination and back again, not always returning by the same route, and 21 took more than one voyage, sometimes venturing on a fresh route, sometimes repeating the same three, or four, or five, or even in one case ten times. The 65 patients took in all 118 voyages, and of these, 48 went to Australia and back round the Cape; 2 to Australia by Cape, returning by Cape Horn; 2 to Australia, returning by America; 2 to Australia to settle; 9 to New Zealand, of whom 6 returned home by Cape, 1 by Cape Horn, and 2 *via* America; 8 to India, round the Cape; 25 to the Cape and back; 8 to the West Indies and back; 1 to China and back; 2 to South America and back; 1 to the United States; ten sea voyages were made by one patient in the Indian Ocean.

It will be seen that the majority took the Australian or New Zealand voyage, and went and returned in clippers round the Cape, with the exception of 9, who either did not return to England or returned *via* America or Cape Horn. Consequently we have records of a good number of patients giving a fair trial to this form of sea voyage. The twenty-five voyages to the Cape and back, though much shorter, may be looked upon also as typical examples. The other voyages, though interesting from their effects in individual cases, are too few in number to draw any definite conclusions from as to the influence of each particular route.

The general results of the 65 sea voyages are: Cure in 3 cases, great improvement in 21, improvement in 26, making total of improved 50, or 77 per cent.; 1 stationary and 14 (or 22 per cent.) worse. The 41 patients with tubercularisation yielded 78.04 per cent. of general improvement, and the 24 softening and excavation cases, 18, or 43.75 per cent. of improved.

The general improvement consisted of gain of appetite, colour and strength, and above all, of weight; sea voyages surpassing all the other climatic groups in this particular. 25 of these patients were weighed before and after the voyages, and the result was 17 had gained, of whom 9 gained more than a stone, and the rest from 5 to 12 lbs. In 3 cases the fact of gain only was recorded. In 2 patients the weight remained stationary, and 6 lost weight.

The large gain of weight is to be explained by the improvement of appetite, the regularity of the meals, the plentiful supply of food at them, and the lack of opportunities for exercise.

The local results show arrest in 5, decrease of disease in 31, stationary condition in 7, advance of disease in 9, advance and extension in 3, extension alone in 10, or, joining the cures and decrease, we get a total of improved 36, or 55.38 per cent.; stationary 7, or 11 per cent.; and similarly joining the other categories, we obtain a total of worse 22, or 34 per cent. This local result is far less favourable than the general result, as comparison will show, and demonstrates that although patients during sea voyages improve in appearance, and even in the leading symptoms, the disease of the lungs may steadily progress. Hardly more than half improved, and one-third deteriorated. On further examining these cases we find that the tuberculation cases showed 58.54 per cent. improved, and 32 per cent. worse, and the excavation cases showed 50 per cent. of improvement, against 37 per cent. of deterioration. Among the first stage or tuberculation patients the unilateral and bilateral improved about equally, the percentages of improvement being respectively 58.62 and 58.34. The large proportion of improvement among the excavation cases compared with the Riviera and other patients rather indicates that the sea voyages are more strikingly beneficial in excavation than in tuberculous consolidation, this conclusion being opposed to the opinion held by Dr. Walshe and others.

When we compare the results of the different kinds of sea voyages, we find that the one to Australia comes out best. Of 49 patients 31 generally improved, 1 was stationary, and 9 became worse; or, in other words, 75 per cent. improved and 22 per cent. deteriorated. The local change is not so great, 61 per cent. improving, and 29.27 per cent. deteriorating. The Cape cases showed 11 general improvement and 4 worse, which is also a good result against 8 local improvements and 4 worse, or the improvements about double the deteriorations.

An interesting feature, and somewhat opposed to Rattray's conclusions, is that the patients who voyaged to India *via* the Cape improved generally and locally, and the one who took ten voyages in the Indian Ocean improved greatly. All these patients must have been for some time exposed to tropical climates.

With regard to the forms of phthisis specially benefited by sea voyages, I would place the scrofulous or strumous form first; next the hæmorrhagic type, marked by limited consolidations and large recurrent hæmoptysis; next, the chronic unilateral cavity cases, without great local irritation. Whether sea air promotes the fibrotic process or no, I cannot say; but to judge by my cases contraction of cavities takes place very frequently during sea voyages. Cases of early consolidation do not progress so well as in certain other climates, though they do not fare badly.

There is no evidence that sea voyages exercise any special influence on the tuberculous disease, except possibly by promoting fibrosis; but where there is septic discharge in the form of chronic abscess, fistula, and the like, sea air seems to promote a healing process. The effect is most marked in empyema, where it is often marvellous. I have sent empyematous patients with drainage tubes in their chests on sea voyages, and the result has been highly satisfactory, the discharge gradually ceasing and the cavity granulating up sufficiently to allow of removal of the tube.

Other cases that profit largely by sea voyages are the mentally overworked, who find in the monotonous routine, amid the soothing influence of a saline atmosphere, that rest which was denied to them in the busy hum of cities. As an example of the benefit of sea voyages I would instance the following three cases:

CASE V.—A warehouse clerk, aged 38, employed in a dusty atmosphere,

but fond of athletics, consulted me on November 1st, 1889, complaining of cough, tinged expectoration, and night sweats, with some, though by no means great, loss of weight. He had a well-developed thorax, but dullness and cavernous sounds were detected in the first interspace on the right side, and crepitations above the left scapula. The sputum contained tubercle bacilli. I prescribed cod-liver oil and a tonic, and advised a voyage round the Cape to Melbourne. He improved slightly under treatment, and started at the end of November. He lost his cough on the outward voyage. On arrival he visited Melbourne and Sydney, and returned home *via* Singapore, Hong Kong, Japan, Vancouver, and the Canadian Pacific, across North America. I examined him in September, 1890, and found him wonderfully better, with no increase of weight, but free from cough or expectoration. On the right side there was flattening and dullness with faint tubular sound in the first interspace. No cavernous sounds could be detected on coughing. Crepitation was still audible above the left scapula. He returned to work and, in the following April, 1891, came to me again. He had stood the severe winter well, and gained 11 lbs. No cough or expectoration, but once he had slight hæmoptysis. No signs could be detected in the left lung, and none in the right, save slight flattening and dullness. I hear that he still keeps well.

CASE VI is that of a law student of Edinburgh, aged 27, who consulted me on November 9th, 1877. In 1868 he had cough and expectoration, and the late Dr. Warburton Begbie found tuberculous disease in the right lung. He had improved under cod-liver oil and tonics, but the cough persisted, and in the last four months he had lost 9 lbs. He was working hard at his studies. There was no fever or wasting, and I recommended a voyage to Australia. I saw him on his return, in September, 1878, and found him greatly improved. On the outward voyage he had lost his cough and gained 8 lbs. He remained in Australia three months and a-half, and lost 6 lbs. during this stay; returned round Cape Horn, and again gained 4 lbs.; but off the Azores he was chilled by night exposure, and caught cold with fresh cough, which however had subsided when I examined him. I could detect no physical signs in his chest. He returned to his work, and though he remained a good deal in the house during the ensuing winter he had no return of his symptoms. A careful subsequent examination, in August, 1879, also failed to detect any physical signs. This case was interesting because the disease, first detected by Dr. Begbie, was of several years' standing when he tried the experiment of a sea voyage, and yet the result was very satisfactory.

CASE VII, an Irish gentleman, aged 40, who consulted me in October, 1877. Five years previously cough had come on, followed by hæmoptysis to the amount of a pint, which was repeated, to a less extent, every two or three months until June, when the hæmorrhage became more frequent, recurring every month during June, July, and August, when it ceased. Each attack as a rule lasted for ten days. Pulse and temperature quiet, and there was considerable yellow expectoration. I detected tubular sounds above the right scapula, and crepitation under the left clavicle and scattered over the whole posterior surface of the left lung. I advised a tonic and cod-liver oil, strong counter-irritation to the left chest, and a voyage to Australia; which last recommendation was not carried out. I saw him in March, 1878, and learnt that he had used counter-irritation largely, and had persevered with the cod-liver oil. He had had several attacks of hæmoptysis, but only in small amounts. The crepitation sounds in the left lung had diminished, and he had gained some weight. He now, on my repeated advice, took a voyage to the Cape, remained twenty-four days on shore, and then returned, and came to me in June, 1878, when I found him well bronzed, without cough or expectoration; breath not short, and the physical examination showed only a small area of crepitation over the left posterior apex; the right lung was clear. He returned to Ireland, and I did not see him again till February, 1886, 7½ years later, when he told me he had been very well till that winter, when his breath was becoming short on exertion, and there was evidence of contraction of the left chest. I came to the conclusion that the left lung was undergoing fibrosis. This was a well marked case of hæmorrhagic phthisis, which appears to have become arrested by the voyage to the Cape. Probably fibrosis set in early, though it was little manifested till some years later. The remarkable feature was the entire cessation of the hæmorrhage from the date of the voyage, though it had recurred with great frequency and regularity previously.

CASES IN WHICH SEA VOYAGES ARE INDICATED.

Sea voyages may be recommended in the following cases: (1) Chronic pleurisy and chronic empyema. (2) Chronic bronchitis. (3) Various forms of scrofulous disease, including scrofulous phthisis. (4) Hæmorrhagic phthisis. (5) Tuberculous excavation, where the cavity is limited and the disease unilateral. (6) Neuroses, the result of overwork, and especially insomnia.

Another important group of moist climates are the British South Coast Stations, which were fully discussed in my Lettsomian Lectures,³ to which those interested are referred.

³ *Influence of Climate in Pulmonary Consumption*, Smith and Elder.

TREATMENT OF CHRONIC INEBRIETY IN SWITZERLAND.—The powers which the communes of several cantons like that of Berne possess and exercise in the case of habitual inebriates, in order to safeguard the general interests of the community, are considerable. If the communal authorities have sufficient grounds to satisfy them that any member of the commune is dissipating his property and means of livelihood in such a manner as to render it probable that he or his family will eventually become chargeable on the communal funds, they can interfere administratively by placing him and his property under guardianship, and, in the case of an habitual drunkard, can put him into an asylum for inebriates.