room when the dissection is made, as, though he decline to touch, yet his person and clothes may become infected by the poison. There may possibly be a doubt whether one who dissects bodies altered by decomposition or antiseptic injections, as they are commonly found in the dissecting-room of medical schools, is so liable to contaminate a puerperal patient as he who makes an necropsy soon after death. Semmelweis, however, believed that animal matter in a state of putrefaction would cause puerperal fever, and immediately lessened the mortality, during the fearful epidemic of puerperal fever which raged in the Vienna Hospital in 1846 and 1847, by obliging all dissecting students to wash their hands in chlorine or chloride of lime before making vaginal examinations. Impressed by Semmelweis's views and opinions, I endeavoured, during my occupancy of the Chair of Obstetric Medicine at King's College, to prevent students frequenting the dissecting-room and *post mortem* theatre from attending midwifery cases, and the result was a very small mortality in the outdoor maternity charity.

This care about absolute cleanliness of the hands in attending labours should extend even to occasions when a medical man has had digitally to examine patients suffering from offensive discharges either proceeding from the surface or from the interior of the body. We have heard in this discussion that the discharges from cancer may produce fever in a lying-in woman; and this is probably true of other putrescent discharges. I have had grave anxiety, extending over some weeks, about a patient after her delivery; because I had gone straight from an instrumental case where labour had been so protracted that febrile symptoms had set in, and the passages had become influenced, so as to pour out an irritating muco-purulent discharge.

When a medical man has a bad case of puerperal fever in his own practice, or is required to see one in consultation, he should certainly not go direct to another midwifery patient without first changing his clothes, besides careful ablution of his hands; and he will be all the safer in his ministrations if he adopt some of those precautions mentioned by Dr. Swayne and others, such as using a Turkish bath, or the more radical measures for disinfection recommended by Dr. Wynn Williams, and for the details of which I may refer to his speech.

Many chemical substances have been recommended to be added to water for purifying the hands: iodine, chlorine and its compounds, sulphurous acid, cyanide of potassium, carbolic acid, and the permanganates. It matters not which agent is employed, so long as it is used carefully and efficiently; and if it be necessary to disinfect clothing, this is readily done by exposing it in an oven to a high temperature, for which many upholsterers have a suitable arrangement. With all deference to Dr. Matthews Duncan, I have no doubt that every medical practitioner who earnestly desires to promote the welfare of his patients and to keep himself blameless should at once abstain from attending fresh cases of labour when one or more of those recently delivered by him have died with acute febrile symptoms, or are still so ill as to require his constant visits. When, indeed, there is the remotest suspicion that he may convey the poison in his own person, he should not incur the risk of disseminating it. How long he ought to absent himself from midwifery practice, is yet a moot point. Dr. Swayne thinks a medical man should seclude himself for a week only; others think a month hardly sufficient. The remarkable experience of Dr. Huntley of Yarrow led him to believe that he actually generated poison in his own body, as the result of some faulty process, which he communicated to his patients. Taking all the circumstances into consideration, I am disposed to recommend a week's seclusion after regular attendance has ceased on a single puerperal fever case. When a series of cases have occurred in the practice of any one medical man, he should absent himself from midwifery practice for a month at least. During either the short or the longer interval of seclusion, the means for disinfection should be fully carried out.

Finally, I have to say a word or two as to the propriety of attending patients suffering from scarlet fever or other zymotic disease, and lying-in women, at the same time. After what has been said in this debate, I cannot expect the same accord of opinion as on other parts of the ground I have gone over; but I would earnestly beg those who have as yet had so favourable an experience, when attending the two sets of patients conjointly, to ponder well what has been said by others on the reverse side of the question. It cannot be expected that men in general practice, who may be in charge of a scarlet fever or small-pox patient, shall at once relinquish all midwifery practice for the time being, because zymotic diseases are so prevalent that this would practically preclude their attending confinements altogether, or make their attendance on midwifery patients so irregular as to be unreliable. Nevertheless, in view of the dangers which have been indicated by various authorities, albeit their experience may seem to point to different conclusions, they are bound to exercise vigilance, lest perchance they slip into a pitfall unsuspected by them. In seeing an ordinary case of illness, a medical man

rarely hitherto stays sufficiently long in the sick-room to concentrate any considerable dose of contagium about him, and the after-exposure to fresh air in passing from house to house no doubt usefully dissipates any smaller quantity. I would suggest, however, to those treating infectious cases, and liable at the same time to be summoned to cases of midwifery, or who may be in attendance on puerperal women, that they should not stay long in the sick-chamber; not undertake the duties of nurses, as Dr. Duncan puts it; that they should see puerperal patients before seeing infectious cases, and never go from the infectious case direct to the lying-in room, without changing clothes and the most careful ablutions. Some doctors change their clothes and wash with a disinfectant whenever they have seen infectious cases. Whatever either will, or may, conduce to the wellbeing of patients, will, I am sure, not be regarded as either too irksome or troublesome by any member of our profession.

[The rest of the address was occupied with interesting biographical sketches of Sir C. Locock and other eminent obstetricians whose loss the Society has had to deplore during the past year, and of whom obituary notices appeared at the time in our pages.]

LETTSONIAN LECTURES ON THE INFLUENCE OF CLIMATE IN THE TREATMENT OF PULMONARY CONSUMPTION.

Delivered before the Medical Society of London.

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LECTURE I.

MR. PRESIDENT AND GENTLEMEN,—When the Council of the Medical Society did me the honour to elect me Lettsoman Lecturer for the present year, some doubts arose in my mind as to what subject would be of interest to the Fellows; but I have decided that the objects of a Society like this would be best attained by selecting some avowedly obscure subject on which light may possibly be thrown by an accumulation of facts, dry though these facts be. Therefore, I choose the Influence of Climate in the Treatment of Pulmonary Consumption, because the large clinical stores laid up by my father and myself may enable me to draw some deductions on this weighty topic.

The study of climate has from time immemorial engaged many and skilful workers, and our knowledge of meteorology has made special strides in the last half-century. Few countries exist where observations, barometrical, thermometrical, hygrometrical, are not daily taken either in Government observatories or by private individuals; and each morning our *Times* newspaper brings us tidings of the weather telegraphed from various parts of Europe, and anxiously looked for by farmers, by doctors, by seamen, and even by the old ladies waiting for a fine day to cross the Channel.

A storm appears off the West Coast of Ireland, and is instantly wired to Victoria, and thence intelligence is despatched to every part of the kingdom; and, when the rude south-wester appears among us, he finds hoisted drum-signals, and our vessels—that is, those with wise skippers—snug in harbour, and fewer victims abroad for his vengeance.

Several praiseworthy attempts have been made of late to trace the effect of weather on the causation of disease, and some information on this subject has been furnished by Dr. William Farr and by Dr. Edward Ballard; but a very wide field remains open to all medical men to connect more closely the phenomena of the atmosphere with those of the human body. There is no lack of excellent works on climate, with ample meteorological data, and even long lists of the diseases prevalent on this or that soil, in order to furnish us with grounds for forming a theory as to the appropriate climate for certain diseases; but of actual results on patients we have but few tabulated records, and to these, it must be allowed, we should strive to make additions.

In contending with the great scourge of all classes in this country—pulmonary consumption—we employ a number and variety of weapons, each, as we think, suitable to the particular case in question, and brandished with different degrees of faith and hope, according to the amount of those qualities present in the practitioners' and in the patients' minds. If any improvement be visible, we are so thankful for it, that no attempt

is made to assign to each remedial agency its proper share in the work, or to separate the useful from the useless; and this is the more to be regretted because, unless we do so, it will be impossible to lay down a practical basis for future therapeutical success, the value of each such agency remaining an unknown quantity.

It must not be supposed that I underrate for an instant the valuable works of Sir James Clark, James Johnson, Scoresby Jackson, Henry Bennet, and others; on the contrary, I owe them much; but I maintain that the great gap in our knowledge at present lies in the non-publication of results of climate on disease. Hundreds, aye, thousands, of patients leave our shores yearly in the pursuit of health, and how few records of this great annual climatic experiment are communicated to the profession! Mentone and Madeira have, among others, given some results collected by local practitioners, and the experiment of the Brompton Hospital in sending patients to Madeira supplied some impartial information on the effects of that climate on phthisical patients of the English lower classes. The object of these lectures will be fully attained if thereby others with ample opportunities be induced to come forward and give us the fruit of their long experience on these points. Before proceeding to offer some practical results of climatic treatment, it will be well to consider the exact relations which climate holds to pulmonary consumption, and these may be roughly classed as threefold.

Firstly, as a direct cause of the disease.

Secondly, as affording immunity from the disease.

Thirdly, as ameliorating and curing it.

Now, it is an undoubted fact that, however much consumptive disease we may assign to the causation of bad food, defective ventilation, injurious occupations, heredity and the like, for a very large number of cases climate and soil are answerable; and this is the more certain because the disease is found in various parts of the world, irrespectively of habits and of races. Phthisis originates in all latitudes, from the equator, where, with slight variations, the mean temperature is 80 deg. Fahr., to the temperate zone, where it averages about 40 deg. Fahr., with great and sudden variations. It prevails in cold and humid climates, and also in hot ones, though a remarkable difference shows itself in the forms prevalent in temperate and in tropical countries. In the former, it is extensively associated with catarrhal and inflammatory attacks, and, as a rule, runs a chronic course; in the latter, it is marked by febrile symptoms and a very acute course, having much the character of rapid and general blood-poisoning, attacking other organs besides the lungs, and lasting only a few months, and sometimes only weeks. This form has been well depicted by Guilbert and Boudin, and prevails in the littoral of Peru, in the West India Islands, and in the Society and Marquesas Islands, where it causes great ravages. According to M. Comeiras, it carries off one-third of the population at Tahiti, prevailing more among the women than the men, which is exactly the reverse of what obtains in this country. Whole families become a prey to convulsive cough. Young girls in various stages of phthisis are abandoned by their parents, and reduced to a state of emaciation dreadful to witness. In a few weeks, the Tahitians pass from a most flourishing state of health into most complete wasting. This seems to be a good case of climate causing the disease, as Mr. Erdhel writes that some of the sailors of the French frigate *Sirène* were attacked with this severe form of consumption while in port at Tahiti, and, in a crew of 680, twelve died and a large number had their lungs affected.

As might be expected, different climates are the agents of causation in different races. Mr. Busk told me that, when surgeon to the *Dreadnought* Hospital, he made a number of *post mortem* examinations on South Sea Islanders, who had worked their passage on board English ships to London, and, on arriving in that port, had been attacked with acute tuberculosis, which had proved fatal in a few weeks.

Another good instance is derived from those invaluable stores of climatology, the Army Medical Reports. These demonstrate the effect of the various climates on the negro troops, and show that, whereas at Sierra Leone the phthisis mortality is 6.3 per 1,000, in the Mauritius it is nearly 13 (12.9) and at Gibraltar, a station regarded as very healthy for European troops, it reaches the enormous sum of 43 per 1,000. This result is the more striking, because the phthisis mortality for white soldiers at Gibraltar is only 5.3 per 1,000, and establishes, says M. Boudin, the incompatibility of the negro race with the climate even of the South of Europe.

We may fairly conclude, therefore, that certain forms of climate are direct causes of consumption to certain races; and next let us consider how far climate affords exemption from the disease. We will carefully study the theories of immunity from phthisis mentioned by authors, which may be described as follows.

1. The high altitude theory.

2. The theory of great cold causing immunity.

3. The theory of the immunity from phthisis from the prevalence of ague.

The first or high altitude theory is at present the one most discussed, and has been strongly advocated by Archibald Smith, Fuchs, Lombard, Brehmer, Küchenmeister, Mühry, and Hermann Weber, among others. Fuchs, in 1853, noticed that the phthisis mortality in towns on the sea-level, instancing Hamburg and Marseilles, was far larger than that of other towns situated at various elevations above it. He found that the phthisis mortality at Hamburg compared with the total mortality was 25 per cent.; whereas at Eschwege, 496 feet high, it was only 12 per cent.; and at Brotterode, in Thuringia, 1,840 feet above the sea-level, the percentage was only 0.9.

Brehmer denies the existence of phthisis in Görbersdorf, in Silesia, which is 1,700 feet above the sea-level; and Virchow states that the disease is rarely seen in the Spessart, which lies about 1,400 feet high. Dr. Lombard of Geneva was one of the first to draw attention to the comparative rarity of phthisis in the high-lying habitable districts of Switzerland; and he remarks that he had never known an instance of phthisical disease among the monks of St. Bernard. The best edition of his work, *Le Climat de Montagnes*, contains a mass of information, with his latest opinions on the subject. His original facts have been supplemented lately by the results of the Helvetic Society of Natural Sciences, which took up the subject, and sent out circulars to the Swiss medical men living at various altitudes, to request them to furnish information as to the relative phthisis mortality in their districts for a period of five years; viz., 1865-1869 (inclusive). Four cantons—Valais, Neuchâtel, Vaud, and Geneva—were assigned to Dr. Lombard, and he has arranged their statistics in three classes, according to the altitude of the locality.

1. Statistics of localities of low altitude (*basses régions*), situated between 1,250 and 1,650 feet above the sea-level.

2. Statistics of localities of moderate altitude (*régions moyennes*), at an elevation of between 1,725 and 2,700 feet.

3. Those of high-level localities (*hautes régions*), situated from 2,700 to 4,000 feet above the sea-level.

The "low-altitude" class gave a phthisis mortality of 10.2 per cent.; the moderate altitudes, one of 9.4 per cent.; and the high level, one of only 5.1 per cent.; and certainly these bear out Dr. Lombard's conclusion that, while localities of low and moderate altitudes—that is, between 1,250 and 3,000 feet—present a large phthisis mortality, above this "phthisis zone", as he terms it, the disease diminishes, becoming extremely rare; and above 5,000 feet it disappears altogether.

Similar evidence is given by Drs. Berry and Brügger from the Upper Engadin, lying 5,000 and 6,000 feet above the sea; and by Dr. Spengler at Davos-Platz, situated at a slightly lower elevation. These authorities state that phthisis is unknown in these tracts, except in persons who have contracted it at a lower level; but that the migratory and enterprising habits of these mountaineers lead them to quit their untainted fastnesses, and to wander over Europe in search of gain, and residing in towns they contract phthisis.

By far the most valuable testimony, however, was afforded by the originator of the theory, Dr. Archibald Smith, in reference to the Peruvian Andes, where he practised for twenty-five years, residing at various levels above the sea, at Lima, at Cerropasco, and at Huanuco, and made good use of his opportunities in studying the climate. He noticed that, while phthisis was not uncommon, and, moreover, assumed a very acute form, near the sea, it was unknown in the regions above 8,000 feet, except, to use his own expression, "as an exotic". This evidence is important, because we know that, even up to 13,500 feet, large towns are found in that part of South America, such as La Paz, the capital of Bolivia; and therefore there probably exist some of the causes specially favourable to the development of phthisis, inseparable from town-life, such as overcrowding and indoor pursuits, and other unsanitary conditions, from which the scattered hamlets and chalets of the high regions in Switzerland are for the most part free.

In confirmation of Archibald Smith, Dr. Tschudi stated that he had never seen a case of phthisis among the Indians of Peru who live in these elevated regions. Jourdanet fixed the immunity line in Mexico—that is, between 20 and 30 degrees north latitude—at about 7,000 feet; and he drew attention to certain peculiarities in the conformation of the Mexican Indians, who, though of middle height, have unusually large and wide chests, quite out of proportion to their size. He considered that it is their enlarged chests which enable them to undergo such great exertions in walking and climbing. It is not impossible that this change in their development is due to the effect of low barometric pressure.

Küchenmeister, then, with true German ideas of generalisation, constructs a system, fixing the elevation of immunity from phthisis for every

degree of north and south latitude; and states that, for Germany and Switzerland, the removal of one degree from north to south would render an extra elevation of 375 feet necessary; and inversely from south to north, this immunity level would fall 375 feet. This necessitates an elevation of 3,000 feet for Switzerland, and about 9,000 feet at the equator. The causes of this alleged immunity are variously given. Some state that the constitution is improved by increase of appetite and of the powers of digestion; others, like Dr. Walshe, hold that the continued inhalation of rarefied air causes increased capacity of the lungs and chest; and it must be admitted that Jourdanet's observations, mentioned above, confirm this opinion.

Such is the mountain theory; and we will now proceed to examine it.

The first great objection appears to be that it entirely ignores all factors which constitute a climate, other than altitude, such as soil, site, prevalent winds, rainfall, moisture, and temperature. It might be argued, as regards Switzerland, that the diminution of phthisis in the higher districts was due to the fact of the population being more scattered, or, as Dr. Lombard very properly suggests, to the substitution of agricultural open air habits for more or less in-door pursuits, and to the greater dryness of the soil and air. Furthermore, as Dr. Symes Thompson has pointed out, it might be better to take as a basis isothermal lines rather than those of latitude; it being ascertained that various places within the same degree of latitude often differ entirely in climatic conditions.

The second objection applies specially to Küchenmeister's attempted classification; for while he fixes the immunity line for phthisis at about 3,000 feet for Switzerland, Lombard's statistics give us a phthisis mortality of five per cent. up to nearly 4,000 feet, which as far as Switzerland is concerned, demolishes this neat generalisation; and Lombard himself is of opinion that no exact line of immunity can be drawn.

Dr. Hermann Weber, in his classical contribution to the *Medico-Chirurgical Transactions* on "Treatment of Phthisis by prolonged Residence in Elevated Regions", also considers that it is scarcely probable that a fixed elevation for immunity will be found for every degree of latitude, as even in the same mountain-range he detects differences in this respect; thus he ascertained the existence of phthisis at Splügen (4,700 feet) and at Andermatt (same level), while it was absent at Klosters, a few hundred feet lower; and even in the Engadin, which boasts of entire immunity from the disease, Dr. Ludwig found a case of consumption in a man who had never lived at a lower level than 4,000 feet.

But the crowning objection appears to come from Asia, from the Kirghis land. According to M. Maydell, this vagrant population of upwards of a million in number are quite exempt from phthisis, although they live not on Himalayas, or Andes, or on Alps, but on a steppe one hundred feet below the sea-level. The fact of their feeding on koumiss has, it should be mentioned, been urged as a reason for their immunity.

And to sum up: though it is evident from the experience of the high climates of the Andes that great elevation when combined with warmth and dryness may bring about immunity from the disease, this is not invariably the case in mountain regions, and a like immunity may exist under the very opposite circumstances; viz., at low levels.

The chief features which appear to be common to all mountain climates compared with low-lying districts, are the lower barometrical pressure; and, in winter, the greater dryness from the comparative absence of vegetation, as well as the increased power of the sun's rays from the greater clearness of the atmosphere. This phenomenon has been well established by the observations at Davos, in Grisons, of Dr. Frankland and of Mr. Waters; and is proved, also, by the tanning of the skin in patients who have wintered there. This greater warmth from the sun explains, also, the accounts of mid-winter picnics, at which we, in this mild insular climate, shudder, and hardly realise. We must not, however, lose sight of the very various conditions attached to mountain climates; for how can we reconcile that of Santa Fé de Bogota in the Andes having a mean temperature similar to that of Malaga, with the snows and frost of the Grisons?

A second theory is, that great cold causes immunity; and that, as you advance further north, the phthisis mortality decreases. A strong argument in favour of this is the rarity of the disease in Finmark, in the northern portions of Scandinavia, in the Faroe Islands, and in Iceland. Shetland was formerly considered free from the scourge; but the careful report of the late Dr. Saxby of Unst shows it to be as prevalent there as in the north of Scotland. As regards Iceland, Dr. Leared and Dr. Hjaltelin maintain, from a very large experience, that phthisis does not exist there; on the other hand, Dr. Mac Cormac quotes from Dr. Schleisner, who was sent by the Danish Government to report on the sanitary condition of Iceland, to the effect that twenty-

two cases of phthisis came under his notice in the island, of which five had vomicae of the lungs, besides his meeting with several scrofulous families. Dr. Mac Cormac also tells us that the late Sir Henry Holland, during his last visit to Iceland in 1871, was called to see two patients with Dr. Hjaltelin, and both of them proved to be cases of pulmonary consumption.

Greenland and its Esquimaux have often been cited as an instance of immunity from phthisis; and several visitors have stated that, while influenza prevails extensively, consumption is practically unknown. Now, I have in my possession an interesting document which throws considerable light on this subject; it is the Government list of mortality in Greenland from 1870 to 1874 inclusive, furnished by the governor to Mr. Gwyn Jeffreys on his return from the Arctic regions in H.M.S. *Valorous*. It has been translated from the Danish by the naval surgeon. According to this, the population consisted, in 1874, of 4,115 Esquimaux and mixed breeds. In 1871, 46 persons died of diseases of the chest, under which heading are classed phthisis, pneumonia, bronchitis, and pleuritis. In 1872, the deaths under this heading were 63; in 1873, 19; in 1874, 35. With the exception of epidemics, diseases of the chest furnished the largest quota of the mortality. The report states that measles was prevalent in 1872; that typhoid fever killed many in 1871; and that ophthalmia is very frequent. Venereal diseases are unknown, and consumption is common. Competent medical men are said to be scarce in Greenland; and perhaps this accounts for the number of deaths from each form of chest-disease not being distinctly specified; but it must be admitted that the report, as far as it goes, leaves little doubt as to the existence of pulmonary consumption in that country; and it is possible that further investigations may give similar results as to the mortality of other cold countries.

A negative argument in favour of this theory is the virulent form of the disease when it prevails in hot climates, such as Tahiti, the Marquesas, and Bourbon; but here, again, our valuable army reports assign to the presidency of Madras, an exceedingly hot region, one of the lowest phthisis mortalities of all the countries where the British Army is stationed; while among the Sepoys, the mortality from this cause is even less, being but .6 per cent. Thus, I fear, we must conclude that cold alone will not give immunity.

The third theory of immunity, viz., that from the prevalence of ague, is supported by some striking evidence. Dr. Green reported of White-hale, United States of America, that, where marsh-fevers prevailed, no instance of phthisis was developed; and he also states that, on a marsh near Rutland being drained, the endemic intermittent fever disappeared, and phthisis, hitherto unknown, then became common. At the request of the inhabitants, the old order of things was reverted to, and the marsh re-established, when fever reasserted her sway to the banishment of consumption. Dr. Drake of the United States of America gives evidence to the same effect; and Professor Schönlein recounts an interesting example occurring in Switzerland, in the boggy tracts which separate the lakes of Zurich and Wallenstadt; for when this country was drained, malarial fevers ceased, and a new enemy, phthisis, took their place.

Many other physicians give testimony to the same effect, and show that the antagonism of ague to phthisis is stronger in the centre of a marshy district than on its confines, though even here cases of phthisis are comparatively rare. Children born in malarious countries seem to lose this strange immunity when sent away, as is often the case, for educational purposes; but it is alleged that the course of phthisis, when once established, is considerably retarded by removal to a marshy district. My own observations, however, run somewhat counter to this last statement; for in several hopeful cases of arrested phthisis under my care, attacks of intermittent fever have rekindled the disease, possibly by congestion, and hastened on the process of lung-disorganisation to a fatal issue. Mr. Gulliver tells me that in the Fen district of Lincolnshire consumption was once a sort of myth among the medical men; and in Mr. Haviland's splendid map of the distribution of phthisis in England among females, Lincolnshire still shows a very low mortality from phthisis, which, according to the author, can only be explained by the fact of malarious districts still existing. That a certain amount of consumption prevails in Lincolnshire I can testify to; for instance, in the neighbourhood of Navenby, bordering on the Fens, I saw a case of clearly endemic phthisis, in consultation with Dr. Andrew Campbell, who informed me that the disease was common in that district. The theory of certain kinds of food causing immunity from consumption seems to rest on some foundation, though the facts accumulated are too few to substantiate it thoroughly. The great instance, already alluded to, is that of the Kirghis and their mare-koumiss; but this diet has been tried in other parts of Russia without the nomad life, and has failed; and it remains to be seen what results the Koumiss Cure Establishment, lately set up at Wiesbaden, may give. There is no doubt

that many predisposed to phthisis are yearly saved by the adoption of a highly oleaginous and nutritive dietary.

We now approach our third topic; namely, climate as a curative agent in consumption. Now, I touch on this part of my subject with some timidity, because I know that great scepticism has often been expressed as to whether climate ever does much good in consumption, and whether we are at all justified in recommending change of climate to a patient in whom the signs of consumption have been detected; but this is one of my chief reasons for making this the subject of my lectures, in order to offer to the Society some fair data to go upon in the matter. There is no doubt that in all climates and in all countries there have been recoveries from phthisis; and, moreover, many instances of phthisis arising in one country have recovered in another; or, again, they may have recovered in the same country; but the question really is, whether certain countries have afforded better results in the treatment of phthisis than certain other countries. The reports from Dr. Archibald Smith, Dr. Guilbert, Dr. Walshe, and Dr. Hermann Weber, about the results of the treatment of phthisis in the Andes, are certainly most striking, and would make us incline to advise all consumptives, who could manage it, to repair to that very elevated region. Dr. Guilbert carefully narrates six instances of the arrest of the disease from prolonged residence in these mountains, two of the patients being Frenchmen, one Swiss, and three South Americans. Of these, one so remarkably showed the influence of climate, that I cannot forbear from giving an abstract of the case.

A Swiss clockmaker, aged 27, who had lost both parents from consumption, was attacked with cough and large hæmoptysis, followed by loss of flesh and night-sweats. He was recommended a change of climate, and accordingly repaired to America, and set up a watchmaker's shop at Panama, a low lying town situated on the isthmus of that name. Here the disease progressed; and, following advice, he travelled to Quito, in the Andes, 9,500 feet above the sea level, where he remained six months, at the end of which period he had regained his original weight, lost the fever and night-sweats, and had an excellent appetite, and scarcely any cough. He returned to Panama, and led a temperate and moderate life; but after some months the cough, night-sweats, and fever, all returned, accompanied by diarrhoea and wasting. A second visit to Quito was recommended, and carried out with the same favourable results, and a return to Panama with the same unfavourable ones. A third journey was then made to Quito, where he remained nine months, and was strong enough to visit some of the higher mountains of the range (though it is not recorded that he performed any mountaineering feats). He returned to Panama, so well that he had a firm conviction that he was cured; but he never lost his cough, and a recurrence of his symptoms soon drove him to the heights. This time he chose Arequipa, a town lying between 8,000 and 9,000 feet above the sea, and here for a fifth time he regained his health; but, with a strange fatality, he quitted the mountains and retired to Tacna, a place at a considerably lower level. Some time afterwards, Dr. Guilbert examined him, and described him as in a state of terrible emaciation, looking more like a corpse than a living being, suffering from fever and night-sweats, with entire loss of appetite, diarrhoea, and a troublesome fistula, and having severe cough and large expectoration. He also detected the existence of cavities in both lungs, and scattered crepitation at the bases; and, having prescribed palliatives, quitted the patient, under the impression that he should see his face no more. But he was mistaken. Dr. Guilbert ascended to La Paz, the capital of Bolivia, at an altitude of 13,500 feet, and here shortly afterwards the patient turned up, having followed his doctor more slowly, and now astonishing him by his rapid improvement. The fever, sweats, diarrhoea, had all disappeared; the expectoration had diminished; the appetite returned; and during some excursions they made together, the patient is reported to have walked as well as the doctor, and to have been free from the "soroche", or mountain-sickness, which is troublesome to new comers in these parts. The cavities remained unchanged. Thus for the seventh time the Andes rescued him from the jaws of death; and it had been well had he clung to them. Unfortunately, he returned to Europe and Neuchâtel on private business; the disease made fresh progress; he was ordered to Eaux Bonnes, and died there a few days after his arrival. I suppose few more powerful instances of the arresting power of mountain-climate could be adduced than this one.

Dr. Hermann Weber, in the fifty-second volume of the *Medico-Chirurgical Transactions*, gives an account of seventeen cases of phthisis, all more or less exhibiting the curative influence of high mountain climates, among which by far the most successful are the eight instances of patients sent by his own or by Dr. Archibald Smith's advice to various towns in the Andes or in Mexico, where they passed long periods, often years.

The evidence of the Peruvians themselves is exceedingly strong in favour of this mountain-cure, for it has long been the custom at Lima and Tacna, where phthisis is prevalent, and has naturally only a duration of from three to six months, to send the consumptives to the valley of Jauja, 10,000 feet above the sea-level, where the government has established a hospital for them, in which 79 per cent. are reported by Dr. Fuentes to recover.

Dr. C. J. B. Williams and Dr. Walshe have both published interesting cases of arrest in these regions; and the latter has noted that in one of his cases, where excavations had been detected in one lung and softening in the other, after the residence at Santa Fè de Bogota, in the Andes of Granada, complete arrest took place; and Dr. Walshe could only detect weak breathing and slight want of tone under one clavicle, but found the chest distinctly widened by the influence of the mountain air.

It is not necessary to add more to the testimony already adduced in favour of the curative influence of these mountain climates; but it will not be difficult to show, from my statistics, that the results of other climates are likewise very successful. Take, for instance, Egypt, a remarkably dry warm climate, but not marked by high altitudes. According to my statistics, published in the *Medico-Chirurgical Transactions*, vol. lv, of twenty phthisical patients sent by Dr. C. J. B. Williams and myself, 65 per cent. improved, 25 per cent. remained stationary, and only 10 per cent. became worse, each of the patients having passed at least one winter in the land of the Pharaohs.

Again, of one hundred and fifty-two patients who wintered at various places situated on the shores of the Mediterranean, 62½ per cent. showed marked signs of improvement, 20 per cent. remained stationary, and only 17 per cent. deteriorated.

I will not dwell more on these statistics, as they will be referred to again in the last lecture; but I merely cite them now to show that we may fairly conclude that climate does exercise healing influence in phthisis, and that that influence is not confined to mountain-districts, but is enjoyed by climates of various regions, differing greatly in latitude, altitude, and meteorology.

Let us now deal with the principal subject of these lectures—the results of the climate of the British health-resorts on consumptive patients; and, before entering on the statistics of the cases, we must take a glance at the climate of the British isles, and the chief sources of its warmth. This topic has been selected on account of its general interest, for we most of us know something of these places, having sent our patients and friends thither, and having visited them ourselves. Therefore I shall not trouble you with long descriptions either of the localities or of the climates, but, taking a general survey of their meteorological features, draw attention to such points of difference between them as appear to me to be of value. We have mostly to deal with the English south coast from Cornwall to Sussex; and, on the whole, this is renowned for its mild winter temperature, which surpasses in warmth and equability not only most inland places of Great Britain, but many spots lying in latitudes considerably further south.

We know that our climate is eminently insular, not being subject to great extremes of heat and cold, but being remarkably equable throughout the year—mild in winter, cool in summer. The influence of the sea is everywhere felt, though more so at places in its immediate vicinity; and this conserving influence on the temperature is also seen decidedly, though in a less degree than on the ocean coast, in the openings of the Irish Sea and the English Channel. The coasts of Ireland and of the west and north of Wales participate in this genial influence, so that the mean temperature of Llandudno in January is about equal to that of Ventnor.

Now, to what can we attribute this warming effect of our encircling waters? Formerly, it was entirely set down to the account of the Gulf-Stream; but Dr. Carpenter and other eminent physicists have thrown some doubt on this theory; and it has been objected, that the Gulf-Stream, after leaving the American coast, spreads over so wide an area that, before reaching the thirtieth meridian, it is practically dispersed by the process of thinning off and superficial extension. Dr. Carpenter attributed the warmth of our shores to the great general movement of warm equatorial water towards the polar area, the result of a general interchange of polar and equatorial waters, quite independent of such local accidents as those which produce the Gulf-Stream proper, and giving movement to a much larger and deeper body of water than the latter can effect. Dr. Wyville Thompson, on the other hand, is inclined to regard the Gulf-Stream as simply the reflex of the equatorial current, added to, during its north-easterly course, by the surface-drift of the anti-trade winds, which follow, in the main, the same direction. He thus graphically describes its course: "The scope and limit of the Gulf Stream will be better understood if we inquire, in

the first place, into its origin and cause. As is well known—in two bands, one to the north and the other to the south of the equator—the north-east and south-east trade-winds, reduced to meridional directions by the eastward frictional impulse of the earth's rotation, drive before them a magnificent surface-current of hot water 4,000 miles long by 450 miles broad, at an average rate of thirty miles a day. Off the coast of Africa, near its starting-point, to the south of the islands of St. Thomas and Anna Bon, this equatorial current has a speed of forty miles in the twenty-four hours, and a temperature of 23 deg. C. (73 F.).

"Increasing quickly in bulk, and spreading out more and more on both sides of the equator, it flows rapidly due west towards the coast of America. Towards the eastern point of South America, Cape St. Roque, the equatorial current splits into two, and one portion trends southwards to deflect the isotherms of 21 deg. C. (70 Fahr.), 15.5 deg. C. (60 Fahr.), 10 deg. and 4.5 deg. C. (50 deg. and 40 Fahr.), into loops upon our maps, thus carrying a scrap of comfort to the Falkland Islands and Cape Horn, while the northern portion follows the north-east coast of South America, gaining continually in temperature under the influence of the tropical sun. Its speed has now increased to sixty-eight miles in twenty-four hours, and, by the union with it of the waters of the River Amazon, it rises to one hundred miles (6.5 feet in a second); but it soon falls off again when it gets into the Caribbean Sea. Flowing slowly through the whole length of this sea, it reaches the Gulf of Mexico through the Straits of Yucatan, when a part of it sweeps immediately round Cuba; but the main stream, having made the circuit of the Gulf of Mexico, passes through the Strait of Florida; thence it issues as the Gulf-Stream in a majestic current upwards of 30 miles broad, 2,200 feet deep, with an average velocity of four miles an hour, and a temperature of 86 deg. F. (30 deg. C.) The hot water pours from the strait with a decided though slight north-easterly impulse, on account of its great initial velocity."

It follows the line of the American coast, and abuts on the cold Labrador current, the two streams being so distinct that a vessel may have her bows in one and her stern in the other, the thermometer registering a difference between them of 30 deg. Fahr. Continuing to ascend, the current passes Sandy Hook, near New York, and reaches Cape Cod, latitude 41 deg., and thence spreads chiefly eastward, the velocity having greatly diminished.

According to Professor Buff, a great part of the warm water is carried, partly by its own motion, but chiefly by the prevailing west and north-west winds, towards our own coasts and those of Norway and Spitzbergen. This water can be traced across the Atlantic, skirting the coasts of France, Great Britain, Scandinavia, rounding the North Cape, and passing the White Sea and the Sea of Kari, along the western shores of Nova Zemla and Spitzbergen; and, after coursing round the coast of Siberia, a trace of it may be found in Behring's Straits entering the North Pacific.

One proof that a current takes this direction is the fact that drift-wood and tropical products from the Gulf of Florida have been washed on the western shores of Ireland, Great Britain, the Hebrides, Orkney, Shetland, and Faroe Isles, Norway, and even Spitzbergen; but a stronger proof still lies in the direction of the isothermal lines of the North Atlantic, for these attribute a far higher degree of warmth to the European shores than to those in the same latitude on the American continent.

It is thus seen that those physicists who do not accept the theory of the Gulf-Stream reaching our coasts, hold that a considerable portion of this warmth may be assigned to the westerly winds which follow its course, and, deriving heat from it, carry this onwards to us.

The broad fact with which we have to deal, as medical men, in considering our climate is, that a warming influence reaches its shores from the Atlantic, traceable somehow to a reversed equatorial current—a current most apparent in the Straits of Florida and off the American coast; but whether this warming influence be conveyed by the Gulf-Stream itself or by a drift current, as the cautious Admiralty chart indicates, is immaterial. We know that, though the waters of the Gulf-Stream may lose their heat after the thirtieth meridian is passed, the said heat has been absorbed by the air, and is brought to us as warm south-west winds; and not only this, but all the heat received by the current in the tropics above 86 deg. Fahr. becomes latent, and is given back in temperate latitudes as free atmospheric heat. It is sufficient to recognise the original source of all this warmth; and to acknowledge that full exposure to it, as is seen on the west coast of Ireland, in Devonshire, and Cornwall, implies considerable advantages in mean and winter temperatures, as well as a larger rainfall and greater equability of climate.

CLINICAL LECTURE

ON

THE ADMINISTRATION OF CHLOROFORM.

*Delivered on November 23rd, 1875.**

By GEORGE H. B. MACLEOD, F.R.S.E.,

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THE early effects are those of excitement in most cases. The patient speaks incoherently, and often loudly, and may struggle much. The degree of this excitement and its continuance vary greatly in different persons. No doubt temperament may affect it; but the state of previous nervousness and the condition of the bowels influence it considerably; while intemperate habits, or the inordinate use of tobacco or opium, most markedly augment it. It is always a dangerous condition. The respiration is often much obstructed, and the terrible strain to which the heart and the vessels of the brain are subjected is full of anxiety. Occasionally, patients become very rigid, and, clenching the teeth and setting the muscles, seem almost in a tetanic seizure. The cloth should be withdrawn, and close attention given while such unpleasant effects last. Usually, this state passes off quickly; but, if not, do not increase the supply of chloroform on the towel, as a very rapid and deep induction is not uncommon after such struggling. It is always to be remembered, however, that this stage of excitement may not occur at all, or be very transient; as otherwise, in watching for it, the full state of anæsthesia may be reached before we are aware of it.

When the patient is struggling, there is a right and a wrong way of holding him. If you try to restrain him by sheer force, you will only augment his struggles. When he meets with resistance, he tries hard to overcome it; but if you guide his hand clear of the cloth, which it is usually his object to seize, you will occupy his attention, and prevent him from doing any harm. A good way to fix his body, if that be required, is for an assistant standing on each side to face the patient, and place a hand in front of each shoulder, and so press him firmly down on the bed. There is no better or more effective way of fixing him than this. The patient is generally much concerned to get rid of the saliva which the chloroform causes to be secreted in augmented quantities. Some keep constantly swallowing, while others eject it. In the latter case, they appear to concentrate their whole energy in collecting and throwing it out, and this so occupies them that the inhalation is retarded. You should always have a soft cloth beside you to wipe the sputum quickly out of the mouth, and the same plan should be adopted to get rid of any vomited matter which may be brought up. To twist the neck towards a basin is a troublesome and even dangerous method of management. Till the vomiting has passed off, no more chloroform should be given. As the patient becomes more deeply affected, the respiration gets regular and natural; the pulse, probably hitherto excited, comes down to the natural standard, and frequently assumes a regularity it had not at first. The anæsthetic, in turn, acts on the brain and spinal cord, and so abolishes intelligence, together with voluntary motion and sensation. This stage is all that I have usually seen operators abroad seek for. They do not, as a rule, wait for the disappearance of reflex action as we do, and, consequently, the movements of the patient commonly continue during an operation. An English authority has told us to seek no more than the abolition of feeling, and says we are to keep the patient quiet by force during the operation. This is wrong. At the stage alluded to, the danger to the heart during an operation is, if possible, augmented. It is requisite for safety that we go on till reflex action is asleep, and this we know by the lids not closing when the eyeball is touched. This is a very good and useful test of the condition of complete anæsthesia having been attained; and no operation should be performed till that state has been reached. If we interfere sooner, no protection to life is secured by the use of the chloroform. Another test, but a much less efficient one, is to handle the diseased or injured part, and observe if it be withdrawn from us. I have not been able to discover any change in the pupil which is so constant or decided as to be of any practical value as a guide in administering chloroform, so that I will not occupy your time by any reference to that point.

* Concluded from page 7 of last number. In the first part of this paper, at page 5, column 1, line 5 from bottom, for "individual", read "undivided"; and in column 2, line 26 from bottom, for "meat, soup, and bread", read "meat-soup and bread".