and that his was the first book on midwifery written in the English language.

It was Harvey who invented the dilator of the cervix uteri, and first used stimulating uterine injections.

The above references and quotations will suffice to show that Harvey's knowledge of disease, and of the offices of a physician, was probably equal to his physiological attainments, and will amply vindicate him from unjust allegations.

[To be continued.]

INTRODUCTION

TO A

DISCUSSION ON THE INFLUENCE OF MOUNTAIN AIR IN THE TREATMENT OF PULMONARY CONSUMPTION.*

By J. HENRY BENNET, M.D., Weybridge.

My object in bringing forward the subject which forms the title of this paper is not so much to enunciate individual opinions, as to bring forward facts and to elicit discussion. There are few subjects which occupy the professional mind more intensely at the present time than the treatment of phthisis. I think I am warranted in stating that it is now generally conceded, both at home and abroad, that the therapeutical views which reigned during the first half of this century, with reference to the influence of climate on phthisis, were erroneous. It was then generally believed that a mild and moist or a warm and moist climate, like that of Madeira or of the West Indies, was the most calculated to arrest phthisis, and to promote a recovery when recovery was possible. I believe that I may claim for my namesake, the late John Hughes Bennett, the eminent Edinburgh professor, and for myself, as his disciple on this pathological question, the merit of having contributed to establish the fact that tropical or even semi-tropical climates are inimical to the constitutional states which lie at the root of phthisis, and in most cases accelerate its progress, tending to prevent instead of to secure recovery. We, and those who have adopted these opinions, have taught, and teach, that the temperature the most conducive to the treatment of phthisis is a day temperature between 55° and 65° or 70° Fahr., and a night temperature between 45° and 55°. In other words, we assert that the climate and temperature which are the most conducive to the physiological well-being of the Caucasian race are also the most favourable to the treatment of phthisis, viewed as a disease of defective vitality and of morbid nutrition.

The tendency of the medical profession up to the present time has been to seek for a cure, a panacea for this disease, which in towns and in densely inhabited communities terminates the career of a considerable proportion of the population. The curative treatment sought has been "medicinal, principally", and has hitherto been sought in vain in this direction. My experience and teaching have been and are, that the disease is merely an expression of lowered or defective vitality, acquired or hereditary; that it is merely, as I have worded it, "a mode of dying". Following out therapeutically this train of thought, the inevitable deduction is that the chief remedy for phthisis is the strict application of hygienic laws, that is, of the laws that regulate and secure healthy life, and so I have found it. Medicine and climate are merely adjuvantia, not to be despised or neglected, but occupy a very secondary position as compared with the strict observance of hygienic laws. Climate is principally of use in enabling the sufferer to obey these laws, and to ward off any physiological strain on peculiar organs. Medicine is principally of use in removing, or helping to remove, morbid complications, which interfere with the physiological play of organs.

When we come to examine the therapeutics of phthisis, we find undeniable evidence that phthisical patients recover in every region of the northern and temperate climates, the regions where it has been more especially studied. I found undeniable evidence of spontaneous cure in Paris in 1840, when resident physician to the Salpêtrière, in the 300 *post mortem* examinations I made on old invalid women above 65, who died under my charge. Professor Bennett, of Edinburgh, found many cases of similar cure among the 800 *post mortem* examinations he conducted when pathologist at the Edinburgh Infirmary. All other pathologists, who since those days have had similar opportunities of observa-

tion, and who have given their minds to the subject, have found similar evidence of spontaneous cure in the dead. Thus phthisical sufferers are found to recover often, as far as we know, without special treatment, wherever the subject is studied. Our English sanatoria—Ventnor, Bournemouth, Torquay, Penzance; all the sanatoria of the north Mediterranean shores, with Malaga, Algiers, Madeira, produce cures every year, and are full of cured residents. Moreover, there is, I firmly believe, scarcely any experienced physician in Great Britain who cannot enumerate cases of cure in his own practice.

We are now told, however, that the highest inhabited regions of Europe—regions between five and six thousand feet high—constitute a specially desirable climate for consumptives, both in summer and in winter, and offer greater chances of cure than any other locality. That cures can and do take place in these regions, even in winter, may be conceded to theory as well as to practice, if the habits of the sufferers are rendered hygienic. Many of those who have done well there, especially Germans, have consented to live in fine weather out of doors, whereas in the plains they had been, and would have been, shut up in unhealthy rooms. Much more, however, is demanded. It is asserted that there is an actual curative virtue in mountain altitudes, and that the chances of recovery are immeasurably increased by passing the summer or the winter, or both, at these elevations. This is the question we have to analyse and discuss to-day.

Within the last twenty years, a considerable amount of information respecting the meteorological and health condition of high altitudes has been brought forward by French physicians, who have resided and practised on the high plains of Central America, at Mexico, on the plain of Anahuac, at Santa Fe de Bogota, Quito, Potosi, and on the sides of the Cordilleras mountains generally. (Dr. Jourdanet, Dr. Coindet, Dr. Domec.) They may be said to have established that phthisis is rare amongst the natives at these elevations, although common in the neighbouring sea-coast towns, such as Vera Cruz and Guayaquil; and that in imported cases the progress of the disease is frequently arrested. I have lately been in correspondence with Dr. Domec, now a professor in the new University of Lille, who has recently passed four years at Quito, in Ecuador—a town of 70,000 inhabitants, and nearly 10,000 feet above the sea. He was one of the professors at the medical school, physician to the hospital, and engaged in active private practice. He only saw two or three cases of spontaneous phthisis among the natives during that time, and in all the cases of imported phthisis from the sea-coast that he met with, the progress of the disease soon appeared to be arrested. He has published an interesting memoir on the subject in the *Montpelier Medical* of July 1878.

Different causes have been brought forward to account for this comparative immunity from phthisis on the healthy, bracing, but mild mountain plains of Central America, the most prominent one being the diminution of barometric pressure. The same immunity has been claimed for the mountain elevations of Europe, and the diminution of barometric pressure has been adduced as one of the chief reasons. The claim, however, proves to be an error, as far as the Swiss mountains are concerned, so the explanation falls to the ground. Last summer I spent nearly two months in Switzerland, examining various mountain stations, and I was referred by Swiss medical friends to a very interesting work published in 1876, at Winterthur, in German, by Dr. Emil Müller, *On the Statistics of Phthisical Mortality in Switzerland*. I had seen no notice of this book in our medical press. It at once disposes of the argument that the diminution in barometrical pressure in the mountain elevations of Switzerland secures to their inhabitants immunity from phthisis. The statement has clearly been made without authority, and has been repeated without investigation. From Dr. Müller's tables, quoted in the recent edition (the third) of my work on the treatment of phthisis, p. 115, it appears that phthisis destroys its victims at all elevations, pretty nearly at the same ratio as in the plains. Thus the mortality, which in Switzerland is 10.2 per cent. at 1,500 feet above the sea, is still 9.8 at an altitude from 3,400 to 4,400 feet for those who are engaged in industrial pursuits (lace and watches). But for those who are engaged in agricultural pursuits it is only about half, respectively 6 and 5 per cent. Above 5,000 feet elevation, with an exclusively agricultural population, it is still 4 per cent.; not very much below that of the agricultural population on the plains and at 4,400 feet. These figures speak for themselves. In London, one of the centres of phthisis, the mortality is 12 per cent. In the mountain regions of Switzerland, the mortality is everywhere nearly doubled for those whose occupations are industrial and sedentary.

It cannot either be extreme cold that can give to mountain elevations an immunity from phthisis. The elevated plains in Central America are in the tropics. Quito is on the line; the snow-level is many thousand feet higher, varying in the tropics from 14,000 to 17,000 feet, and the climate is mild, equable, and bracing both in winter and summer.

* Read in the Section of Medicine at the Annual Meeting of the British Medical Association in Cork, August 1879.

Dr. Domec states that at Quito, in a large room, with doors and windows open day and night, he found the temperature to oscillate all the year round between 57° and 65° Fahr. The mean of the winter was 15.4, that of the spring 15.7, that of the summer 15.6, that of the autumn 15.7; that is from 59° to 60° Fahr. He states that during four years he watched daily the thermometer placed in the large drawing-room of the house in which he lived without fire, and open to every wind day and night. He never once saw it between six o'clock in the morning and ten o'clock at night above 63° Fahr. or below 57°. Sometimes in the night, with winds from the mountains, the thermometer outside was lower, but the falling of the temperature was always of short duration, and its fall never reduced that of the open rooms below 57°.

I attended for two winters at Mentone a young married lady aged 26, from Guayaquil, the coast sea-port of Quito, sent to me by Dr. Gueneau de Mussy, of Paris. Educated and married in France, she there became consumptive, and finding that her recovery at Mentone was only a partial one, she returned, by my and Dr. Gueneau de Mussy's advice, to her native country. She has now been two years at Quito, and I am told that she has become quite well and robust. But then at Mentone she lived shut up. I never could make her open her doors or windows. At Quito she has lived in the open air constantly. I heard from her much about the domestic life at Quito. The rooms are large, fires are unknown, and doors and windows are always open, night and day. The entire population lives as it were in the open air, at all times and at all seasons.

May not this free and constant ventilation in a temperate, equable climate be the cause of the freedom from phthisis, which at first sight appears so singular? In these towns of the mountain plains of tropical America there are poverty, destitution, famine, vice, and all other evils to which flesh is heir. Owing, however, to the ideal, physiological climate, the entire population live in the open air, like hunters in the forest or on the prairie; like Arabs in the African deserts.

Dr. Domec states that other forms of tuberculation, such as tubercular meningitis, tubercles in the bones or in the testicles, and acute miliary tuberculation of the lungs, proved equally rare. He never met them in his medical or surgical wards, nor was pleurisy, acute or chronic, often seen; and yet various forms of scrofulous disease were so common as to impress a peculiar character on surgery. Catarrhal and inflammatory affections of the aerial passages of the bronchial tubes and of the lungs were frequent and severe—a fact which he rationally attributes to the great power of the sun in a generally clear mountain atmosphere, and to the sudden transition to shade temperature. This is a most important pathological fact, showing that severe inflammatory conditions of the pulmonary organs do not lead to phthisis alone, *per se*. There must be other constitutional conditions present for these to do so. In my opinion, lowered vitality, even when there is moisture in the air from all but continuous rain, a temperature of from 55° to 65° Fahr. generally speaking, produces no unfavourable results on the thoracic organs, and on the human organisation generally unless there be also a chill. This is exemplified by the exceptional health in summer of the inhabitants of the west coast of Scotland, and of the south and west coast of Ireland, proverbially rainy regions. Such weather with common care leaves the aerial passages free from morbid conditions. The general healthiness of such a temperature is exemplified by the low mortality of Great Britain during the two last months of rain and low summer temperature—June and July. The day temperature has only varied between 56° and 66° Fahr., and the mortality of London was only 17 per 1,000 for the first and second weeks in July (1879).

We have thus seen that altitude alone does not secure the mountain populations of Switzerland from phthisis; indeed, that according to Dr. Emil Müller's statistical researches the mortality from phthisis is still 4 per cent. in the strictly agricultural population—a very scanty one—living above 5,000 feet. The assertion persistently made of late that such immunity exists, is thus negated on undeniable authority. It has also been persistently asserted that a dry cold atmosphere and climate preserve from and cure phthisis. This statement is likewise negated by the investigation of the bills of mortality of the most northern regions of Europe, in which, during the winter months the cold is intense, the rivers frozen, the ground covered with snow, and the sky clear and blue.

Thus Dr. Lombard, of Geneva, in his recently published work, entitled, *Traité de Climatologie*, which I have quoted at p. 116 of my work on phthisis, states that the mortality from phthisis in the northern towns of Sweden is 14.7 per cent., in those of the centre 12.5, in those of the south 13.1. Norway presents the same high mortality, 13 per cent. or 1 in 8—a very high rate. In Russia the mortality is 16.4 in the four northern provinces, where the cold is extreme and prolonged.

Extreme coldness of climate evidently does not preserve from phthisis.

Cold undoubtedly purifies the air, and may thus contribute to render respiration physiologically healthy, but this it can only do in the case of persons who are constantly out of doors in the open air and breathe pure air indoors. In cold climates and regions, but a very small proportion of the twenty-four hours can be thus spent. Generally speaking, often for days and weeks together, life is passed in close unhealthy stove-heated habitations, under conditions most prejudicial to health. By living in winter at the top of a Swiss mountain 6,000 feet high (St. Moritz, Davos), we merely reproduce, as regards cold and sunshine, the condition of Archangel, in Northern Russia, with a mortality from phthisis of 19 per cent., or of Wolodya, with a mortality of 20.4 per cent.

Ventilation is always defective in rooms heated by stoves, and respiration is thence incomplete. The products of retrograde changes are imperfectly eliminated in the lungs; health is lowered, and phthisis is engendered. Thence, no doubt, in a great measure, the cause of the frequency of phthisis in central and northern Europe.

I think I have thus demonstrated my position. The undoubted immunity, or comparative immunity, from phthisis enjoyed by the inhabitants of the elevated mountain-plains of tropical and subtropical America, from Mexico to the Argentine Republic, cannot be owing to mere elevation—to barometric conditions—inasmuch as phthisis reigns at all elevations, even above 5,000 feet, on the mountains of Switzerland. It cannot, either, be attributed to mere dry cold, as the mortality from phthisis is greater in Norway, Sweden, and Northern Russia, than in London or Paris. What, then, can be the cause? In my opinion, it is explained by the equable climate, ranging at Quito all the year between 57° and 66° Fahr. In such a climate, the habits of the people secure constant and free ventilation night and day. The entire population lives as it were in the open air. These health-data militate strongly in favour of the views of your distinguished countryman Dr. Mac Cormac of Belfast, whose work on *Consumption* is the most physiological and practical exposition of the evils of defective ventilation that exists.

I believe that I am warranted in saying that Swiss physicians generally do not send their patients suffering with chronic chest-affections to the higher mountain-elevations. Dr. Lombard of Geneva, the chief authority on the influence of mountain climates on health, certainly does not. Most Swiss physicians keep their patients, even in mid-summer, at elevations between 2,000 and 4,000 at the highest, such as Weissenburg (2,940) and Gurnigel (3,783); and, as a rule, do not send them in winter either to these or higher elevations. They fear the rareness and extreme dryness of the atmosphere at the higher elevations in fine weather, and the frequent cloud (fog) or rain in bad weather in summer, or snow in winter. They fear also the great variations of the thermometer between day and night, and the lowness of the temperature at the latter period of the twenty-four hours. They say that these conditions often produce acute and subacute affections of the aerial passages, pharyngitis, laryngitis, bronchitis.

I have now spent twenty successive winters on the north shores of the Mediterranean, at Mentone—a good observatory for studying the Mediterranean; and there find several of the conditions claimed for the higher mountain regions of Switzerland in winter—dryness of the atmosphere, and intense sunshine and sun-heat. As winter in the northern hemisphere means north winds, and as on the north Mediterranean shores the north winds are necessarily dry cold winds, they leave the sky pure and blue, and the sun uncovered and ardent. These are the very conditions on which so much stress is laid at Davos and St. Moritz. But then, on the north Mediterranean shores, the night temperature is seldom low. Throughout the winter, it usually ranges between 40° and 50° Fahr. only; whilst the day temperature rises to between 50° and 60° Fahr. Such temperatures admit of free ventilation night and day. Breathing pure air is not confined to the few hours spent out of doors (say from three to five), with from nineteen to twenty-one hours passed in stove-heated, breath-poisoned rooms.

Fresh air may be breathed in the Mediterranean in winter for the entire twenty-four hours, with windows open from two to ten inches, according to weather, if patients can be convinced of its innocuity and of its beneficial influence. Indeed, in my experience, it is only those who can be thus convinced who improve and get better; those who cannot, remain as ill, and do as badly, as they would in London or Paris. I believe that it is in this respect principally that the north Mediterranean climate approximates, in its influence on phthisis, to that of the mountain-plains of tropical Europe.

But if, in the Mediterranean, these conditions—cold and dryness—are exaggerated, as is the case when polar waves of cold spread over western Europe, freezing the rivers and covering the mountains and country with snow, when a cold air and an ardent sunshine continue for weeks, we always suffer severely. Inflammatory affections of the

tonsils, fauces, larynx, and bronchial tubes become rife—quite epidemic; and yet these are the atmospheric conditions said to be all but permanent at Davos. On the Mediterranean shores, the last winter was an exceptional one in this respect. Frequent south winds tempered and modified the north winds; the sky was often covered with unusual clouds; the air was less dry; more rain fell; the nights were warmer. The visitors complained; but we, the physicians, did not. The winter was an exceptionally healthy one; there were very few catarrhal affections, no catarrhal epidemic. I myself, for the first time in twenty years, got through the winter without the slightest cold. I find my experience at Mentone confirmed by that of Dr. Marcet at Cannes, as contained in a recent valuable memoir in the BRITISH MEDICAL JOURNAL.

Dr. Clifford Allbutt, in a series of interesting papers, which have also recently appeared in the *Lancet*, attributes great importance to the antiseptic character of mountain-air, as evidenced by the subsidence of hectic fever produced by the absorption of the purulent products of the disease in the lungs. This same subsidence of hectic is constantly observed with us in the Mediterranean, provided the patients ventilate freely; not if they do not ventilate. If it be an antiseptic phenomenon, the proximity of the sea must impress the same characteristic on atmosphere—must equally deprive it of morbid germs. In all probability, however, free ventilation night and day would produce the same result anywhere.

The cases published by Dr. Clifford Allbutt and others—those from Danvers, Colorado, and St. Paul's, Minnesota, in the United States—triumphantly prove that consumption may get better in the coldest regions and climates, provided the sufferers throw aside vain theoretical fears and live hygienically, in the open air as much as possible. In this respect, they are valuable contributions to the therapeutics of phthisis. On the other hand, they by no means prove that such climates—climates in which twenty hours or more of the twenty-four must be passed, in the finest weather, in stove-heated rooms—are the best for consumptives; that they exercise a positive and exceptional curative influence on phthisis. We must also remember that, both in Europe and in America, it is the picked cases that are sent to the higher mountain-elevations in winter.

In conclusion, I would again draw forcible attention to the fact that pulmonary consumption, although a mere mode of dying to many, perhaps to most, may be recovered from anywhere in northern and temperate regions, either with or without treatment, as proved by the *post mortem* examination of the aged, and by the general experience of the profession. Phthisis also, except in the acute and subacute forms, is essentially a chronic disease, frequently taking some years to run its course even without treatment, and still more frequently so with rational treatment. Moreover, it is a disease which progresses naturally *per saltum*, as it were. It has periods of lull, of arrest, which do not imply eventual cure, and must not be mistaken for such. These periods of temporary lull may, it is now thoroughly proved, occur anywhere in temperate or cold climates—in Paris or in London, at Mentone or at Madeira, at Davos or at St. Paul's. This fact has been abundantly established; but it is a very different thing to claim for the extreme climates pre-eminence over the temperate ones. It will require a great deal of evidence to establish this as a fact; and so far the evidence, as detailed in this essay, seems to be antagonistic to such claims.

It appears to me that if we are guided by the laws of physiology, by those of general pathology, and by the meteorological facts brought from the mountain plains of central or tropical America, we are warranted in concluding that for Europeans the north shores of the Mediterranean offer the best attainable climates in winter. They constitute the nearest attainable approach to the American mountain plains, and admit of life being spent, as there, in the open air in the day, as also of free ventilation at night. I do not, however, believe that those regions exercise any specific curative influence on the disease. They merely act by improving the general health, by restoring nutritive power, and arousing general vitality. For all this to be accomplished the patient must be obedient to medical guidance, and surround himself with pure air day and night. If he does not do so, he usually dies, and, generally speaking, as rapidly as he would in London or in Paris.

Quito is a long, long way from us, or we might rationally make it a sanatorium for consumption. There is the Atlantic to cross, as also the Isthmus of Panama, a Pacific Ocean navigation; and when Guayaquil is reached there is still eight days' arduous travelling in the mountain in a palanquin, and all kinds of hardship to encounter on the road. Mexico is easier of access, but still not to be reached without great trouble, risk, and expense.

For summer, Alpine elevations in Europe are no doubt an immense improvement on the heated plains and cities of continental Europe, and

it is easy to understand the rush made to them by the Germans and Swiss, but are they superior in climate and health advantages to the cool breezy shores and hills of Great Britain for invalids? I much doubt it. Even on the natives, mountain elevations in Europe, according to Dr. Lombard, are not altogether good, producing in the Alps and Pyrenees diminution of stature and often idiocy, cretism, goitre.

I have myself noticed repeatedly that at great elevations in the Alps the conditions even in summer are not favourable to health or to those suffering from chest affections. Owing to the dryness and clearness of the atmosphere, when the weather is fine, not only is the heat of the sun intense, but the atmosphere itself is warm. Last year I was at the comfortable hotel at Murren, near Lauterbrunnen, 5,500 high, on the 15th of July, on a lovely cloudless day, and found the thermometer in the shade 80° Fahr. at two o'clock. The sun was fierce and broiling, whilst at and after sunset at these altitudes, the nights are very cold. Whenever the weather is damp and rainy in the Alps at two, three, or more thousand feet, there are constantly clouds hanging on the mountain sides or ascending the valleys. These clouds are merely cold damp fog. Often there is snow in midsummer. These are not conditions favourable to health.

THE WINTER CLIMATE OF DAVOS PLATZ.*

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THE valley of Davos lies in the Grisons, between the Lower Rhine and Upper Engadine valleys, and runs N.N.W. and S.S.E., being well sheltered on each side by lofty mountains, and is ten miles in length and one-third of a mile to half a mile in breadth, widening towards the south. Davos Platz, the sanitarium, stands 5,103 feet above the sea-level. Meteorological observations have been taken for four successive winter seasons by the Rev. Francis Redford, Mr. Guntery, and Mr. and Mrs. McMorland; and of the many interesting climatic records kept the following is a summary.

The barometric pressure varies from 24.62 inches to 25.02.

The thermometric observations give a mean temperature for the winter months, based on four years, of 28.1° Fahr. The mean for each year is as follows: for 1876-77, 30.6° Fahr.; for 1877-78, 28.3° Fahr.; for 1878-79, 26.3° Fahr.; for 1879-80, 27.3° Fahr. The maxima range from 75° Fahr., registered in October 1876, to 12.5° Fahr. in December 1878; the mean maximum of the four years being 39° Fahr. The minima range from 43.1° Fahr. in October 1876, down to -16.7° Fahr. in December 1879; the mean minimum for the four years being 17.3° Fahr. The maxima only exceeded 60° Fahr. on eight days during last winter, and fell below 20° Fahr. on thirteen days. The minima fell below 0° Fahr. on seven days in 1876-7, on eleven days in each of the winters 1877-8 and 1878-9, and on fifteen days in last winter.

The black bulb *in vacuo* thermometer yielded the following extraordinary results of solar radiation in this mountain climate, giving a total mean of 114.4° Fahr. In 1876-77, the mean was 114.8° Fahr.; in 1877-78, 111.4° Fahr.; in 1878-79, 113.4° Fahr.; and in 1879-80, 118° Fahr. The maximum was 166° Fahr., in February 1879. The sun's rays are so powerful that, by placing black cloth behind the solar maximum thermometer, a temperature sufficiently high to boil water has been attained; but Dr. Frankland is of opinion that this permeability of the atmosphere to solar radiation does not increase with altitude, as the same results were obtained at the Fluela Pass, 2,700 feet above Davos, the thermometer not marking higher records. Tanning and browning of the skin is a result of this radiation.

The percentage of humidity varies from 72 to 62, the last two winters giving 63 and 62 respectively, indicating a very dry state of the atmosphere. Last January was a particularly dry month, the percentage falling to 40° Fahr. The number of days on which rain or snow fell during the three winters varies from forty-three to fifty-seven per winter, and the rest of the days were for the most part sunshiny. Last winter numbered one hundred and ten fine days, thirty cloudy, and forty-three wet or snowy. As may be concluded from the temperatures, but little moisture fell in form of rain, and nearly all as snow; and when snow falls, owing to the dryness and low temperature, it does not cling to the clothes—consequently invalids often go out in the snow with impunity. During the last winter there were few days on which outdoor exercise could not be taken, and in most seasons at least two-thirds of the days can be counted on for walks or drives. The prevalent winds are the north, north-east, and south-west; the latter, or *Föhn*, is most dreaded, on account of its melting the snow, and thus disturbing the winter conditions of equilibrium of climate. Wind, however, is very slight in force, and the general state of atmosphere is that of calm, or the low temperatures would be unendurable.

* Abstract of a paper read at the Meteorological Society, June 16th, 1880.