CLIMATIC CHARACTERISTICS OF SALT LAKE CITY.

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The members of this Association can easily recall a time when climatological researches were speculative, vague and unsatisfactory, and many of the articles presented on this subject were largely imaginative and conjectural; but within the last decade this subject has engaged the attention of some of the most eminent and scientific physicians, and so many valuable statistics have been collected from the United States Signal Service reports and other sources that climato-therapeutics has become an interesting and important study to every well-informed physician.

Local pride and enthusiasm have, however, induced many writers to advance claims as to the climatic advantages of health resorts which are not justified by actual statistics, nor by the experience of invalids; and though I cannot hope to present to the profession observations especially interesting or original, I do desire to avoid the errors above referred to. Again, there still remains a wide difference of opinion as to what is needed in a health resort. No less an authority than the late Dr. Austin Flint is accredited with having commended to consumptives the wards of Bellevue Hospital; while others, equally honest in their opinions, whose careful researches render them worthy of our consideration, have in turn recommended climates high and low, moist and dry, for apparently the same class of cases. It is hardly to be expected, therefore, that the subject matter of this paper will meet the approval of all; but if I can simply and truthfully present and favorably impress you with a few of the many advantages of Salt Lake City as a sanatory resort, my object will have been accomplished.

Salt Lake City is located near the shores of the Great Salt Lake, in one of the most beautiful valleys of the West. It numbers about 35,000 inhabitants, is laid out in blocks of 40 rods square, with streets 130 feet in width, many of which are adorned with trees and bordered with streams of water. The altitude of the city is 4,348 feet above sea-level. Surrounding the valley are lofty mountain ranges, and one never wearies of the variety of scenery which they afford, the beauty and grandeur of which can hardly be surpassed. The water supply for the city proper comes from the summit of the snow-capped mountains and is pure, clear and cold. Utah lake, 50 miles to the south, is the source of the Jordan river, a stream of fresh water flowing through the city to empty into the Great Salt Lake. This water, however, is only used for irrigating purposes, though the same lake would furnish an unlimited water supply, were it needed. Farms and orchards cover

the valley, and the cereals, fruits and vegetables are raised in abundance. This much as a brief general description of the city and environments, and I will now proceed to the special climatic advantages.

Most authorities believe that the essential features of a health resort, particularly for pulmonary diseases, should be:

1. Atmospheric dryness.
2. Equability of temperature.
3. Altitude varying from 3,000 to 8,000 feet.
4. Greatest number of clear, sunshiny days.
5. Freedom from high winds, electrified storms, etc.

I present them in the order of importance commonly adopted by writers on this subject.

ATMOSPHERIC DRYNESS.

The dryness of the atmosphere, as indicated inversely by its relative humidity, is, we believe, of more importance to the invalid than any other climatological factor. Dr. Denison, in an interesting essay on this subject, comparing Denver, Col., with Jacksonville, Fla., allowing for the increased volume of air breathed in the higher altitude, due to its rarefaction and consequent frequency of respiration, assuming in both places a robust man breathing eighteen times per minute and expiring an average of thirty cubic inches, ordinary exercise included, shows that in the dry air of Colorado the vapor exhaled above that inhaled in twenty-four hours is 2,453 grains, or nearly six ounces more than during the same period in Florida. The same method of comparison applied to Denver and Salt Lake City shows that in the still dryer air of Salt Lake the excess of vapor transpired would be 144 grains more than in Denver and four ounces more than in Los Angeles. Certainly his suggestion, that "this transpiration of surplus vapor is an admirable vehicle for removing effete matter, waste tissue and germs of disease," is a most reasonable one.

Though opinions vary on almost every other climatic factor, all agree that *pure* air is essential to the invalid, and that the dryer the air, the more aseptic are its properties. This much is conceded by those who oppose altitude, equability, etc., as of importance in climato-therapy. In this connection I would submit the following table, compiled by Dr. H. D. Niles, of this city, from the United States Signal Service reports:

Period of observations, from 1879 to 1884, inclusive.	Elevat'n, Feet.	Relative humidity Per cent.	Average daily Range, Deg. F.	No. clear and fair days.
Salt Lake City	4,348	44.0	18.6	277
Denver	5,294	51.2	24.2	309
Colorado Springs	6,080	55.5	28.4	316
El Paso	3,764	48.9	30.1	332
Santa Fe	6,992	44.7	26.0	318
Los Angeles	371	68.2	23.1	313

It will be noticed that the relative humidity of Salt Lake City during that period is 44 per cent.

of saturation, while that of Denver, a representative high altitude resort, is 51.2, and that of Los Angeles, of low altitude, 68.2, a difference in the first instance, in favor of Salt Lake City, of 7 per cent., while in the latter comparison there is a very great variation of 24 per cent.

Statistics for given periods are apt to be misleading, and in combining the various conditions essential to rating a climate, figures favorable or unfavorable may be chosen, according to the period selected; but, endeavoring to make due allowance for any discrepancies in this regard, I think I am correct in drawing the conclusion that for dryness of atmosphere Salt Lake City is not excelled.

EQUABILITY OF TEMPERATURE.

But few authorities are inclined to criticise an equable climate, and this is one of the strong points in favor of Salt Lake. The close proximity of Great Salt Lake, a body of water covering an area of 2,500 square miles, acting as a moderator to the climate and tempering the winds, gives to this city an equability of climate usually found only in low altitudes with excessive moisture. In this feature the climate is indeed unique, and nowhere else, to my knowledge, can the same degree of equability be found combined with perfect hygrometric conditions and such elevation. High altitudes and dry climates usually have their disadvantages in extreme cold, high winds and variability, while to secure equability we must submit to warmth, moisture and accompanying enervation; but in this valley there seems to be a happy exception to the general rule, for, as above indicated, the average daily range is but 18° F. Drs. Hamilton and Standart, well-known Salt Lake physicians, stated, in a recent paper, that from a record of the readings of the thermometer kept at Camp Douglas, three miles from this city, for a period of twenty-four years, previous to the establishment of a signal service station, it was ascertained that the average high extreme for these years was 97½°, and the average low extreme 4° above zero, making an average annual range of 93½°. It will be seen that for equability of climate these figures compare favorably with sanitary resorts of low altitude, while, as compared with cities of the same altitude and relative humidity, there is a marked difference.

ALTITUDE.

Another great advantage is that the elevation is not extreme. With an altitude of 4,300 feet, it also has advantages of varying the elevation from 500 to 1,500 feet, for patients may choose their residence either on the benches and foothills of the mountains, or in the valley below, and still be at no great distance from the center of the city. The invigorating and tonic effect of the rarefied air of this altitude, as compared with the heavy, depressing atmosphere of the sea coast,

can hardly be estimated, and certainly none can appreciate it who have never sojourned in a mountainous region. It will also be observed that with a moderate elevation we have nearly all the advantages and none of the dangers of high altitude resorts.

NUMBER OF CLEAR AND SUNSHINY DAYS.

Statistics are not so favorable in this respect, perhaps, as in some other cities, and yet it must not be understood that the percentage of cloudy days necessarily indicates that the greater part of the day is cloudy. On the contrary, it is seldom that the sun is obscured longer than a few hours in the day; a fog is unknown, and refreshing rains are hailed with delight. The invalid is soon in the sunshine again, relieved from the dust. A day during which the face of the sun does not smile upon this valley is exceptional indeed, and an event to be remembered. The average rainfall for Salt Lake City from 1847 to 1889 was between 15 and 16 inches, the maximum for any single year during that period being 22.61 inches, the minimum 10.14 inches. Weather reports for a number of years place the mean rainfall at Denver at 14.99 inches, and at Los Angeles, 18.25 inches. A striking advantage in the rainfall of this valley, as compared with Los Angeles, is that while Los Angeles has its rain almost entirely in winter, with but little during the balance of the year, and, consequently, intolerable dust, in Salt Lake City the showers occur during the summer, purifying the atmosphere. *Freedom from high winds*, as already indicated by its equability, is another advantage this climate enjoys. Observations show that the number of miles traveled by the wind at this point for one year was 44,468; some years were as low as 37,000. To more clearly indicate this favorable feature I would state that for the same year statistics show that the number of miles traveled at San Diego was 55,062; Colorado Springs, 70,912; St. Paul, 76,096; Jacksonville, Fla., 74,192, and Cape May, 134,455. This not only relieves from extreme cold, variability, great amount of dust, etc., but what is equally essential, it allows the invalid the freedom of constant open-air exercise, without the dangers of being frozen by a blizzard or translated by a whirlwind, such as are frequent in other high and dry climates. Though this valley may have its dust storms, the moderate velocity of the wind renders this disturbing element less frequent here than usual to corresponding altitudes. But perhaps enough has been said in detail of the climate of this valley, and in what follows I feel that I am justified in assuming that Salt Lake City has the climatic advantages so important to health seekers. Pure and desirable atmosphere is, however, not all-important. Neither is it the only advantage Salt Lake offers. A high and dry climate,

in itself essential, can be greatly aided by healthful surroundings, and if you can add to such a climate many of the beneficial features of a sea-side resort, you give to the invalid an "ideal climate" indeed. Such, we believe, is that of Salt Lake City. So large a body of water as the Great Salt Lake lends its modifying influence to the atmosphere of the city, and residents in this valley are invigorated by bathing in its waters, unique and wonderful in their effects. This lake is about 350 miles in circumference, and picturesquely located. Analyses of the water vary in its solid ingredients from 15 to 30 per cent., according to different periods of examination. This may be accounted for by increased fresh water supply at one time, and diminished supply, rapid evaporation, etc., at another. The water is so clear that objects at a depth of 15 feet can be distinctly seen. The temperature of the water during the bathing season (from May 15th to October 15th) varies from 65° to 85° F. The novice need have no fear of going to the bottom, for the density of the water (about 1,800 grains of solid matter to the pint) renders sinking impossible and swimming a delightful exercise; while invalids too weak to indulge in this recreation can spend their time upon the beach, enjoying the sunshine and the beautiful scenery, strengthened by the refreshing breezes of the lake. Eastern cities are filled with men and women enervated by overwork and mental strain, who would be given a new lease of life by one season at the Great Salt Lake, and many consumptives have already attested its virtues and sounded its praises.

We hear of the hot springs of Arkansas and their favorable effects on the many invalids who visit them, but within the limits of this city are several hot sulphur springs of equal virtues, where one can derive all the benefits of the waters without endangering health by the depressing influences of the Arkansas climate. Numerous cases of rheumatic and neuralgic affections, gastro-hepatic, skin and syphilitic diseases, and miners suffering from metallic poisoning, resort to these springs and are benefited by their use, and at an early date it is expected that a sanitarium will be erected in the heart of the city, with all the conveniences for invalids, with baths supplied by piping water both from these springs and Salt Lake, so that all can, with little exertion or expense, derive the full benefit of the springs without inconvenience or loss of time. But the more practical may ask, what class of cases are most benefited by this climate?

I have in my possession a long list of clinical notes on cases of phthisis, etc., which have been cured by this combination of nature's remedies. Some of these histories are of unusual interest from their long and faithful but unavailing trial of other resorts; others because they are the only

survivors of large families which have succumbed to the disease. If any present are interested, I shall be glad to furnish them; but it is not my intention to embody, in an article of this character, elaborate clinical statistics, nor to attempt to classify the diseases which are benefited by a residence in Salt Lake City. I have already, in referring to the lake and springs, indicated some of these diseases, and I might add to such as have been suggested the whole list of so-called strumous affections, while others will suggest themselves to every experienced physician.

Any person taking the trouble to investigate will find that phthisical patients have been and are now being positively and permanently cured by long residence in this climate. I would emphasize the expression "long residence," for many can tell the sad story of some bright young consumptive who has been so greatly improved by a short residence of from three to six months in this climate that the cautions of his friends and physicians are disregarded and he returns to his Eastern home only to find, after a brief interval, that the dread disease is again upon him, and though he may again hasten to the mountains, he finds that it is too late. It is well known that high altitude and rarefied atmosphere accelerate the circulation and hasten tissue change, and the general inference has been that heart disease and advanced cases of lung troubles should be prohibited these climates. Assuming that this inference was correct, I have watched my cases of organic heart disease with much anxiety, and have frequently urged lower altitude. To my surprise, however, some of the most aggravated forms of valvular heart disease are improved rather than depressed by this climate, and among these are patients who have had all the advantages of low altitude resorts and are capable of judging of the relative benefit derived by residence in various altitudes.

In this connection it may be well to again call attention to the moderate altitude of this city and the opportunities for varying the elevation as may be most suitable to the individual case. I offer this suggestion for what it is worth. I do not assume the responsibility of recommending this climate for all cases of heart disease, but it is probable that many cases which do not do well in other climates will progress favorably here.

Again it is presumed that advanced stages of phthisis are not benefited by high altitudes, but the end only hastened. Certainly this is true of extreme and hopeless cases, and yet we are not without many authentic histories of relief and cure in this climate where abscess and well-marked destruction of lung tissue had been diagnosed by our most eminent Eastern physicians, and it is nothing unusual to meet now comparatively healthy and active business men who were brought here on a stretcher. It is, however, im-

portant to impress upon all physicians recommending patients to this climate the desirability of sending them early in the incipency of the disease, if the best results are to be expected. In recent years the many allurements of the Golden State have attracted so many health seekers, and the travel in that direction has been so great that, as when in olden time "all roads led to Rome," so now California is in all instances the objective point. As these people journey homeward disappointed, as a great many are, by the climate of the western coast, we are convinced that they may find in the Great Salt Lake Valley all the climatological factors so essential to the comfort and restoration of the invalid.

DR. H. B. BAKER criticised the author in that he had given only the *relative* and not the absolute humidity, and had not supported his claims with tables of sickness and death.

REPORT OF CASES OF DANGEROUS MIDDLE EAR AND MASTOID INFLAMMATIONS WHICH FOLLOWED TREATMENT OF THE NASO-PHARYNX.

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Seventeen or more years ago, when the nasal douche was in the hands of nearly every one under treatment for catarrh, inflammations of the middle ear from the unskilled use of said douche were frequently met with. Now again, since such great advancement has been made in the line of nasal surgery, we see these inflammations quite often. Many of them have fallen under my care of late, some of which are briefly reported as follows:

Case 1.—Suppurative otitis media, with total loss of the left memb. tymp., from the use of finely powdered acetate of lead in epistaxis.

This occurred in a young man aged twenty-three years, eight months before he consulted me. He stated that everything had failed to arrest the bleeding until his physician applied the lead, which had the desired effect very quickly, but that it started a violent pain in a few hours, which finally caused perforation and destruction of the drum-head and a discharge ever since, and terribly impaired hearing, which condition still existed at the date of my examination.

Case 2.—Otitis media, with extension to mastoid process, following the application of a strong solution of nitrate of silver to the nares. Wild's incision. Apparent recovery. Death.

This happened in a young man aged eighteen,

who had been under treatment by his physician for catarrh for some time. Like the former case, after the use of the silver the ear soon became violently inflamed, was treated, became better and worse, and was finally sent to me for treatment. I found the tissues swollen behind the ear, and immediately cut down to the bone and evacuated a large quantity of pus. He soon became much better and returned home in one week, but took a relapse in a short time and died of meningitis, as I subsequently learned. No post-mortem examination.

Case 3.—Otitis media, following the application of caustics to the nasal mucus membrane. Puncture of the drum-head; recovery.

This was in a man sixty years old who was under the care of an eminent specialist of an adjoining state. He suffered very much for weeks but recovered his hearing.

Case 4.—Suppurative otitis media of five years duration, following local applications to the nares. Loss of left drum-head, polypoid growths, caries, death.

A young lady, aged twenty, who had been in the hands of an excellent surgeon in another city. He had first treated her nose, then her ear, had removed a polypus, but still there was an offensive discharge, for which she consulted me. I saw a polypus in the middle ear, but as she could not then remain for treatment, gave her a weak solution of bichloride of mercury ($\frac{1}{4}$ grain to the ounce,) to use once or twice a day until she could return for treatment. She came back in three months, when no sign of a polypus was seen. (This is by no means unusual after the use of bichloride of mercury.)

The dry boracic acid treatment was begun, but it had no effect in stopping the discharge; other applications were made with like results. Carious bone was felt with the probe, which we intended to remove, but as she was called home suddenly owing to the death of an intimate friend, a simple antiseptic wash was given her until she could return, but she died in a very few days from what her physician pronounced to be meningitis.

Case 5.—Suppurative otitis media, with total loss of the right drum-head, with greatly impaired hearing following the surgical treatment of the naso-pharynx.

This was a very painful and protracted case from an adjoining State, which had also been in very skilled hands. He had had some nasal hypertrophies removed when a violent inflammation of the ear was set up, was treated for it for some time by the operator, and subsequently by one who made a specialty of the ear, but having a slight cessation of pain he visited relatives in Indianapolis and called on me. I found great tenderness all around the ear, though there was profuse suppuration. He was twice leeches very