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[COMPLIMENTS OF THE AUTHOR.]

NEW MEXICO :

ITS CLIMATIC ADVANTAGES FOR
CONSUMPTIVES.

BY

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NEW MEXICO:
ITS CLIMATIC ADVANTAGES FOR CONSUMP-
TIVES.

BY J. HILGARD TYNDALE, M. D., NEW YORK.

WHEN we wish to obtain knowledge in reference to the climate of any section of our country, the meteorological reports of the United States Signal Service are our chief source of information. They are accurate, and are cheerfully and quickly furnished. Meteorological data represent the ever-shifting phenomena in the sea of air surrounding our globe. The "climate" of any region is the embodiment of some stable elements with the above changes superadded, in which embodiment regional geography and local conformation play a prominent part. For this reason it is well to visit and inspect in person the territory, the climate of which it is desired to investigate. Hence my recent trip to New Mexico.

Personal observations with regard to climate include the use of your own powers of observation, the finding of meteorological data kept by physicians or some scientifically inclined individuals, and personal interviews with them. If my material is somewhat scanty, it is because in previous observations I have had to deal with a region of advanced civilization, whereas in New Mexico everything may be said to be new, notwithstanding the evidences of civilization of by-gone ages.

In determining whether and how far the climate of any locality or region of country is suitable for consumptives in the earlier stages, we look for certain elements which reason and experience have shown to exert in combination a beneficial influence upon the

general condition and upon the destructive process going on in the lungs of a patient. In my opinion the great desideratum for an ideal climate is an *aseptic atmosphere with considerable altitude for some, and little elevation or sea-level for the other forms of pulmonary consumption.*¹

AN ASEPTIC ATMOSPHERE.

Germ pathology is now sufficiently far advanced to justify us in accepting the fact of germs (bacteria) being the "ferment of contagion," the organisms which usher in putrefaction in phthisis (I am not satisfied of the specific character of the tubercle bacillus), to cause us to reflect upon the importance of excluding further invasions from without, and to check proliferation within, if not to destroy the already existing breed, and lastly to reason from the premises of the known facts, that lowlands with warmth and moisture are the breeding grounds of septic organisms. Now a truly aseptic atmosphere should not be steadfastly warm or hot, nor loaded with moisture, as the result of evaporation from large bodies of water on the one hand, while the geological substratum of a chosen locality should not admit of subsoil moisture on the other. The importance of subsoil moisture in the development of pulmonary consumption was urged by Dr. Bowditch, of Boston, as early as 1862.²

The elements of meteorological changes concerning us are humidity, degrees of temperature as to means and equability (diurnal and annual range), barometric pressure, the movements of the air ocean (frequency and velocity of winds), the rainfall, and intensity of sunlight. More or less frequent electric

¹ A series of articles giving the opinion of the most prominent pneumatologists of our country on the elements going to make up a suitable climate for consumptives will appear shortly.

² Topographical Distribution and Local Origin of Consumption in Massachusetts. By H. I. Bowditch, M. D., of Boston. (Medical Communications of the Massachusetts Medical Society, vol. x., No. 2, 1862.)

changes, not too frequent winds, and occasional rainfall, are not disturbing factors in the benefit to be gained by consumptives. On the other hand rapid and frequent thermometric changes, a lack of stability of temperature; winds of great velocity and some persistence; and a high relative humidity of some duration — these three elements, when combined for a number of days in any region, are known to be the fruitful source of severe colds, of acute inflammation of the air passages.¹

Seibert proves from six hundred cases that "if a strong wind accompanies a high, or a rising, or a long-lasting high percentage of humidity, together with an already low or then falling thermometer, then the frequency of pneumonia will be found to be astonishing."

The qualities necessary, then, to constitute an aseptic climate, one which yields no breeding ground for infection, and where the meteorological conditions do not favor acute exacerbations of pulmonary troubles, includes the contrary of the above conditions, namely: —

- (1.) Dryness, absence of persistent humidity.
- (2.) A cool or moderately warm atmosphere, with a reasonable equability of temperature.
- (3.) Shelter from or absence of frequent winds of great velocity.
- (4.) A preponderance of clear days over the cloudy ones — in other words, abundance of sunshine, as a natural accompaniment of the other constituents.

ALTITUDE.

Elevation above the sea level may be spoken of as low, medium, and high altitude, ranging say from 1500 to 6000 feet. The latter may be considered as the "line of immunity" in our latitudes. The proper altitude for any given patient should be chiefly determined by the condition of his heart's action. Feeble

¹ Seibert on Meteorology and Croupous Pneumonia, in American Journal Medical Sciences, January, 1882.

impulse and rapid action, to begin with a low or moderate altitude (1000 to 2000); moderately weak impulse and rapidity of action, somewhat above normal, to medium altitudes (2500 to 4000 feet); no great variation from normal impulse and action, to high altitudes (4500 feet and over).

With increasing elevation the pressure of the air column is diminished; equably lessened barometric pressure is indicative of a relatively low degree of humidity, and accords with relative dryness found at high altitude.

Of ozone we need not speak here. Its importance and action upon the human organism are undergoing investigation.¹

Now let us see whether these requirements (which for the want of space I have given only in abstract) are found in New Mexico, and if so, to what extent.

The physical aspect of New Mexico may be briefly summed up as follows: The "Spanish Range" of the Rocky Mountains enters the Territory from the north, and, spreading out into spurs, like the spread fingers of a hand, gives rise to numerous valleys between each spur. The rest of the country is a broad expanse of rolling meadow land, at an elevation varying from 7000 to 6000 feet, sloping off toward the south, and decreasing in elevation down to 3000 feet above sea level. Away from the general range, mountains, valleys, and plains are more or less abruptly intermingled. In the words of Dr. Bizzell, "Rapid transition and great diversity of elevation, containing within its border deep valleys, gorges, and cañons, associated with mountains and elevated and more or less arid plains."

The soil is, of course, a porous one, as is the case throughout the Rocky Mountain region.

Water courses are few and far between. Such creeks as there are, all have their fountain-heads in the regions of eternal snow. The water is clear and sup-

¹ See *Ozone in Relation to Health and Disease*. By Henry Day, M. D. (London.)

posedly chemically pure, being largely melted snow. Temperature of mountain-stream water about 58° F.

Vegetation is as sparse as it is in Northern Colorado, notwithstanding the more southern latitude. The pine growths of the mountains and mountain plateaux are not sufficiently dense to impregnate the air with terebinthine odors, and thus to be considered as a direct antiseptic agent for continuous inhalation.

In considering in how far we find the elements which we accept as constituting a suitable climate for a majority of consumptives we will begin with

ELEVATION.

Every degree of altitude is represented, from 3000 feet to 8000 feet and over. As 6000 feet represents our "line of immunity," we have use only for altitudes from 1500 feet to 6000 feet. The Atchison, Topeka, and Santa Fé Railroad traverses the Territory from north to south. Along its line have grown up the principal towns and settlements, representing all the above elevations. Traveling through Kansas on the same road it became clear to my mind that coming from the East through that State, and passing through New Mexico from north to south, an invalid is enabled to make a slow journey, beginning at a comparatively low altitude in Kansas, and traveling westward, to gradually ascend, until an elevation of from 6000 to 7000 feet is reached. This may be accomplished without deviating from a straight course westward, and yet to stop at towns of such size as to afford the necessary comforts of life, good food, society, medical attendance, and other things pertaining to civilization. To illustrate this I will give the names of such places, together with their elevations, from east to west on the railroad:—

In Kansas: Topeka, 904 feet; Emporia, 1161 feet; Newton, 1433 feet; Larned, 2015 feet; Kinsley, 2207 feet; Dodge City, 2499 feet; Lakin, 3020 feet.

In Colorado: Las Animas, 3959 feet; La Junta, 4117 feet; Trinidad, 6034 feet.

In New Mexico: Las Vegas, 6452 feet; Santa Fé, 7013 feet.

Beginning in the south, at the junction of the Territory of New Mexico with Old Mexico and the State of Texas, the figures run upwards toward the north to Raton, near the Colorado line, as follows:—

El Paso, 3662 feet; La Mesilla, 3844 feet; Socorro, 4665 feet; Silver City, 5890 feet (not reached by rail); Albuquerque, 5006 feet; Las Vegas, 6452 feet; Raton, 7861 feet.

Our next question relates to the aseptic qualities of the atmosphere, and the elements which render it so at these several elevations.

DRYNESS.

The low relative humidity of the elevated regions of New Mexico are primarily due to far inland position, a fact dwelt upon by Dr. Charles Denison in his work "Health Resorts in the Rocky Mountains," and previous papers. The great distance from the Atlantic and Pacific Oceans, as well as the Gulf of Mexico, would preclude any great quantity of moisture from these great sources; and such as it might be, is still further diminished and diluted as it ascends and spreads into space. The other source of more or less constant humidity, subsoil moisture, is naturally absent at such elevation, where the soil is a porous one. Of the rain and snowfall, the tables of the Signal Service as given at their three stations, Santa Fé, La Mesilla, and Silver City, will give information:—

LA MESILLA.

Altitude, 3844 feet; latitude, $32^{\circ} 17'$; longitude, $106^{\circ} 48'$; mean annual barometer, 26.070.

Mean relative humidity from September, 1877, to August, 1882:—

Average mean of five years: 43 per cent. saturation.

Average mean for each month of the year:—

January	51%	July	49%
February	45%	August	50%
March	35%	September	47%
April	31%	October	48%
May	29%	November	45%
June	31%	December	51%

Minimum percentage (greatest dryness) 22.5, May, 1879.

Maximum percentage (highest degree of saturation) 64.5, January, 1879.

SILVER CITY.

Altitude, 5890 feet; latitude, 32° 48'; longitude, 108° 15'.

Mean relative humidity from May, 1878, to December, 1882:—

Average mean of four years: 43 per cent. saturation.

Average mean of each month of the year:—

January	58%	July	52%
February	54%	August	61%
March	42%	September	55%
April	34%	October	54%
May	33%	November	53%
June	34%	December	49%

Minimum percentage (greatest dryness) 18.8, June, 1878.

Maximum percentage (highest degree of saturation) 67.8, August, 1881.

SANTA FE.

Altitude, 7013 feet; latitude, 35° 41'; longitude, 106° 10'; mean annual barometer, 23.262.

Mean relative humidity from January, 1872, to December, 1882:—

Average mean of ten years: 45 per cent. saturation.

Average mean of each month of the year:—

January	52%	July	46%
February	54%	August	51%
March	42%	September	43%
April	35%	October	42%
May	28%	November	49%
June	30%	December	55%

Minimum percentage (greatest dryness), 20.0, May, 1873.

Maximum percentage (highest degree of saturation), 71.4, August, 1876.

The most noteworthy fact in connection with the above showing is the very low mean relative humidity in three places, representing the southern, southwestern, and northern portions of the territory. The higher percentages of humidity, occurring in the summer months of July and August, as also in the winter months of December, January, and February, are in accord with the rain and snowfall. On some parts of the coast of California the rainfall is out of all proportion to relative humidity and its percentage, a fact which makes dryness a very doubtful constituent.

Precipitation. Annual Amount (in inches and hundredths).

LA MESILLA.

1878	1879	1880	1881
8.07	7.30	7.10	15.05

SANTA FE.

1873	1874	1875	1876	1877	1878	1879	1880
9.73	19.93	18.97	15.97	13.15	19.52	11.44	9.89

SILVER CITY.

1879	1880	1881
13.77	16.90	30.82

At Fort Union the total rain and snowfall for the year 1881 amounted to 39.48 inches.

In comparing the dryness of these several localities it will be observed that the Mesilla Valley carries off the palm, both as regards relative humidity and precipitation; none of the monthly averages of five years show more than a trifle above half saturation (50 per cent.), while as low an average as 29 per cent. is

reached, and in one month 18 per cent., a degree of dryness rarely attained. As proof of this I reproduce the mean relative humidity of various sections of our country:—

New England States, 73 per cent.; Middle Atlantic States, 74 per cent.; South Atlantic States, 79 per cent.; Gulf States, 82 per cent.; Lower Lake Region, 79 per cent.; Upper Lake Region, 70 per cent.; Ohio Valley, Tennessee, and the Northwest, 73 per cent.; Lower Mississippi Valley, 58 per cent.; Denver, Colorado, 42 per cent.

By far the heaviest rainfalls occur in the months of July and August. While there is scarcely any rain during the other months, the rains of midsummer resemble deluges in their character. Very little snow falls except on the highest mountain ranges, from whence it drifts in small part into the valleys and the towns located therein.

Closely allied to the subject of dryness is that of *sunshine*. Of this there is an abundance in New Mexico, the number of perfectly clear days far outnumbering the overcast, cloudy, and rainy ones taken together. I regret that, aside from the reports appended, no records have been kept anywhere of the number of clear days in any one year. The only private data I could stir up were in possession of parties at Las Vegas Hot Springs, and these, I have reason to believe, were not reliable.

Number of Clear, Fair, and Cloudy Days.

LA MESILLA.

Year.	Clear.	Fair.	Cloudy.
1878	238	93	34
1879	252	81	30
1880	191	135	40
1881	161	157	47

SANTA FE.

Year.	Clear.	Fair.	Cloudy.
1877	140	158	51
1878	160	169	36
1879	169	152	33
1880	184	137	45
1882	188	128	39

The year 1881 is omitted, as the report was incomplete.

SILVER CITY.

Year.	Clear.	Fair.	Cloudy.
1879	246	87	34
1880	230	104	32
1881	222	109	32

Average Number of Clear Days in the Summer Months (April to October) and the Winter Months (October to April).

Locality.	Summer.	Winter.	Yearly Average.
La Mesilla.	140	115	255
Santa Fé.	87	104	191
Silver City.	112	122	234

A residence of nearly two years in Colorado justifies me in saying that on "fair" days the sun shines during a goodly portion, if not the greater part of the day. This fact enables me to state that the sun shines during a number of hours almost every day in the year and quite certainly in this proportion:—

La Mesilla, 325 to 333 days ; Santa Fé, 298 to 326 days ; Silver City, 330 to 335 days.

In the first two above-named places there were no cloudy days for the three consecutive months of June, July, and August, 1879 (a very dry year). At Silver City the *number of cloudy days* for each month in two consecutive years is worth recording : —

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1880	1	3	0	2	0	0	12	5	3	0	1	5
1881	0	2	0	2	3	2	8	6	4	1	3	2

The next question to interest us is that of

TEMPERATURE.

Points of importance are the mean temperature of months and seasons of the year, showing the *warmth, coolness or coldness* of the atmosphere in degrees, and the diurnal and annual ranges of temperature (the daily fluctuation, together with the number of degrees the thermometer runs over during a year) showing what we have to expect of the *equability of the temperature* : —

Monthly Means of Temperature. (Average Thermometrical Reading for each Month.)

LA MESILLA (FIVE YEARS).

January	41.1°	July.....	79.6°
February.....	46.5	August	76.5
March.....	53.5	September.....	69.5
April.....	59.8	October.....	63.7
May.....	69.2	November.....	45.6
June.....	77.3	December.....	44.4

SANTA FE (TEN YEARS).

January	28.2°	July	68.0°
February	31.7	August	65.9
March	39.1	September	62.5
April	45.5	October	49.8
May	56.0	November	36.9
June	65.4	December	28.1

SILVER CITY (FOUR YEARS).

January	37.2°	July	71.6°
February	41.0	August	68.5
March	47.2	September	63.5
April	48.5	October	56.6
May	61.7	November	39.6
June	70.3	December	39.3

FORT UNION (TWO YEARS). ELEVATION, 6700 FEET.

January	29.5°	July	72.5°
February	36.9	August	69.8
March	43.6	September	62.2
April	52.0	October	52.3
May	50.5	November	39.3
June	71.3	December	37.2

In all of the above four localities, representing the southern, northern, southwestern, and northeastern parts of the Territory respectively, we find the coldest weather to occur in the month of January. Then there is a constant upward tendency, until in July the highest readings of the thermometer occur; after which there is an equally steady decline to the end of the year

Mean Annual Temperature.

Yearly average temperature, as the result of observation of a number of years:—

La Mesilla, five years, 3844 feet above sea level, 60.6°. Silver City, two years, 5890 feet above sea level, 53.7°. Santa Fé, ten years, 7013 feet above sea level, 48.7°. Fort Union, two years, 6700 feet above sea level, 49.8°.

The extent of fluctuation of temperature, to show what sort of equability we are dealing with, is illus-

trated by the range in each month for one year (1879 to 1880), and by the annual range (difference between hottest and coldest day of that year): —

Monthly Range.

LA MESILLA (SOUTHERN PORTION).

July.....	52°	January.....	53°
August.....	53	February.....	57
September.....	63	March.....	57
October.....	59	April.....	57
November.....	62	May.....	55
December.....	57	June.....	51

SILVER CITY (SOUTHWESTERN PORTION).

July.....	39°	January.....	54°
August.....	42	February.....	—
September.....	47	March.....	—
October.....	44	April.....	54
November.....	53	May.....	61
December.....	51	June.....	55

During part of February and March the minimum thermometer was unserviceable.

SOCORRO (CENTRAL PORTION).

July ¹	40°	January.....	50°
August.....	40	February.....	60
September.....	47	March.....	60
October.....	46	April.....	51
November.....	49	May.....	51
December.....	58	June.....	52

SANTA FE (NORTHERN PORTION).

July.....	48°	January.....	57°
August.....	48	February.....	54
September.....	48	March.....	63
October.....	46	April.....	51
November.....	46	May.....	56
December.....	66	June.....	54

¹ Observer absent on repair duty.

FORT UNION (NORTHEASTERN PORTION) FOR THE YEAR 1881.

January	87°	July.....	51°
February.....	88	August.....	44
March.....	71	September.....	59
April.....	70	October.....	61
May.....	48	November.....	63
June.....	49	December.....	70

What is accomplished by the thermometer in running over the degrees of Fahrenheit during a year will now be shown by the

Annual Range.

Station.	Elevation.	Maximum.	Minimum.	Annual Range.
La Mesilla.	3844	104°	17°	87°
Silver City.	5890	91	13	78
Socorro.	4665	95	6	89
Santa Fé.	7013	95	-13	108
Fort Union.	6700	96	-25	121

These figures serve to illustrate the worst feature of the climate of New Mexico, as indeed of the whole Rocky Mountain region, namely, a lack of *reasonable equability of temperature*.

To give an illustration of what we shall call an equable climate, I append the monthly and annual ranges, together with the mean temperature for one year (1879 to 1880), of a locality where equability abounds, but, as usual, in the company of a high degree of humidity:—

Key West, Florida.

MONTHLY RANGE.

July.....	19°	January.....	18°
August.....	19	February.....	19
September.....	18	March.....	24
October.....	15	April.....	24
November.....	24	May.....	20
December.....	15	June.....	22

Annual range, 30° (maximum, 94°, minimum, 64°).

MONTHLY MEAN.

July.....	84.4°	January.....	73.1°
August.....	84.7	February.....	73.1
September.....	82.5	March.....	76.3
October.....	79.8	April.....	76.8
November.....	74.0	May.....	79.1
December.....	74.2	June.....	83.4

Annual mean relative humidity, 74.4%

Equability of temperature is, of course, not found with altitude and dryness in New Mexico, and this fact makes it an undesirable climate for those cases of consumption in whom *general sensitiveness and irritability of the mucous membranes and the skin* is a prominent symptom. This state of hypersensitiveness is not affected by the ruling degree of temperature (the means), but by sudden and ungraded fluctuations. Neither is the "irritable heart" of such persons suited to high altitude, as it cannot be readily disciplined into normal action.

But* for all cases of slowly progressive destruction and infiltration there can be no question that as dryness and equability are not found together in the temperate zone, dryness is the *absolute requirement*, and equability of temperature a secondary consideration.

A perhaps still worse element of temperature, which is an invariable accompaniment of dryness, is the *diurnal range*, the fluctuation of the thermometer within twenty-four hours, as we find it in the Rocky Mountain region or anywhere where the radiation of heat from the earth after sundown is not intercepted by the "moisture blanket." I select three stations at different latitudes in the Territory and do not give the mean of the daily changes in each month, but simply seize at random upon the first day of each month (1879 to 1880), by which the facts will be amply shown: —

LA MESILLA. LATITUDE 32° 17'.

1879		1880	
July.....	49°	January.....	21°
August.....	35	February.....	21
September.....	46	March.....	43
October.....	36	April.....	35
November.....	39	May.....	32
December.....	44	June.....	33

SÓCORRO. LATITUDE 34° 5'.

July.....	28°	January.....	13°
August.....	18	February.....	16
September.....	33	March.....	34
October.....	24	April.....	30
November.....	18	May.....	28
December.....	33	June.....	34

SANTA FE. LATITUDE 35° 41'.

July.....	40°	January.....	28°
August.....	32	February.....	14
September.....	32	March.....	41
October.....	22	April.....	34
November.....	23	May.....	25
December.....	34	June.....	40

The diurnal ranges are all the way from 15° to 50° F. In the Signal Service the daily readings are taken at seven A. M., two P. M., and nine P. M. There are two reasons why this great daily fluctuation should not be considered quite so much of an evil factor. One reason is, that this variation is largely due to the sudden evaporation at nightfall, and is increased at night time; a time when patients should be in-doors, after spending the day in the open air. Another reason is, that changes at dry, elevated stations may be thermometrically great, but still convey only the sensation of comfort.

WINDS.

Neither theory nor the teachings of experience justify the belief that more or less frequent movements of the atmospheric ocean have a harmful effect upon con-

sumptives. On the contrary, these movements are necessary for changing the air surrounding us, which in stagnation becomes charged with deleterious matter. Rain absorbs and precipitates these admixtures, while atmospheric motion scatters them. Great velocity of wind and persistency may and do prove harmful by the increased rapidity with which the warmth of the body is being continually carried off; an infliction under which the average consumptive gets chilled and fails to react, giving rise to internal congestions.

At high altitudes, and in the absence of high shelter, winds of great frequency and long duration are plentiful. Most towns in New Mexico are built along the line of railroads, and as these roads mostly run parallel to mountain ranges, the majority are visited by frequent and persistent winds, which are a source of great discomfort and irritation to the consumptive; more especially so when accompanied by *dust*. The only remedy for this nuisance lies in selecting such spots as are located in a nook or corner of the mountains, protected on several sides by high hills. In other words, protection against winds is to be found in *local shelter* only.

In the matter of local shelter, Santa Fé, Socorro, Silver City, Las Vegas Hot Springs (not the town), and Raton, are favored spots.

In the following tables will be found the *direction of the most prevalent winds*, as also the *number of times* they were observed to blow during the year from their respective points of the compass:—

LA MESILLA.

	N.	NE.	E.	SE.	S.	SW.	W.	NW.
1880	42	9	28	106	89	66	153	41
1881	77	19	15	121	88	76	90	71

West and southeast winds the most frequent.

SANTA FE.

	N.	NE.	E.	SE.	S.	SW.	W.	NW.
1880	100	109	105	80	53	201	43	183
1881	137		134	140	68	157	41	115

Southwest winds the most frequent. Northwest next.

FORT UNION.

	N.	NE.	E.	SE.	S.	SW.	W.	NW.
1881	175	103	83	49	191	197	153	144

Southwest winds the most frequent. Cold north winds in winter. - West and northwest winds next in frequency.

SILVER CITY.

	N.	NE.	E.	SE.	S.	SW.	W.	NW.
1880	53	29	27	72	84	117	181	241
1881	109	7	4	53	138	91	116	262

Northwest winds by far the most frequent.

Having reviewed the physical aspect and the climatic advantages and disadvantages, a word or two with reference to the quality of food, social advantages, and medical attendance.

Since the advent of railroads food is abundant and of reasonably good quality at most hotels. Cattle are plenty. Vegetables and fruit are very sparingly raised, except in Southern New Mexico, where fine grapes grow in the Mesilla Valley, from which a wretched wine is manufactured. Prices at hotels and boarding-houses are reasonable.

In all the towns one will find very excellent society (organized, if I may so call it), composed of as hospitable people as you would meet anywhere. The presence of the lower class of Spaniards, with their filthy habits and unseemly adobe houses, is not particularly cheering. Yet to my mind there was something picturesque in their whole surroundings, as well as those of the Pueblo Indians, the descendants of the Aztecs.

The medical profession is well represented throughout, and the colleagues are well up to the times, energetic practitioners, and most diligent readers and students.

In New Mexico we do not find that variety and grandeur of scenery which distinguishes Colorado. It is of a more subdued order. Yet there are many quaint and charming spots.

A few remarks about individual places : —

RATON,

near the Colorado line, and the first station reached after passing through a long tunnel, is beautifully located and sheltered by high hills clad with a tolerably heavy pine growth. Dr. J. J. Schuler, who is practicing there, has just commenced to keep meteorological records.

LAS VEGAS

has 8000 inhabitants, and is the business centre of the Territory. The chief attraction are the Hot Springs, with their improvements in the way of hotels and the bath-house. The springs are about forty in number, but only a few are utilized. My interest in the springs confined itself to the *alkaline muriates*, known to be of benefit to consumptives by improving digestion and assisting assimilation. The analysis of these, as determined by Professor Hayden, is as follows, in what is called Spring No. 3 : —

Sodium carbonate, 5.00. Calcium carbonate, and magnesium carbonate, 11.43. Sodium sulphate, 16.21. Sodium chloride, 27.34. Silicic acid, 2.51.

Traces of bromine, iodine, and lithium.

Temperature 123° F.

Private meteorological data stated that there had been no rain during the entire winter of 1881-82, and only a few inches of snow, which all passed off in three days or less. The kettle formed by the mountains is open only to the northwest and southeast, the openings of a cañon through which flows a clear stream dignified by the name of Rio Gallinas.

My thanks are due to Drs. C. C. Gordon and W. R. Tipton for much kindness, assistance, and hospitality.

SANTA FÉ.

is the oldest city in the United States, being 333 (one third of a thousand) years old. It has a foreign appearance in every particular, and everything in and about it makes you imagine yourself in Spain. The location of the city is such as to be sheltered from harsh winds, the situation being one of considerable slopes at the foot of a high mountain. Santa Fé is the capital of the Territory, and has, like most Mexican cities, a plaza in its centre, and many very beautiful gardens, also a very well-conducted hospital.

LA MESILLA,

one of several towns in the Mesilla Valley, a stretch of land in Southern New Mexico, about one mile wide in its northern portion, and spreading out to six miles in its southern. Taking our sensations and not the monthly range for a standard, the air is mild, with a bright sunshine nearly every day in the year. Vegetation does not decay, neither does meat; they undergo shrinkage and dry up to the extent of mummification in dead animals. In the absence of the congregation of many individuals in one locality we have here some of the true aseptic qualities, from the presence of which we may reasonably hope for repair of ulcerated tissue after a "line of demarcation" would be set up for the destructive process, and the healing process aided by water abstraction and shrinkage.

This valley presents to the invalid the advantages of a very moderate altitude, varying from 4000 feet near the Rio Grande to about 7000 feet in the high ranges of the Guadalupe and other mountains. The protection of the valley from sharp winds is chiefly to the north.

In a letter to Dr. W. D. Bizzell, of Mobile, Ala.,¹ Dr. O. H. Woodworth writes from Mesilla, "Our climate is very dry, mild, and equable; no dew falls; the rainfall is only about eight inches yearly. The elevation of the Rio Grande Valley at this place is about 4000 feet above sea level. Our winters are very mild and pleasant; of course we have a few cold snaps occasionally, but not disagreeably so. Snow seldom falls in the Rio Grande Valley, which is bordered by mountains, and when it does it melts as fast as it falls, never remaining on the ground more than an hour or so. Our summers are cool and pleasant; the sultry, suffocating "heated terms" of the States are unknown. A person can sleep out-of-doors (owing to the absence of dew) the year round, except in rainy weather, of which we have comparatively very little."

Other places have been mentioned when speaking of elevation. Of course the benefits of the climate are not confined to the towns, but, on the contrary, it is my belief that in the as yet uninhabited country in the northwestern part of New Mexico and the adjoining portions of Arizona, as well as the Mesilla Valley in general, together with other valleys in Southern and Southwestern New Mexico, will be found choice spots, where *proper altitude is coupled to local shelter.*

SILVER CITY

is a new town, located some distance off the railroad, in the southern part of the Territory (Grant County). From this place Dr. Lewis Kennon, an ex-army surgeon, writes me as follows: "There is rarely a day

¹ Climate of the United States considered with Reference to Pneumonia and Consumption. By W. D. Bizzell M. D. 1875

in the year that an invalid cannot take exercise in the open air. I do not think there were three such days in the past winter.

"Diseases of the heart, either with or without valvular disease, do badly here. *All* diseases of the breathing apparatus do well, I can almost say without exception. Bronchial trouble is marvelously benefited almost from the first. The most miraculous changes for the better are produced in broken-down systems from overwork or dissipation, all forms of neurasthenia, and that state of debauch you Eastern folks see so much of. . . . We have every range of temperature, but dry in all and everywhere. Some authors speak of an ideal climate. This is very near the thing, for phthisis, here in Grant County."

In endeavoring to determine the suitability of the climate of New Mexico as a whole for a great proportion of patients suffering from the various forms of pulmonary consumption, we must compare the actual find to the ideal standard set up at the beginning of this paper on the one hand; on the other, look to practical results actually attained.

Elevation is present all the way from moderate altitude to the supposed "line of immunity," and higher still.

Dryness — a mean relative humidity of low percentage — forms the leading feature of climatic advantages. According to Vivenot's classification¹ the following range of degrees of moisture may be set down as representing so many varieties of dryness: —

Dry, below and up to 55%.

Moderately dry, 56 to 70 %.

Moderately moist (or moist), 71 to 85%.

Excessively moist, 86 to 100%.

Referring back to our tables it will be seen that the climate is a very dry one.

The possibility of a full and unobstructed sun bath

¹ Rudolph v. Vivenot, Ueber die Messung der Luftfeuchtigkeit, Schmidt's Jahrbucher, Band 132, p. 248.

is given in the number of perfectly clear days, which gives us not only length of time, but, with such diathermancy of the atmosphere as exists in those regions, great intensity of sunlight.

Equability of temperature, of course, does not exist at considerable elevations in the temperate zone. The great monthly and annual ranges of temperature at the various stations mentioned, together with the great and sudden daily fluctuations, show no approach to anything like reasonable equability of temperature. After a time, when meteorological records shall have been kept for several years at a number of places in the Territory, we would do well to select for our patients, in addition to the appropriate altitude, those localities wherein we find the nearest *approach to an equable temperature*, and the most perfect *local shelter from winds*.

In lieu of any further general observations I quote from the publication prepared for the railroad companies:—

“The statistics of the United States Army Reports demonstrate the important fact that New Mexico has the lowest ratio of respiratory diseases to be found in the country, the cases being 1.3 per thousand, while in various other localities the proportion ranges from 2.3 to 6.9.

“A very striking evidence of the curative character of this wonderful climate is found in the army records of the time of the Rebellion. Among the troops originally sent to New Mexico, in 1861, there were some 350 cases of catarrh. At the expiration of a year no cases were reported, and all who had the disease and remained in the country were cured. Dr. Symington said ‘that in a residence of eight years in New Mexico he had seen but two cases of phthisis among the natives.’”

Of the advisability of remaining in one locality the year round I would say that a change in summer and winter is desirable. The more elevated positions in

the mountains afford a retreat from the summer heat (especially in July and August) of the southern latitudes, while numerous little sheltered valleys and cañons afford protection from the sudden storms of winter. All these changes may be found within comparatively short distances, and in this manner many consumptives may continue to "live within the bounds of restricted vitality."

